

# Human Activity Detection

October 15, 2018

## 1 Human Activity Recognition

This project is to build a model that predicts the human activities such as Walking, Walking\_Upstairs, Walking\_Downstairs, Sitting, Standing or Laying.

This dataset is collected from 30 persons(referred as subjects in this dataset), performing different activities with a smartphone to their waists. The data is recorded with the help of sensors (accelerometer and Gyroscope) in that smartphone. This experiment was video recorded to label the data manually.

### 1.1 How data was recorded

By using the sensors(Gyroscope and accelerometer) in a smartphone, they have captured '3-axial linear acceleration'( $tAcc-XYZ$ ) from accelerometer and '3-axial angular velocity' ( $tGyro-XYZ$ ) from Gyroscope with several variations.

prefix 't' in those metrics denotes time.

suffix 'XYZ' represents 3-axial signals in X , Y, and Z directions.

#### 1.1.1 Feature names

1. These sensor signals are preprocessed by applying noise filters and then sampled in fixed-width windows(sliding windows) of 2.56 seconds each with 50% overlap. ie., each window has 128 readings.
2. From Each window, a feature vector was obtained by calculating variables from the time and frequency domain. > In our dataset, each datapoint represents a window with different readings
3. The acceleration signal was separated into Body and Gravity acceleration signals( $tBodyAcc-XYZ$  and  $tGravityAcc-XYZ$ ) using some low pass filter with corner frequency of 0.3Hz.
4. After that, the body linear acceleration and angular velocity were derived in time to obtain *jerk signals* ( $tBodyAccJerk-XYZ$  and  $tBodyGyroJerk-XYZ$ ).
5. The magnitude of these 3-dimensional signals were calculated using the Euclidian norm. This magnitudes are represented as features with names like  $tBodyAccMag$ ,  $tGravityAccMag$ ,  $tBodyAccJerkMag$ ,  $tBodyGyroMag$  and  $tBodyGyroJerkMag$ .

6. Finally, We've got frequency domain signals from some of the available signals by applying a FFT (Fast Fourier Transform). These signals obtained were labeled with *prefix 'f'* just like original signals with *prefix 't'*. These signals are labeled as *fBodyAcc-XYZ*, *fBodyGyroMag* etc.,.
7. These are the signals that we got so far.
  - tBodyAcc-XYZ
  - tGravityAcc-XYZ
  - tBodyAccJerk-XYZ
  - tBodyGyro-XYZ
  - tBodyGyroJerk-XYZ
  - tBodyAccMag
  - tGravityAccMag
  - tBodyAccJerkMag
  - tBodyGyroMag
  - tBodyGyroJerkMag
  - fBodyAcc-XYZ
  - fBodyAccJerk-XYZ
  - fBodyGyro-XYZ
  - fBodyAccMag
  - fBodyAccJerkMag
  - fBodyGyroMag
  - fBodyGyroJerkMag
8. We can estimate some set of variables from the above signals. ie., We will estimate the following properties on each and every signal that we recorded so far.
  - *mean()*: Mean value
  - *std()*: Standard deviation
  - *mad()*: Median absolute deviation
  - *max()*: Largest value in array
  - *min()*: Smallest value in array
  - *sma()*: Signal magnitude area
  - *energy()*: Energy measure. Sum of the squares divided by the number of values.
  - *iqr()*: Interquartile range
  - *entropy()*: Signal entropy
  - *arCoeff()*: Autorregresion coefficients with Burg order equal to 4
  - *correlation()*: correlation coefficient between two signals
  - *maxInds()*: index of the frequency component with largest magnitude
  - *meanFreq()*: Weighted average of the frequency components to obtain a mean frequency
  - *skewness()*: skewness of the frequency domain signal
  - *kurtosis()*: kurtosis of the frequency domain signal
  - *bandsEnergy()*: Energy of a frequency interval within the 64 bins of the FFT of each window.
  - *angle()*: Angle between two vectors.

9. We can obtain some other vectors by taking the average of signals in a single window sample. These are used on the angle() variable'

- gravityMean
- tBodyAccMean
- tBodyAccJerkMean
- tBodyGyroMean
- tBodyGyroJerkMean

### 1.1.2 Y\_Labels(Encoded)

- In the dataset, Y\_labels are represented as numbers from 1 to 6 as their identifiers.
  - WALKING as 1
  - WALKING\_UPSTAIRS as 2
  - WALKING\_DOWNSTAIRS as 3
  - SITTING as 4
  - STANDING as 5
  - LAYING as 6

## 1.2 Train and test data were saperated

- The readings from 70% of the volunteers were taken as *trianing data* and remaining 30% subjects recordings were taken for *test data*

## 1.3 Data

- All the data is present in 'UCI\_HAR\_dataset/' folder in present working directory.
  - Feature names are present in 'UCI\_HAR\_dataset/features.txt'
  - *Train Data*
    - \* 'UCI\_HAR\_dataset/train/X\_train.txt'
    - \* 'UCI\_HAR\_dataset/train/subject\_train.txt'
    - \* 'UCI\_HAR\_dataset/train/y\_train.txt'
  - *Test Data*
    - \* 'UCI\_HAR\_dataset/test/X\_test.txt'
    - \* 'UCI\_HAR\_dataset/test/subject\_test.txt'
    - \* 'UCI\_HAR\_dataset/test/y\_test.txt'

## 1.4 Data Size :

27 MB

## 2 Quick overview of the dataset :

- Accelerometer and Gyroscope readings are taken from 30 volunteers(referred as subjects) while performing the following 6 Activities.

1. Walking
2. WalkingUpstairs
3. WalkingDownstairs
4. Standing
5. Sitting
6. Lying.

- Readings are divided into a window of 2.56 seconds with 50% overlapping.
- Accelerometer readings are divided into gravity acceleration and body acceleration readings, which has x,y and z components each.
- Gyroscope readings are the measure of angular velocities which has x,y and z components.
- Jerk signals are calculated for BodyAcceleration readings.
- Fourier Transforms are made on the above time readings to obtain frequency readings.
- Now, on all the base signal readings., mean, max, mad, sma, arcoefficient, engery-bands,entropy etc., are calculated for each window.
- We get a feature vector of 561 features and these features are given in the dataset.
- Each window of readings is a datapoint of 561 features.

## 2.1 Problem Framework

- 30 subjects(volunteers) data is randomly split to 70%(21) test and 30%(7) train data.
- Each datapoint corresponds one of the 6 Activities.

## 2.2 Problem Statement

- Given a new datapoint we have to predict the Activity

```
In [1]: import numpy as np
import pandas as pd
import warnings
warnings.filterwarnings("ignore")

# get the features from the file features.txt
features = list()
with open('UCI_HAR_Dataset/features.txt') as f:
    features = [line.split()[1] for line in f.readlines()]
print('No of Features: {}'.format(len(features)))
```

No of Features: 561

## 2.3 Obtain the train data

```
In [12]: # get the data from txt files to pandas dataframe
```

```
X_train = pd.read_csv('UCI_HAR_Dataset/train/X_train.txt', delim_whitespace=True, head=1)
```

```
# add subject column to the dataframe
```

```
X_train['subject'] = pd.read_csv('UCI_HAR_Dataset/train/subject_train.txt', header=None)
```

```
y_train = pd.read_csv('UCI_HAR_Dataset/train/y_train.txt', names=['Activity'], squeeze=True)
```

```
y_train_labels = y_train.map({1: 'WALKING', 2: 'WALKING_UPSTAIRS', 3: 'WALKING_DOWNSTAIRS',  
                               4: 'SITTING', 5: 'STANDING', 6: 'LAYING'})
```

```
# put all columns in a single dataframe
```

```
train = X_train
```

```
train['Activity'] = y_train
```

```
train['ActivityName'] = y_train_labels
```

```
train.sample()
```

```
Out[12]:
```

6212	tBodyAcc-mean()-X	tBodyAcc-mean()-Y	tBodyAcc-mean()-Z	\
	0.380322	-0.009925	-0.172745	
6212	tBodyAcc-std()-X	tBodyAcc-std()-Y	tBodyAcc-std()-Z	tBodyAcc-mad()-X \
	0.125378	-0.160388	-0.04863	0.076071
6212	tBodyAcc-mad()-Y	tBodyAcc-mad()-Z	tBodyAcc-max()-X	\
	-0.115744	-0.016339	0.49712	
6212	...	angle(tBodyAccMean,gravity)	\	
	...		-0.644849	
6212	angle(tBodyAccJerkMean),gravityMean)	angle(tBodyGyroMean,gravityMean)	\	
		0.184224		0.870293
6212	angle(tBodyGyroJerkMean,gravityMean)	angle(X,gravityMean)	\	
		-0.173777		-0.657367
6212	angle(Y,gravityMean)	angle(Z,gravityMean)	subject	Activity \
	0.203386	0.237609	27	3
6212	ActivityName			
	WALKING_DOWNSTAIRS			

[1 rows x 564 columns]

```
In [13]: train.shape
```

```
Out[13]: (7352, 564)
```

## 2.4 Obtain the test data

```
In [14]: # get the data from txt files to pandas dataffame
X_test = pd.read_csv('UCI_HAR_Dataset/test/X_test.txt', delim_whitespace=True, header=0)

# add subject column to the dataframe
X_test['subject'] = pd.read_csv('UCI_HAR_Dataset/test/subject_test.txt', header=None, names=['subject'])

# get y labels from the txt file
y_test = pd.read_csv('UCI_HAR_Dataset/test/y_test.txt', names=['Activity'], squeeze=True)
y_test_labels = y_test.map({1: 'WALKING', 2: 'WALKING_UPSTAIRS', 3: 'WALKING_DOWNSTAIRS',
                             4: 'SITTING', 5: 'STANDING', 6: 'LAYING'})

# put all columns in a single dataframe
test = X_test
test['Activity'] = y_test
test['ActivityName'] = y_test_labels
test.sample()
```

```
Out[14]:
```

	tBodyAcc-mean()-X	tBodyAcc-mean()-Y	tBodyAcc-mean()-Z	\
2376	0.142909	-0.022732	-0.077417	
	tBodyAcc-std()-X	tBodyAcc-std()-Y	tBodyAcc-std()-Z	tBodyAcc-mad()-X \
2376	-0.300135	-0.087465	-0.268216	-0.379653
	tBodyAcc-mad()-Y	tBodyAcc-mad()-Z	tBodyAcc-max()-X	...
2376	-0.077845	-0.291151	-0.016602	...
	angle(tBodyAccMean,gravity)	angle(tBodyAccJerkMean,gravityMean)	\	
2376	0.653273	-0.293463		
	angle(tBodyGyroMean,gravityMean)	angle(tBodyGyroJerkMean,gravityMean)	\	
2376	-0.210501	-0.449654		
	angle(X,gravityMean)	angle(Y,gravityMean)	angle(Z,gravityMean)	\
2376	-0.426216	0.421082	0.239323	
	subject	Activity	ActivityName	
2376	20	2	WALKING_UPSTAIRS	

```
[1 rows x 564 columns]
```

```
In [15]: test.shape
```

```
Out[15]: (2947, 564)
```

```
In [16]: train.columns
```

```

Out[16]: Index(['tBodyAcc-mean()-X', 'tBodyAcc-mean()-Y', 'tBodyAcc-mean()-Z',
               'tBodyAcc-std()-X', 'tBodyAcc-std()-Y', 'tBodyAcc-std()-Z',
               'tBodyAcc-mad()-X', 'tBodyAcc-mad()-Y', 'tBodyAcc-mad()-Z',
               'tBodyAcc-max()-X',
               ...
               'angle(tBodyAccMean,gravity)', 'angle(tBodyAccJerkMean,gravityMean)',
               'angle(tBodyGyroMean,gravityMean)',
               'angle(tBodyGyroJerkMean,gravityMean)', 'angle(X,gravityMean)',
               'angle(Y,gravityMean)', 'angle(Z,gravityMean)', 'subject', 'Activity',
               'ActivityName'],
              dtype='object', length=564)

```

### 3 Data Cleaning

#### 3.1 1. Check for Duplicates

```

In [17]: print('No of duplicates in train: {}'.format(sum(train.duplicated())))
         print('No of duplicates in test : {}'.format(sum(test.duplicated())))

```

No of duplicates in train: 0

No of duplicates in test : 0

#### 3.2 2. Checking for NaN/null values

```

In [18]: print('We have {} NaN/Null values in train'.format(train.isnull().values.sum()))
         print('We have {} NaN/Null values in test'.format(test.isnull().values.sum()))

```

We have 0 NaN/Null values in train

We have 0 NaN/Null values in test

#### 3.3 3. Check for data imbalance

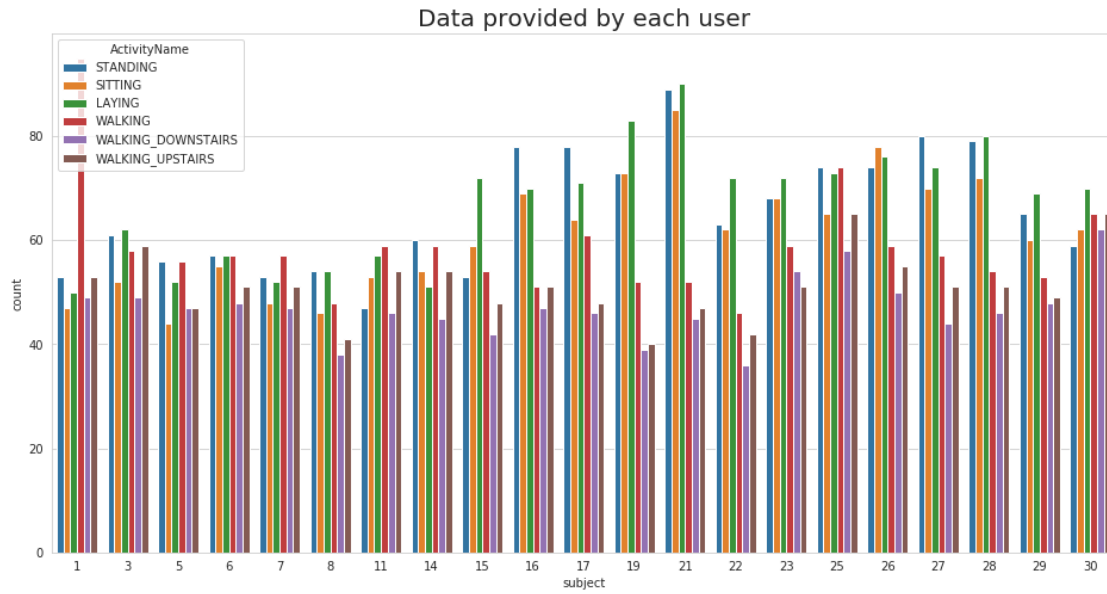
```

In [20]: import matplotlib.pyplot as plt
         import seaborn as sns

         sns.set_style('whitegrid')

In [21]: plt.figure(figsize=(16,8))
         plt.title('Data provided by each user', fontsize=20)
         sns.countplot(x='subject',hue='ActivityName', data = train)
         plt.show()

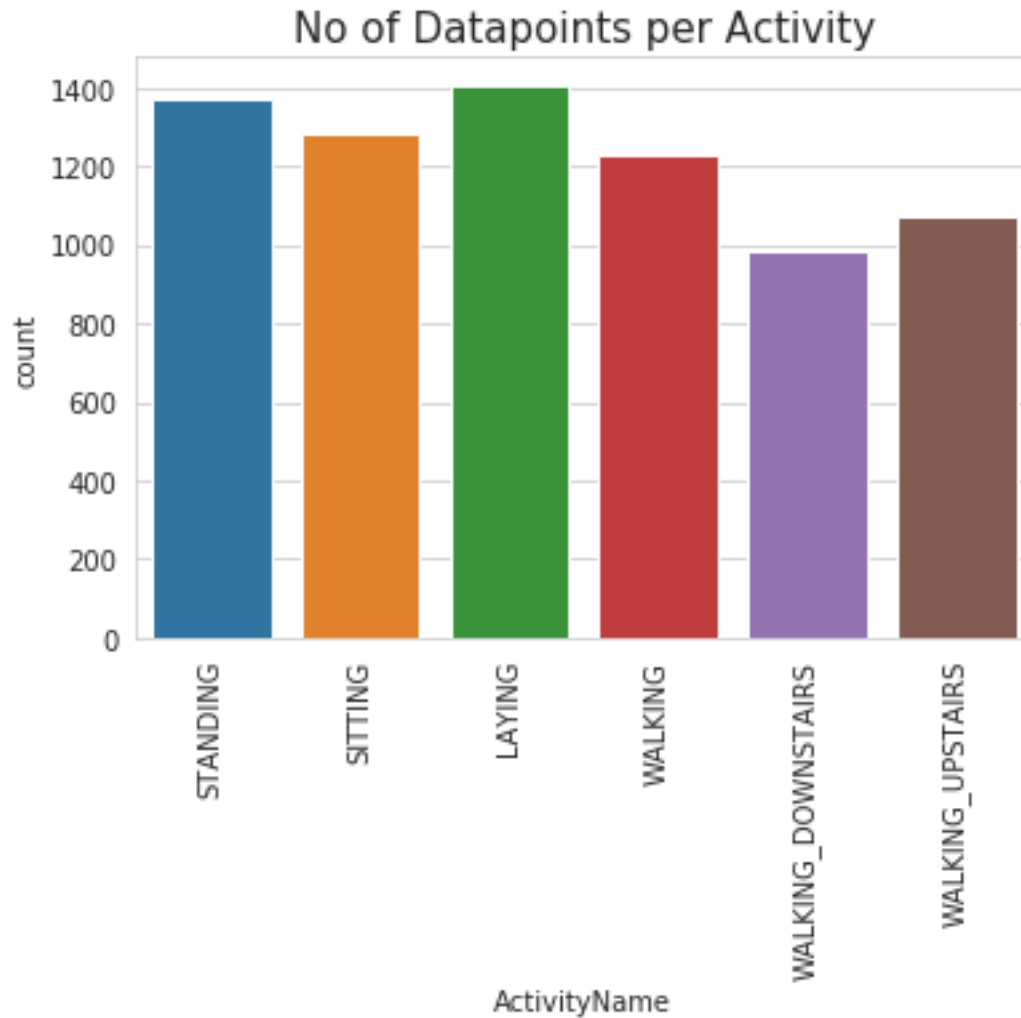
```



We have got almost same number of reading from all the subjects

```
In [22]: plt.title('No of Datapoints per Activity', fontsize=15)
sns.countplot(train.ActivityName)
plt.xticks(rotation=90)
plt.show()
```





#### 3.3.1 Observation

Our data is well balanced (almost)

### 3.4 4. Changing feature names

```
In [23]: columns = train.columns
```

```
# Removing '()' from column names  
columns = columns.str.replace(' [()] ', '')  
columns = columns.str.replace(' [-] ', '_')  
columns = columns.str.replace(' [,] ', '')
```

```
train.columns = columns  
test.columns = columns
```

```
test.columns
```

```
Out [23]: Index(['tBodyAcc_mean_X', 'tBodyAcc_mean_Y', 'tBodyAcc_mean_Z',
               'tBodyAcc_std_X', 'tBodyAcc_std_Y', 'tBodyAcc_std_Z', 'tBodyAcc_mad_X',
               'tBodyAcc_mad_Y', 'tBodyAcc_mad_Z', 'tBodyAcc_max_X',
               ...
               'angletBodyAccMeangravity', 'angletBodyAccJerkMeangravityMean',
               'angletBodyGyroMeangravityMean', 'angletBodyGyroJerkMeangravityMean',
               'angleXgravityMean', 'angleYgravityMean', 'angleZgravityMean',
               'subject', 'Activity', 'ActivityName'],
              dtype='object', length=564)
```

### 3.5 5. Save this dataframe in a csv files

```
In [27]: train.to_csv('UCI_HAR_Dataset/csv_files/train.csv', index=False)
        test.to_csv('UCI_HAR_Dataset/csv_files/test.csv', index=False)
```

## 4 Exploratory Data Analysis

*"Without domain knowledge EDA has no meaning, without EDA a problem has no soul."*

### 4.0.1 1. Featurig Engineering from Domain Knowledge

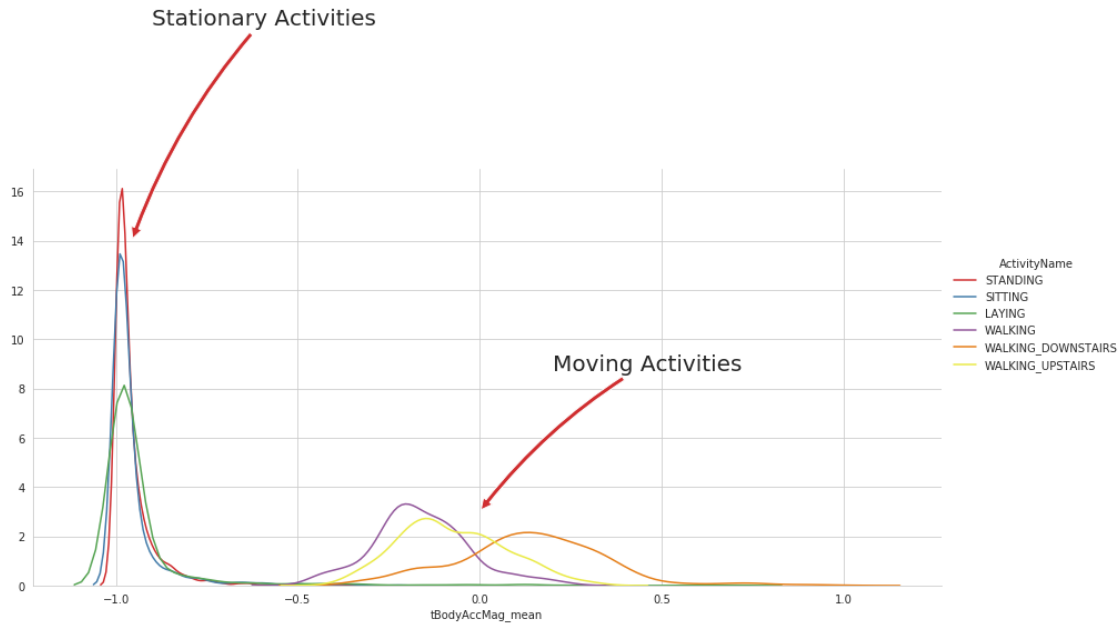
- Static and Dynamic Activities

- In static activities (sit, stand, lie down) motion information will not be very useful.
- In the dynamic activities (Walking, WalkingUpstairs, WalkingDownstairs) motion info will be significant.

### 4.0.2 2. Stationary and Moving activities are completely different

```
In [36]: sns.set_palette("Set1", desat=0.80)
        facetgrid = sns.FacetGrid(train, hue='ActivityName', size=6, aspect=2)
        facetgrid.map(sns.distplot, 'tBodyAccMag_mean', hist=False)\
            .add_legend()
        plt.annotate("Stationary Activities", xy=(-0.956,14), xytext=(-0.9, 23), size=20,\
            va='center', ha='left',\
            arrowprops=dict(arrowstyle="simple",connectionstyle="arc3,rad=0.1"))

        plt.annotate("Moving Activities", xy=(0,3), xytext=(0.2, 9), size=20,\
            va='center', ha='left',\
            arrowprops=dict(arrowstyle="simple",connectionstyle="arc3,rad=0.1"))
        plt.show()
```

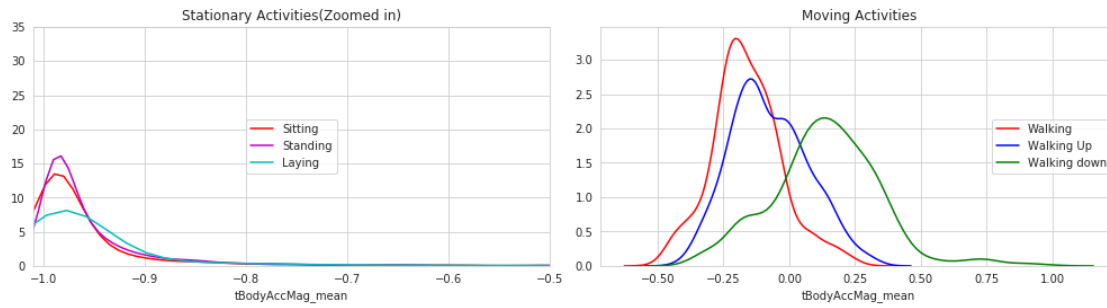


```
In [39]: # for plotting purposes taking datapoints of each activity to a different dataframe
df1 = train[train['Activity']==1]
df2 = train[train['Activity']==2]
df3 = train[train['Activity']==3]
df4 = train[train['Activity']==4]
df5 = train[train['Activity']==5]
df6 = train[train['Activity']==6]

plt.figure(figsize=(14,7))
plt.subplot(2,2,1)
plt.title('Stationary Activities(Zoomed in)')
sns.distplot(df4['tBodyAccMag_mean'],color = 'r',hist = False, label = 'Sitting')
sns.distplot(df5['tBodyAccMag_mean'],color = 'm',hist = False,label = 'Standing')
sns.distplot(df6['tBodyAccMag_mean'],color = 'c',hist = False, label = 'Laying')
plt.axis([-1.01, -0.5, 0, 35])
plt.legend(loc='center')

plt.subplot(2,2,2)
plt.title('Moving Activities')
sns.distplot(df1['tBodyAccMag_mean'],color = 'red',hist = False, label = 'Walking')
sns.distplot(df2['tBodyAccMag_mean'],color = 'blue',hist = False,label = 'Walking Up')
sns.distplot(df3['tBodyAccMag_mean'],color = 'green',hist = False, label = 'Walking d')
plt.legend(loc='center right')

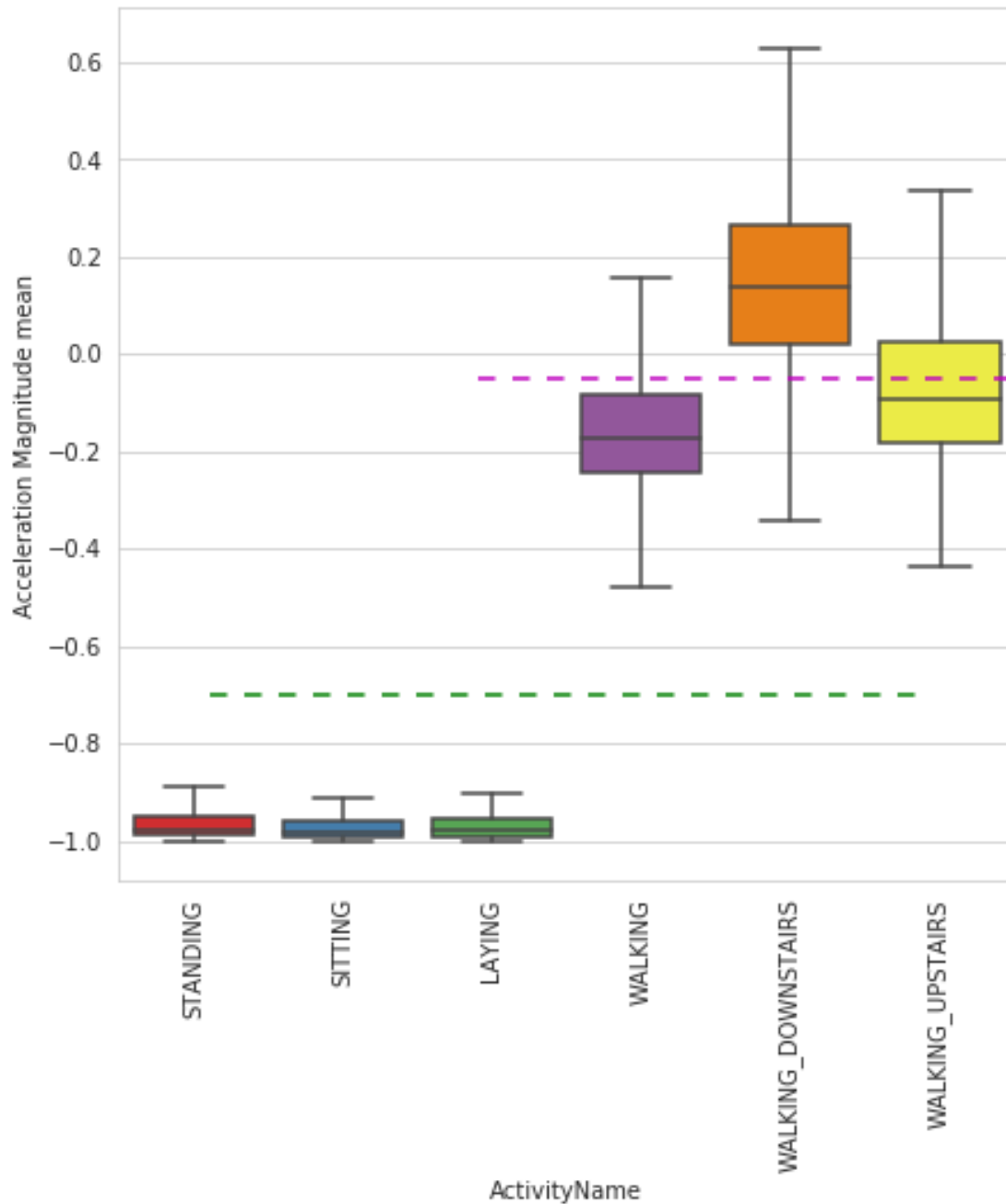
plt.tight_layout()
plt.show()
```



### 4.0.3 3. Magnitude of an acceleration can saperate it well

```
In [41]: plt.figure(figsize=(7,7))
sns.boxplot(x='ActivityName', y='tBodyAccMag_mean',data=train, showfliers=False, satur
plt.ylabel('Acceleration Magnitude mean')
plt.axhline(y=-0.7, xmin=0.1, xmax=0.9,dashes=(5,5), c='g')
plt.axhline(y=-0.05, xmin=0.4, dashes=(5,5), c='m')
plt.xticks(rotation=90)
plt.show()
```

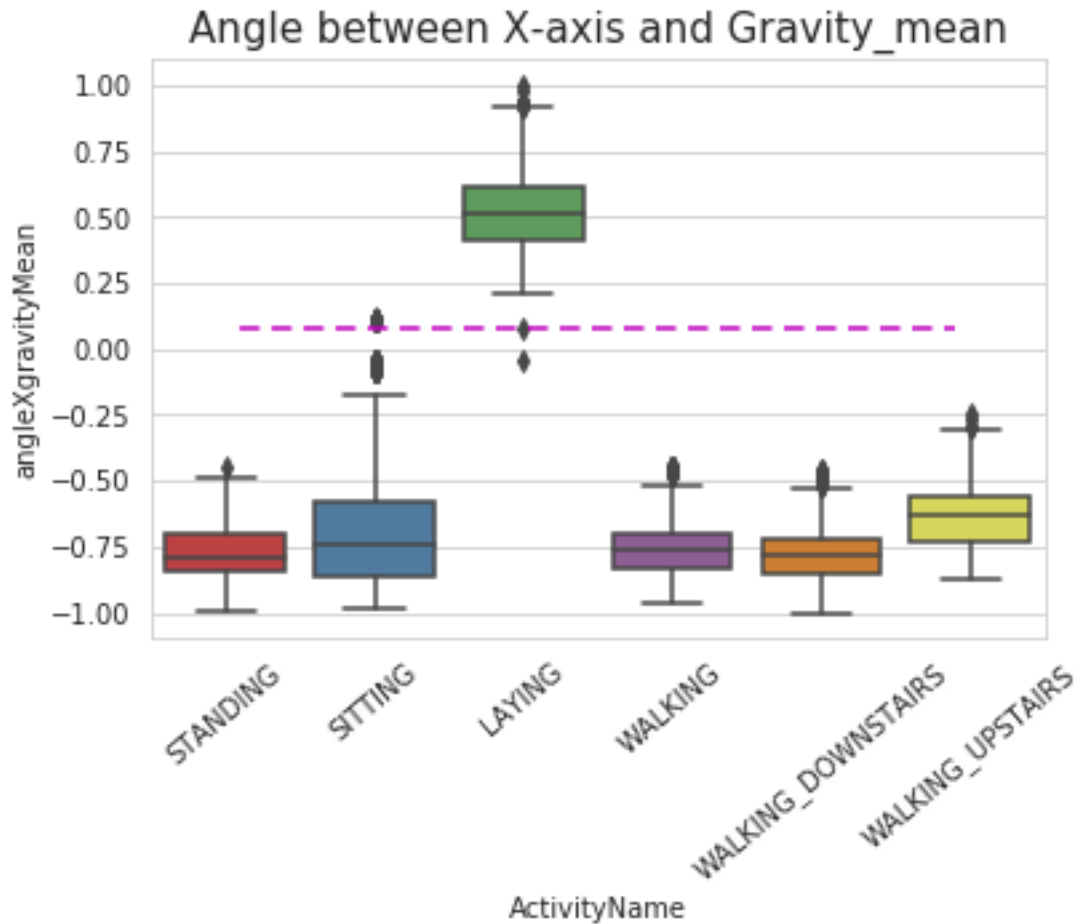
<matplotlib.figure.Figure at 0x1471d613b5f8>



\_\_ Observations\_\_: - If tAccMean is  $< -0.8$  then the Activities are either Standing or Sitting or Laying. - If tAccMean is  $> -0.6$  then the Activities are either Walking or WalkingDownstairs or WalkingUpstairs. - If tAccMean  $> 0.0$  then the Activity is WalkingDownstairs. - We can classify 75% the Activity labels with some errors.

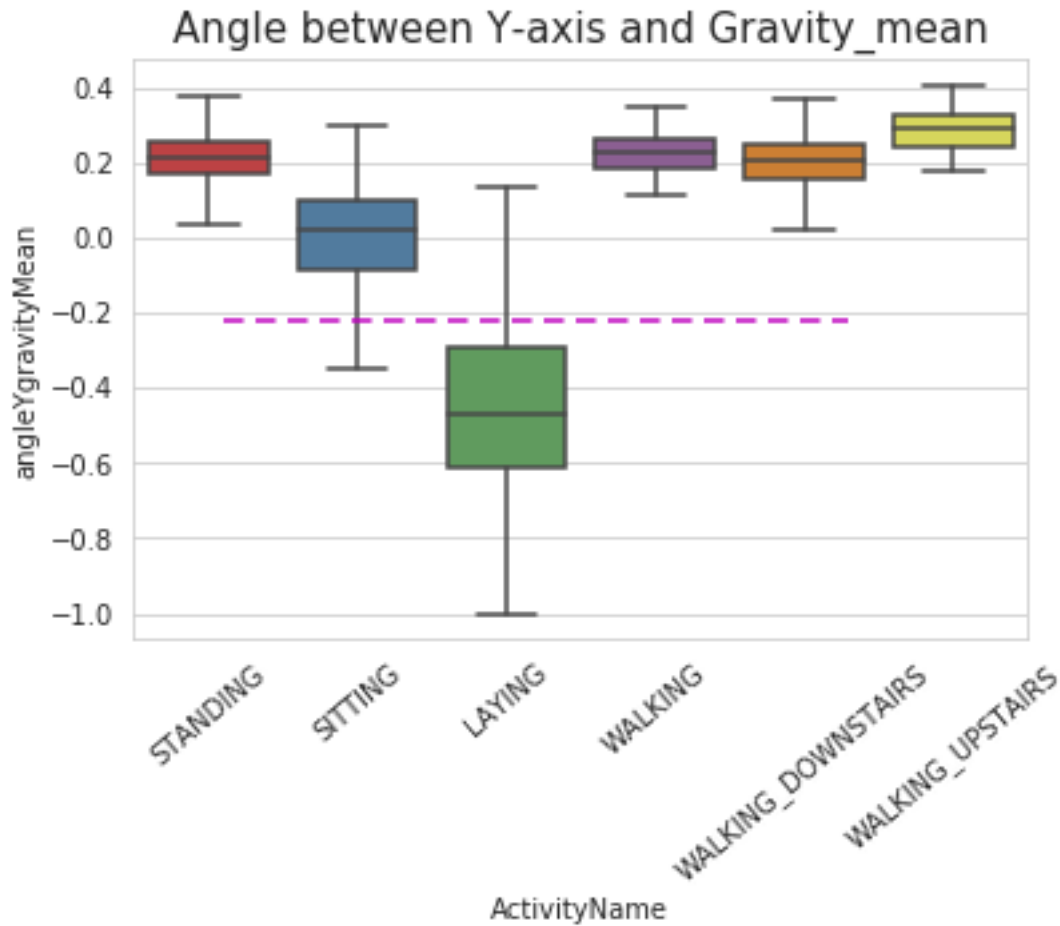
#### 4.0.4 4. Position of GravityAccelerationComponents also matters

```
In [43]: sns.boxplot(x='ActivityName', y='angleXgravityMean', data=train)
plt.axhline(y=0.08, xmin=0.1, xmax=0.9, c='m', dashes=(5,3))
plt.title('Angle between X-axis and Gravity_mean', fontsize=15)
plt.xticks(rotation = 40)
plt.show()
```



\_\_ Observations\_\_: \* If angleX,gravityMean > 0 then Activity is Laying. \* We can classify all datapoints belonging to Laying activity with just a single if else statement.

```
In [44]: sns.boxplot(x='ActivityName', y='angleYgravityMean', data = train, showfliers=False)
plt.title('Angle between Y-axis and Gravity_mean', fontsize=15)
plt.xticks(rotation = 40)
plt.axhline(y=-0.22, xmin=0.1, xmax=0.8, dashes=(5,3), c='m')
plt.show()
```



## 5 Apply t-sne on the data

```
In [45]: import numpy as np
         from sklearn.manifold import TSNE
         import matplotlib.pyplot as plt
         import seaborn as sns
```

```
In [46]: # performs t-sne with different perplexity values and their repective plots..
```

```
def perform_tsne(X_data, y_data, perplexities, n_iter=1000, img_name_prefix='t-sne'):

    for index,perplexity in enumerate(perplexities):
        # perform t-sne
        print('\nperforming tsne with perplexity {} and with {} iterations at max'.format(perplexity, n_iter))
        X_reduced = TSNE(verbose=2, perplexity=perplexity).fit_transform(X_data)
        print('Done..')
```

```

# prepare the data for seaborn
print('Creating plot for this t-sne visualization..')
df = pd.DataFrame({'x':X_reduced[:,0], 'y':X_reduced[:,1] , 'label':y_data})

# draw the plot in appropriate place in the grid
sns.lmplot(data=df, x='x', y='y', hue='label', fit_reg=False, size=8,\
           palette="Set1",markers=['^','v','s','o', '1','2'])
plt.title("perplexity : {} and max_iter : {}".format(perplexity, n_iter))
img_name = img_name_prefix + '_perp_{}_iter_{}.png'.format(perplexity, n_iter)
print('saving this plot as image in present working directory...')
plt.savefig(img_name)
plt.show()
print('Done')

```

```

In [47]: X_pre_tsne = train.drop(['subject', 'Activity','ActivityName'], axis=1)
        y_pre_tsne = train['ActivityName']
        perform_tsne(X_data = X_pre_tsne,y_data=y_pre_tsne, perplexities =[2,5,10,20,50])

```

performing tsne with perplexity 2 and with 1000 iterations at max

```

[t-SNE] Computing 7 nearest neighbors...
[t-SNE] Indexed 7352 samples in 0.096s...
[t-SNE] Computed neighbors for 7352 samples in 27.701s...
[t-SNE] Computed conditional probabilities for sample 1000 / 7352
[t-SNE] Computed conditional probabilities for sample 2000 / 7352
[t-SNE] Computed conditional probabilities for sample 3000 / 7352
[t-SNE] Computed conditional probabilities for sample 4000 / 7352
[t-SNE] Computed conditional probabilities for sample 5000 / 7352
[t-SNE] Computed conditional probabilities for sample 6000 / 7352
[t-SNE] Computed conditional probabilities for sample 7000 / 7352
[t-SNE] Computed conditional probabilities for sample 7352 / 7352
[t-SNE] Mean sigma: 0.635855
[t-SNE] Computed conditional probabilities in 0.052s
[t-SNE] Iteration 50: error = 124.7532959, gradient norm = 0.0285542 (50 iterations in 6.885s)
[t-SNE] Iteration 100: error = 106.8683777, gradient norm = 0.0273265 (50 iterations in 3.556s)
[t-SNE] Iteration 150: error = 100.6163483, gradient norm = 0.0195194 (50 iterations in 2.591s)
[t-SNE] Iteration 200: error = 97.3039246, gradient norm = 0.0156689 (50 iterations in 2.512s)
[t-SNE] Iteration 250: error = 95.0665588, gradient norm = 0.0124335 (50 iterations in 2.484s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 95.066559
[t-SNE] Iteration 300: error = 4.1143718, gradient norm = 0.0015598 (50 iterations in 2.224s)
[t-SNE] Iteration 350: error = 3.2087288, gradient norm = 0.0010000 (50 iterations in 1.990s)
[t-SNE] Iteration 400: error = 2.7785664, gradient norm = 0.0007231 (50 iterations in 2.024s)
[t-SNE] Iteration 450: error = 2.5142882, gradient norm = 0.0005710 (50 iterations in 2.042s)
[t-SNE] Iteration 500: error = 2.3313522, gradient norm = 0.0004800 (50 iterations in 2.062s)
[t-SNE] Iteration 550: error = 2.1932867, gradient norm = 0.0004106 (50 iterations in 2.078s)
[t-SNE] Iteration 600: error = 2.0840328, gradient norm = 0.0003637 (50 iterations in 2.089s)
[t-SNE] Iteration 650: error = 1.9942801, gradient norm = 0.0003322 (50 iterations in 2.104s)
[t-SNE] Iteration 700: error = 1.9186578, gradient norm = 0.0003031 (50 iterations in 2.119s)

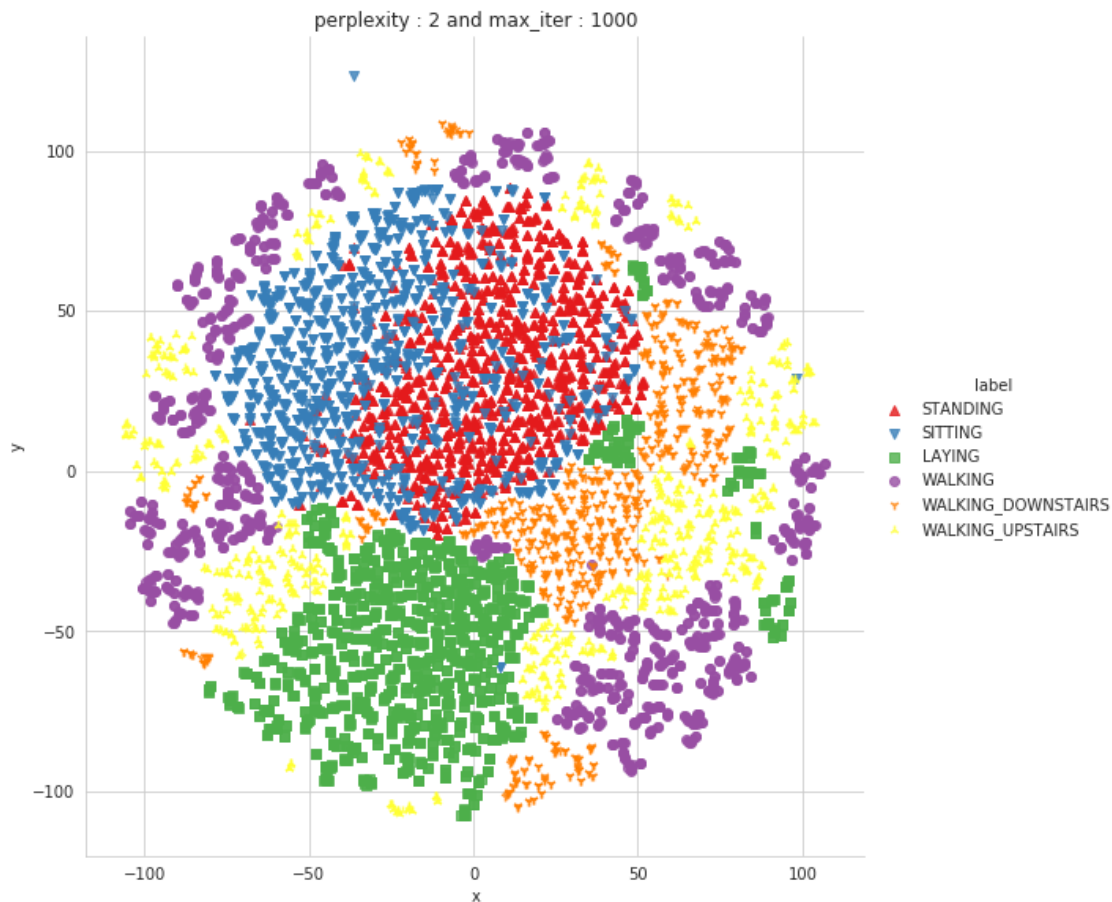
```



```

[t-SNE] Iteration 750: error = 1.8537792, gradient norm = 0.0002782 (50 iterations in 2.127s)
[t-SNE] Iteration 800: error = 1.7970450, gradient norm = 0.0002557 (50 iterations in 2.133s)
[t-SNE] Iteration 850: error = 1.7470232, gradient norm = 0.0002375 (50 iterations in 2.144s)
[t-SNE] Iteration 900: error = 1.7022941, gradient norm = 0.0002236 (50 iterations in 2.137s)
[t-SNE] Iteration 950: error = 1.6622392, gradient norm = 0.0002098 (50 iterations in 2.146s)
[t-SNE] Iteration 1000: error = 1.6259054, gradient norm = 0.0002008 (50 iterations in 2.150s)
[t-SNE] Error after 1000 iterations: 1.625905
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...

```



Done

```

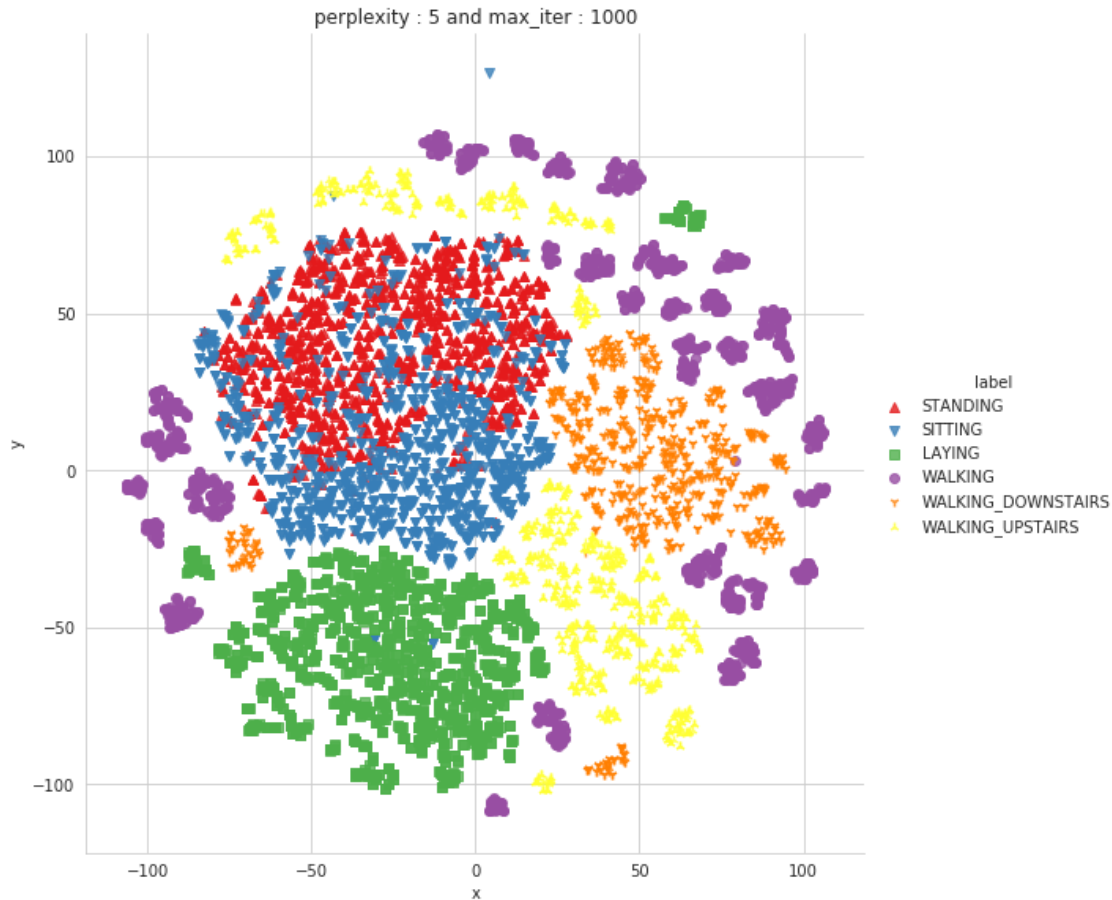
performing tsne with perplexity 5 and with 1000 iterations at max
[t-SNE] Computing 16 nearest neighbors...
[t-SNE] Indexed 7352 samples in 0.085s...
[t-SNE] Computed neighbors for 7352 samples in 27.997s...
[t-SNE] Computed conditional probabilities for sample 1000 / 7352

```

```

[t-SNE] Computed conditional probabilities for sample 2000 / 7352
[t-SNE] Computed conditional probabilities for sample 3000 / 7352
[t-SNE] Computed conditional probabilities for sample 4000 / 7352
[t-SNE] Computed conditional probabilities for sample 5000 / 7352
[t-SNE] Computed conditional probabilities for sample 6000 / 7352
[t-SNE] Computed conditional probabilities for sample 7000 / 7352
[t-SNE] Computed conditional probabilities for sample 7352 / 7352
[t-SNE] Mean sigma: 0.961265
[t-SNE] Computed conditional probabilities in 0.058s
[t-SNE] Iteration 50: error = 114.0592880, gradient norm = 0.0203027 (50 iterations in 5.592s)
[t-SNE] Iteration 100: error = 97.2689438, gradient norm = 0.0156565 (50 iterations in 2.620s)
[t-SNE] Iteration 150: error = 92.9875412, gradient norm = 0.0087415 (50 iterations in 2.308s)
[t-SNE] Iteration 200: error = 91.0414810, gradient norm = 0.0071048 (50 iterations in 2.266s)
[t-SNE] Iteration 250: error = 89.8754654, gradient norm = 0.0057384 (50 iterations in 2.205s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 89.875465
[t-SNE] Iteration 300: error = 3.5759211, gradient norm = 0.0014691 (50 iterations in 2.256s)
[t-SNE] Iteration 350: error = 2.8154438, gradient norm = 0.0007505 (50 iterations in 2.240s)
[t-SNE] Iteration 400: error = 2.4350181, gradient norm = 0.0005242 (50 iterations in 2.264s)
[t-SNE] Iteration 450: error = 2.2171905, gradient norm = 0.0004073 (50 iterations in 2.302s)
[t-SNE] Iteration 500: error = 2.0723400, gradient norm = 0.0003336 (50 iterations in 2.340s)
[t-SNE] Iteration 550: error = 1.9670427, gradient norm = 0.0002847 (50 iterations in 2.343s)
[t-SNE] Iteration 600: error = 1.8857234, gradient norm = 0.0002473 (50 iterations in 2.354s)
[t-SNE] Iteration 650: error = 1.8205318, gradient norm = 0.0002198 (50 iterations in 2.367s)
[t-SNE] Iteration 700: error = 1.7666595, gradient norm = 0.0001984 (50 iterations in 2.379s)
[t-SNE] Iteration 750: error = 1.7211496, gradient norm = 0.0001790 (50 iterations in 2.379s)
[t-SNE] Iteration 800: error = 1.6821029, gradient norm = 0.0001657 (50 iterations in 2.390s)
[t-SNE] Iteration 850: error = 1.6482807, gradient norm = 0.0001518 (50 iterations in 2.398s)
[t-SNE] Iteration 900: error = 1.6185459, gradient norm = 0.0001421 (50 iterations in 2.402s)
[t-SNE] Iteration 950: error = 1.5919563, gradient norm = 0.0001332 (50 iterations in 2.406s)
[t-SNE] Iteration 1000: error = 1.5682360, gradient norm = 0.0001277 (50 iterations in 2.403s)
[t-SNE] Error after 1000 iterations: 1.568236
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...

```



Done

performing tsne with perplexity 10 and with 1000 iterations at max

[t-SNE] Computing 31 nearest neighbors...

[t-SNE] Indexed 7352 samples in 0.085s...

[t-SNE] Computed neighbors for 7352 samples in 28.368s...

[t-SNE] Computed conditional probabilities for sample 1000 / 7352

[t-SNE] Computed conditional probabilities for sample 2000 / 7352

[t-SNE] Computed conditional probabilities for sample 3000 / 7352

[t-SNE] Computed conditional probabilities for sample 4000 / 7352

[t-SNE] Computed conditional probabilities for sample 5000 / 7352

[t-SNE] Computed conditional probabilities for sample 6000 / 7352

[t-SNE] Computed conditional probabilities for sample 7000 / 7352

[t-SNE] Computed conditional probabilities for sample 7352 / 7352

[t-SNE] Mean sigma: 1.133828

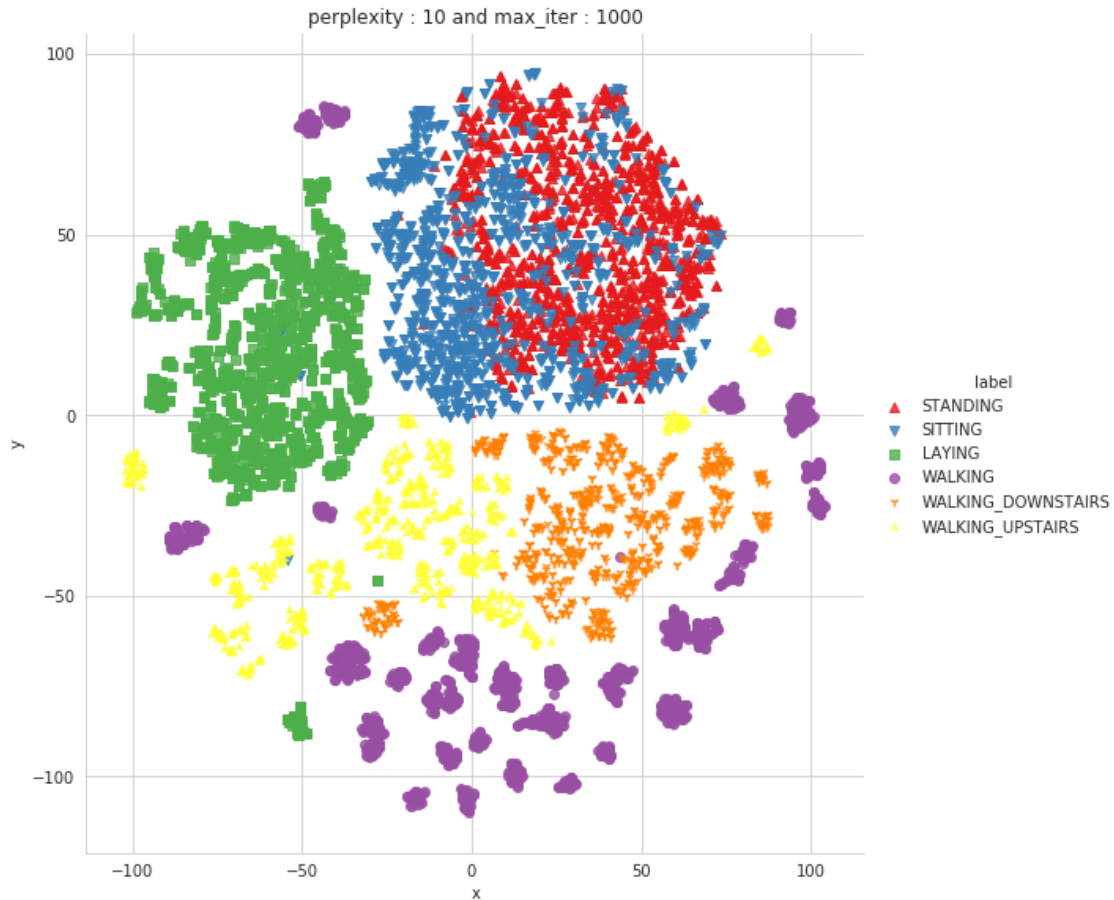
[t-SNE] Computed conditional probabilities in 0.155s

[t-SNE] Iteration 50: error = 105.6137085, gradient norm = 0.0229994 (50 iterations in 4.228s)

[t-SNE] Iteration 100: error = 89.9958496, gradient norm = 0.0122725 (50 iterations in 3.063s)

[t-SNE] Iteration 150: error = 87.1489944, gradient norm = 0.0071774 (50 iterations in 2.760s)

```
[t-SNE] Iteration 200: error = 85.9672318, gradient norm = 0.0061608 (50 iterations in 2.772s)
[t-SNE] Iteration 250: error = 85.2867050, gradient norm = 0.0036593 (50 iterations in 2.769s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 85.286705
[t-SNE] Iteration 300: error = 3.1305749, gradient norm = 0.0013861 (50 iterations in 2.801s)
[t-SNE] Iteration 350: error = 2.4887924, gradient norm = 0.0006460 (50 iterations in 2.720s)
[t-SNE] Iteration 400: error = 2.1697743, gradient norm = 0.0004211 (50 iterations in 2.716s)
[t-SNE] Iteration 450: error = 1.9855604, gradient norm = 0.0003128 (50 iterations in 2.724s)
[t-SNE] Iteration 500: error = 1.8673357, gradient norm = 0.0002509 (50 iterations in 2.730s)
[t-SNE] Iteration 550: error = 1.7841893, gradient norm = 0.0002111 (50 iterations in 2.735s)
[t-SNE] Iteration 600: error = 1.7217950, gradient norm = 0.0001803 (50 iterations in 2.736s)
[t-SNE] Iteration 650: error = 1.6726514, gradient norm = 0.0001601 (50 iterations in 2.735s)
[t-SNE] Iteration 700: error = 1.6333241, gradient norm = 0.0001421 (50 iterations in 2.731s)
[t-SNE] Iteration 750: error = 1.6008626, gradient norm = 0.0001299 (50 iterations in 2.744s)
[t-SNE] Iteration 800: error = 1.5734997, gradient norm = 0.0001197 (50 iterations in 2.738s)
[t-SNE] Iteration 850: error = 1.5501360, gradient norm = 0.0001125 (50 iterations in 2.739s)
[t-SNE] Iteration 900: error = 1.5305120, gradient norm = 0.0001046 (50 iterations in 2.737s)
[t-SNE] Iteration 950: error = 1.5137104, gradient norm = 0.0000972 (50 iterations in 2.745s)
[t-SNE] Iteration 1000: error = 1.4986035, gradient norm = 0.0000922 (50 iterations in 2.751s)
[t-SNE] Error after 1000 iterations: 1.498603
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...
```



Done

performing tsne with perplexity 20 and with 1000 iterations at max

[t-SNE] Computing 61 nearest neighbors...

[t-SNE] Indexed 7352 samples in 0.085s...

[t-SNE] Computed neighbors for 7352 samples in 29.036s...

[t-SNE] Computed conditional probabilities for sample 1000 / 7352

[t-SNE] Computed conditional probabilities for sample 2000 / 7352

[t-SNE] Computed conditional probabilities for sample 3000 / 7352

[t-SNE] Computed conditional probabilities for sample 4000 / 7352

[t-SNE] Computed conditional probabilities for sample 5000 / 7352

[t-SNE] Computed conditional probabilities for sample 6000 / 7352

[t-SNE] Computed conditional probabilities for sample 7000 / 7352

[t-SNE] Computed conditional probabilities for sample 7352 / 7352

[t-SNE] Mean sigma: 1.274335

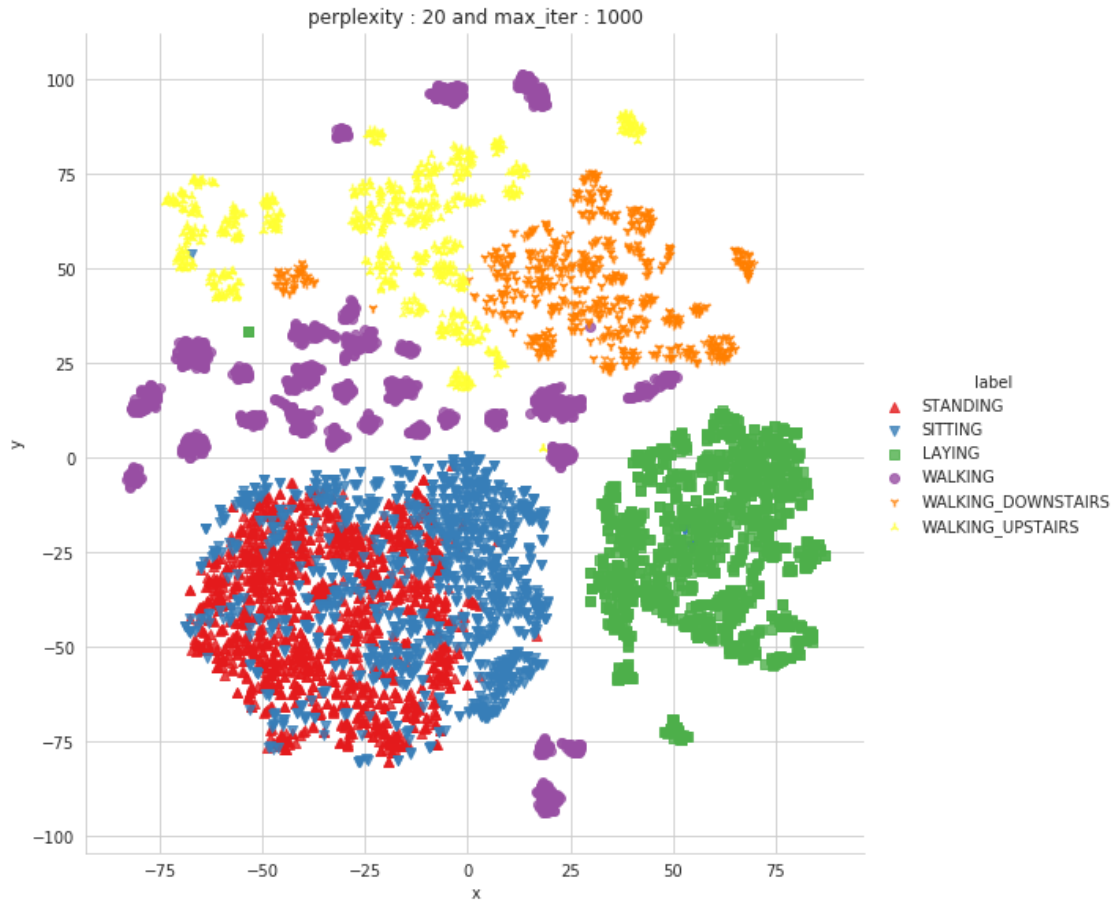
[t-SNE] Computed conditional probabilities in 0.271s

[t-SNE] Iteration 50: error = 97.7926636, gradient norm = 0.0125853 (50 iterations in 10.212s)

[t-SNE] Iteration 100: error = 84.0754013, gradient norm = 0.0064392 (50 iterations in 5.176s)

[t-SNE] Iteration 150: error = 81.9258728, gradient norm = 0.0035655 (50 iterations in 4.332s)

```
[t-SNE] Iteration 200: error = 81.1771851, gradient norm = 0.0022705 (50 iterations in 4.284s)
[t-SNE] Iteration 250: error = 80.7830048, gradient norm = 0.0021464 (50 iterations in 4.261s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 80.783005
[t-SNE] Iteration 300: error = 2.7013526, gradient norm = 0.0013006 (50 iterations in 4.028s)
[t-SNE] Iteration 350: error = 2.1675630, gradient norm = 0.0005758 (50 iterations in 3.776s)
[t-SNE] Iteration 400: error = 1.9185538, gradient norm = 0.0003485 (50 iterations in 3.796s)
[t-SNE] Iteration 450: error = 1.7722032, gradient norm = 0.0002463 (50 iterations in 3.821s)
[t-SNE] Iteration 500: error = 1.6783440, gradient norm = 0.0001935 (50 iterations in 3.838s)
[t-SNE] Iteration 550: error = 1.6141162, gradient norm = 0.0001585 (50 iterations in 3.852s)
[t-SNE] Iteration 600: error = 1.5673211, gradient norm = 0.0001348 (50 iterations in 3.869s)
[t-SNE] Iteration 650: error = 1.5318861, gradient norm = 0.0001161 (50 iterations in 3.879s)
[t-SNE] Iteration 700: error = 1.5039140, gradient norm = 0.0001032 (50 iterations in 3.889s)
[t-SNE] Iteration 750: error = 1.4814334, gradient norm = 0.0000954 (50 iterations in 3.893s)
[t-SNE] Iteration 800: error = 1.4631746, gradient norm = 0.0000885 (50 iterations in 3.909s)
[t-SNE] Iteration 850: error = 1.4486455, gradient norm = 0.0000838 (50 iterations in 3.923s)
[t-SNE] Iteration 900: error = 1.4372107, gradient norm = 0.0000781 (50 iterations in 3.938s)
[t-SNE] Iteration 950: error = 1.4272782, gradient norm = 0.0000750 (50 iterations in 3.935s)
[t-SNE] Iteration 1000: error = 1.4186589, gradient norm = 0.0000716 (50 iterations in 3.933s)
[t-SNE] Error after 1000 iterations: 1.418659
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...
```



Done

performing tsne with perplexity 50 and with 1000 iterations at max

[t-SNE] Computing 151 nearest neighbors...

[t-SNE] Indexed 7352 samples in 0.086s...

[t-SNE] Computed neighbors for 7352 samples in 29.958s...

[t-SNE] Computed conditional probabilities for sample 1000 / 7352

[t-SNE] Computed conditional probabilities for sample 2000 / 7352

[t-SNE] Computed conditional probabilities for sample 3000 / 7352

[t-SNE] Computed conditional probabilities for sample 4000 / 7352

[t-SNE] Computed conditional probabilities for sample 5000 / 7352

[t-SNE] Computed conditional probabilities for sample 6000 / 7352

[t-SNE] Computed conditional probabilities for sample 7000 / 7352

[t-SNE] Computed conditional probabilities for sample 7352 / 7352

[t-SNE] Mean sigma: 1.437672

[t-SNE] Computed conditional probabilities in 0.563s

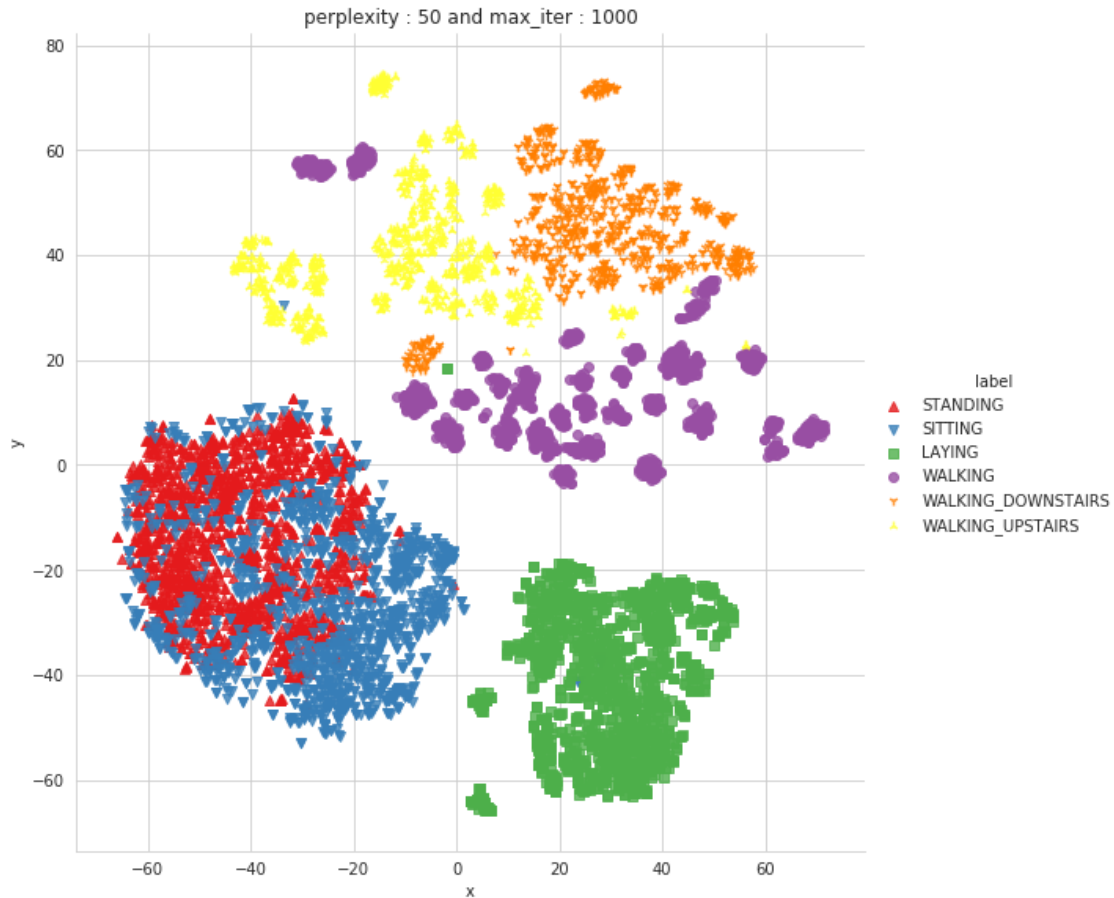
[t-SNE] Iteration 50: error = 87.2486420, gradient norm = 0.0071327 (50 iterations in 7.677s)

[t-SNE] Iteration 100: error = 75.6975098, gradient norm = 0.0044917 (50 iterations in 7.338s)

[t-SNE] Iteration 150: error = 74.6203918, gradient norm = 0.0024377 (50 iterations in 6.859s)

```
[t-SNE] Iteration 200: error = 74.2492752, gradient norm = 0.0015409 (50 iterations in 6.908s)
[t-SNE] Iteration 250: error = 74.0674744, gradient norm = 0.0012064 (50 iterations in 6.929s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 74.067474
[t-SNE] Iteration 300: error = 2.1519017, gradient norm = 0.0011851 (50 iterations in 6.938s)
[t-SNE] Iteration 350: error = 1.7552953, gradient norm = 0.0004863 (50 iterations in 6.881s)
[t-SNE] Iteration 400: error = 1.5867779, gradient norm = 0.0002808 (50 iterations in 6.877s)
[t-SNE] Iteration 450: error = 1.4929526, gradient norm = 0.0001902 (50 iterations in 6.869s)
[t-SNE] Iteration 500: error = 1.4330895, gradient norm = 0.0001395 (50 iterations in 6.872s)
[t-SNE] Iteration 550: error = 1.3918693, gradient norm = 0.0001124 (50 iterations in 6.866s)
[t-SNE] Iteration 600: error = 1.3627089, gradient norm = 0.0000937 (50 iterations in 6.858s)
[t-SNE] Iteration 650: error = 1.3417925, gradient norm = 0.0000828 (50 iterations in 6.860s)
[t-SNE] Iteration 700: error = 1.3263514, gradient norm = 0.0000745 (50 iterations in 6.865s)
[t-SNE] Iteration 750: error = 1.3148748, gradient norm = 0.0000693 (50 iterations in 6.873s)
[t-SNE] Iteration 800: error = 1.3062829, gradient norm = 0.0000676 (50 iterations in 6.880s)
[t-SNE] Iteration 850: error = 1.2999574, gradient norm = 0.0000594 (50 iterations in 6.882s)
[t-SNE] Iteration 900: error = 1.2946123, gradient norm = 0.0000580 (50 iterations in 6.883s)
[t-SNE] Iteration 950: error = 1.2901206, gradient norm = 0.0000535 (50 iterations in 6.876s)
[t-SNE] Iteration 1000: error = 1.2863228, gradient norm = 0.0000517 (50 iterations in 6.881s)
[t-SNE] Error after 1000 iterations: 1.286323
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...
```





Done

```
In [48]: X_pre_tsne = train.drop(['subject', 'Activity', 'ActivityName'], axis=1)
         y_pre_tsne = train['ActivityName']
         perform_tsne(X_data = X_pre_tsne, y_data=y_pre_tsne, perplexities = [20, 50, 90], n_iter=2000)
```

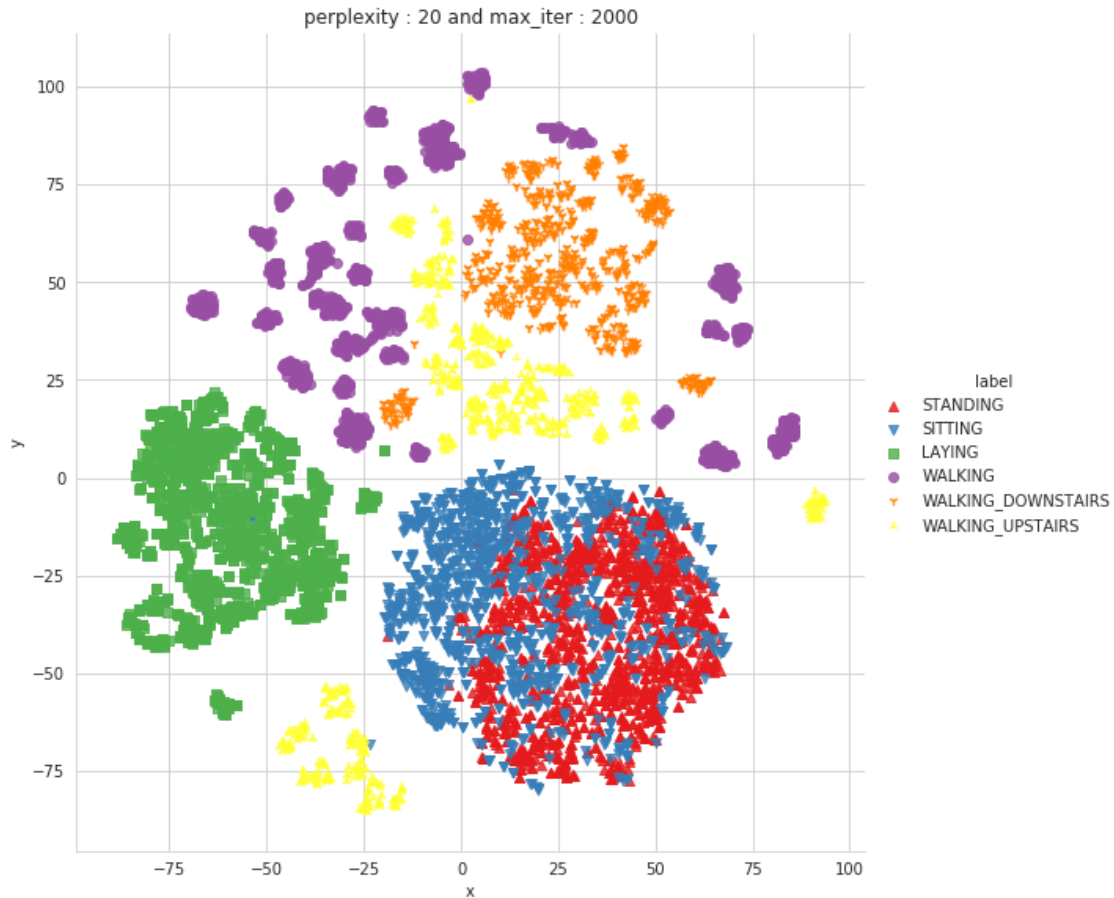
performing tsne with perplexity 20 and with 2000 iterations at max

```
[t-SNE] Computing 61 nearest neighbors...
[t-SNE] Indexed 7352 samples in 0.096s...
[t-SNE] Computed neighbors for 7352 samples in 29.076s...
[t-SNE] Computed conditional probabilities for sample 1000 / 7352
[t-SNE] Computed conditional probabilities for sample 2000 / 7352
[t-SNE] Computed conditional probabilities for sample 3000 / 7352
[t-SNE] Computed conditional probabilities for sample 4000 / 7352
[t-SNE] Computed conditional probabilities for sample 5000 / 7352
[t-SNE] Computed conditional probabilities for sample 6000 / 7352
[t-SNE] Computed conditional probabilities for sample 7000 / 7352
```

```

[t-SNE] Computed conditional probabilities for sample 7352 / 7352
[t-SNE] Mean sigma: 1.274335
[t-SNE] Computed conditional probabilities in 0.268s
[t-SNE] Iteration 50: error = 97.7995453, gradient norm = 0.0148661 (50 iterations in 4.925s)
[t-SNE] Iteration 100: error = 84.0072556, gradient norm = 0.0072344 (50 iterations in 4.098s)
[t-SNE] Iteration 150: error = 81.9547729, gradient norm = 0.0038887 (50 iterations in 3.829s)
[t-SNE] Iteration 200: error = 81.1930771, gradient norm = 0.0023243 (50 iterations in 3.886s)
[t-SNE] Iteration 250: error = 80.7936783, gradient norm = 0.0017376 (50 iterations in 3.906s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 80.793678
[t-SNE] Iteration 300: error = 2.6971016, gradient norm = 0.0013003 (50 iterations in 3.848s)
[t-SNE] Iteration 350: error = 2.1623621, gradient norm = 0.0005753 (50 iterations in 3.746s)
[t-SNE] Iteration 400: error = 1.9135176, gradient norm = 0.0003476 (50 iterations in 3.750s)
[t-SNE] Iteration 450: error = 1.7679424, gradient norm = 0.0002466 (50 iterations in 3.763s)
[t-SNE] Iteration 500: error = 1.6742762, gradient norm = 0.0001907 (50 iterations in 3.771s)
[t-SNE] Iteration 550: error = 1.6101197, gradient norm = 0.0001570 (50 iterations in 3.776s)
[t-SNE] Iteration 600: error = 1.5637125, gradient norm = 0.0001333 (50 iterations in 3.787s)
[t-SNE] Iteration 650: error = 1.5287232, gradient norm = 0.0001169 (50 iterations in 3.789s)
[t-SNE] Iteration 700: error = 1.5011986, gradient norm = 0.0001056 (50 iterations in 3.797s)
[t-SNE] Iteration 750: error = 1.4793161, gradient norm = 0.0000964 (50 iterations in 3.805s)
[t-SNE] Iteration 800: error = 1.4618779, gradient norm = 0.0000929 (50 iterations in 3.807s)
[t-SNE] Iteration 850: error = 1.4484754, gradient norm = 0.0000847 (50 iterations in 3.801s)
[t-SNE] Iteration 900: error = 1.4374721, gradient norm = 0.0000808 (50 iterations in 3.802s)
[t-SNE] Iteration 950: error = 1.4281392, gradient norm = 0.0000762 (50 iterations in 3.805s)
[t-SNE] Iteration 1000: error = 1.4201696, gradient norm = 0.0000742 (50 iterations in 3.811s)
[t-SNE] Error after 1000 iterations: 1.420170
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...

```



Done

performing tsne with perplexity 50 and with 2000 iterations at max

[t-SNE] Computing 151 nearest neighbors...

[t-SNE] Indexed 7352 samples in 0.084s...

[t-SNE] Computed neighbors for 7352 samples in 29.811s...

[t-SNE] Computed conditional probabilities for sample 1000 / 7352

[t-SNE] Computed conditional probabilities for sample 2000 / 7352

[t-SNE] Computed conditional probabilities for sample 3000 / 7352

[t-SNE] Computed conditional probabilities for sample 4000 / 7352

[t-SNE] Computed conditional probabilities for sample 5000 / 7352

[t-SNE] Computed conditional probabilities for sample 6000 / 7352

[t-SNE] Computed conditional probabilities for sample 7000 / 7352

[t-SNE] Computed conditional probabilities for sample 7352 / 7352

[t-SNE] Mean sigma: 1.437672

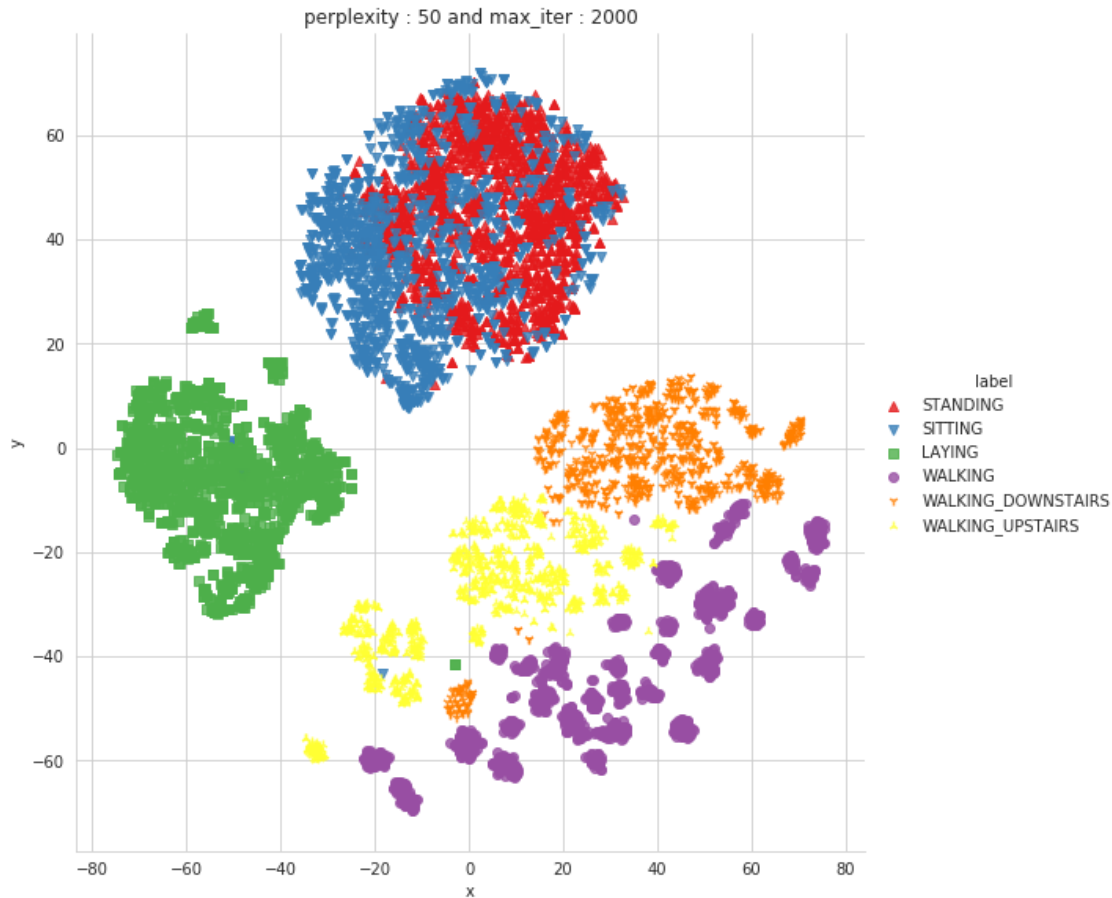
[t-SNE] Computed conditional probabilities in 0.563s

[t-SNE] Iteration 50: error = 86.5717087, gradient norm = 0.0175077 (50 iterations in 9.532s)

[t-SNE] Iteration 100: error = 75.5988235, gradient norm = 0.0040401 (50 iterations in 7.759s)

[t-SNE] Iteration 150: error = 74.7132950, gradient norm = 0.0022374 (50 iterations in 6.777s)

```
[t-SNE] Iteration 200: error = 74.3355331, gradient norm = 0.0015600 (50 iterations in 6.712s)
[t-SNE] Iteration 250: error = 74.1238327, gradient norm = 0.0013079 (50 iterations in 6.724s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 74.123833
[t-SNE] Iteration 300: error = 2.1673098, gradient norm = 0.0012021 (50 iterations in 6.918s)
[t-SNE] Iteration 350: error = 1.7651653, gradient norm = 0.0004890 (50 iterations in 6.872s)
[t-SNE] Iteration 400: error = 1.5937643, gradient norm = 0.0002820 (50 iterations in 6.877s)
[t-SNE] Iteration 450: error = 1.4993401, gradient norm = 0.0001900 (50 iterations in 6.881s)
[t-SNE] Iteration 500: error = 1.4392725, gradient norm = 0.0001415 (50 iterations in 6.878s)
[t-SNE] Iteration 550: error = 1.3982749, gradient norm = 0.0001117 (50 iterations in 6.861s)
[t-SNE] Iteration 600: error = 1.3687805, gradient norm = 0.0000930 (50 iterations in 6.867s)
[t-SNE] Iteration 650: error = 1.3471440, gradient norm = 0.0000831 (50 iterations in 6.870s)
[t-SNE] Iteration 700: error = 1.3317789, gradient norm = 0.0000741 (50 iterations in 6.895s)
[t-SNE] Iteration 750: error = 1.3202772, gradient norm = 0.0000682 (50 iterations in 6.894s)
[t-SNE] Iteration 800: error = 1.3111961, gradient norm = 0.0000654 (50 iterations in 6.898s)
[t-SNE] Iteration 850: error = 1.3041462, gradient norm = 0.0000611 (50 iterations in 6.877s)
[t-SNE] Iteration 900: error = 1.2984530, gradient norm = 0.0000579 (50 iterations in 6.878s)
[t-SNE] Iteration 950: error = 1.2937618, gradient norm = 0.0000519 (50 iterations in 6.887s)
[t-SNE] Iteration 1000: error = 1.2894143, gradient norm = 0.0000500 (50 iterations in 6.895s)
[t-SNE] Error after 1000 iterations: 1.289414
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...
```



Done

performing tsne with perplexity 90 and with 2000 iterations at max

[t-SNE] Computing 271 nearest neighbors...

[t-SNE] Indexed 7352 samples in 0.085s...

[t-SNE] Computed neighbors for 7352 samples in 30.783s...

[t-SNE] Computed conditional probabilities for sample 1000 / 7352

[t-SNE] Computed conditional probabilities for sample 2000 / 7352

[t-SNE] Computed conditional probabilities for sample 3000 / 7352

[t-SNE] Computed conditional probabilities for sample 4000 / 7352

[t-SNE] Computed conditional probabilities for sample 5000 / 7352

[t-SNE] Computed conditional probabilities for sample 6000 / 7352

[t-SNE] Computed conditional probabilities for sample 7000 / 7352

[t-SNE] Computed conditional probabilities for sample 7352 / 7352

[t-SNE] Mean sigma: 1.540175

[t-SNE] Computed conditional probabilities in 0.960s

[t-SNE] Iteration 50: error = 77.8780289, gradient norm = 0.0304282 (50 iterations in 11.843s)

[t-SNE] Iteration 100: error = 69.3429031, gradient norm = 0.0028602 (50 iterations in 11.184s)

[t-SNE] Iteration 150: error = 68.8140335, gradient norm = 0.0018916 (50 iterations in 10.861s)

```
[t-SNE] Iteration 200: error = 68.6173096, gradient norm = 0.0011898 (50 iterations in 10.953s)
[t-SNE] Iteration 250: error = 68.5081253, gradient norm = 0.0010420 (50 iterations in 11.034s)
[t-SNE] KL divergence after 250 iterations with early exaggeration: 68.508125
[t-SNE] Iteration 300: error = 1.8464389, gradient norm = 0.0012062 (50 iterations in 11.311s)
[t-SNE] Iteration 350: error = 1.5126369, gradient norm = 0.0004407 (50 iterations in 11.089s)
[t-SNE] Iteration 400: error = 1.3816696, gradient norm = 0.0002530 (50 iterations in 11.059s)
[t-SNE] Iteration 450: error = 1.3117870, gradient norm = 0.0001741 (50 iterations in 11.065s)
[t-SNE] Iteration 500: error = 1.2696241, gradient norm = 0.0001230 (50 iterations in 11.059s)
[t-SNE] Iteration 550: error = 1.2407528, gradient norm = 0.0000947 (50 iterations in 11.048s)
[t-SNE] Iteration 600: error = 1.2200854, gradient norm = 0.0000762 (50 iterations in 11.047s)
[t-SNE] Iteration 650: error = 1.2050776, gradient norm = 0.0000659 (50 iterations in 11.058s)
[t-SNE] Iteration 700: error = 1.1939315, gradient norm = 0.0000586 (50 iterations in 11.072s)
[t-SNE] Iteration 750: error = 1.1858423, gradient norm = 0.0000530 (50 iterations in 11.082s)
[t-SNE] Iteration 800: error = 1.1796997, gradient norm = 0.0000490 (50 iterations in 11.086s)
[t-SNE] Iteration 850: error = 1.1750507, gradient norm = 0.0000472 (50 iterations in 11.079s)
[t-SNE] Iteration 900: error = 1.1714048, gradient norm = 0.0000439 (50 iterations in 11.071s)
[t-SNE] Iteration 950: error = 1.1685311, gradient norm = 0.0000415 (50 iterations in 11.069s)
[t-SNE] Iteration 1000: error = 1.1659497, gradient norm = 0.0000405 (50 iterations in 11.073s)
[t-SNE] Error after 1000 iterations: 1.165950
Done..
Creating plot for this t-sne visualization..
saving this plot as image in present working directory...
```



Done

## 5.1 Obtain the train and test data

```
In [2]: train = pd.read_csv('UCI_HAR_Dataset/csv_files/train.csv')
        test = pd.read_csv('UCI_HAR_Dataset/csv_files/test.csv')
        print(train.shape, test.shape)
```

(7352, 564) (2947, 564)

```
In [3]: train.head(1)
```

```
Out[3]:
```

	tBodyAcc_mean_X	tBodyAcc_mean_Y	tBodyAcc_mean_Z	tBodyAcc_std_X \
0	0.288585	-0.020294	-0.132905	-0.995279

	tBodyAcc_std_Y	tBodyAcc_std_Z	tBodyAcc_mad_X	tBodyAcc_mad_Y \
0	-0.983111	-0.913526	-0.995112	-0.983185

```

tBodyAcc_mad_Z  tBodyAcc_max_X      ...      angletBodyAccMeangravity  \
0      -0.923527      -0.934724      ...      -0.112754

angletBodyAccJerkMeangravityMean  angletBodyGyroMeangravityMean  \
0      0.0304      -0.464761

angletBodyGyroJerkMeangravityMean  angleXgravityMean  angleYgravityMean  \
0      -0.018446      -0.841247      0.179941

angleZgravityMean  subject  Activity  ActivityName
0      -0.058627      1      5      STANDING

[1 rows x 564 columns]

```

```

In [4]: # get X_train and y_train from csv files
X_train = train.drop(['subject', 'Activity', 'ActivityName'], axis=1)
y_train = train.ActivityName

In [5]: # get X_test and y_test from test csv file
X_test = test.drop(['subject', 'Activity', 'ActivityName'], axis=1)
y_test = test.ActivityName

In [6]: print('X_train and y_train : ({},{})'.format(X_train.shape, y_train.shape))
print('X_test and y_test : ({},{})'.format(X_test.shape, y_test.shape))

X_train and y_train : ((7352, 561),(7352,))
X_test and y_test : ((2947, 561),(2947,))

```

## 6 Let's model with our data

### 6.0.1 Labels that are useful in plotting confusion matrix

```

In [43]: labels=['LAYING', 'SITTING', 'STANDING', 'WALKING', 'WALKING_DOWNSTAIRS', 'WALKING_UPSTAIRS']

```

### 6.0.2 Function to plot the confusion matrix

```

In [176]: import itertools
import numpy as np
import matplotlib.pyplot as plt
from sklearn.metrics import confusion_matrix

def plot_confusion_matrix(cm, classes,
                           normalize=False,
                           title='Confusion matrix',
                           cmap=plt.cm.Blues):
    if normalize:
        cm = cm.astype('float') / cm.sum(axis=1)[:, np.newaxis]

```



```

plt.imshow(cm, interpolation='nearest', cmap=cmap)
plt.title(title)
plt.colorbar()
tick_marks = np.arange(len(classes))
plt.xticks(tick_marks, classes, rotation=90)
plt.yticks(tick_marks, classes)

fmt = '.2f' if normalize else 'd'
thresh = cm.max() / 2.
for i, j in itertools.product(range(cm.shape[0]), range(cm.shape[1])):
    plt.text(j, i, format(cm[i, j], fmt),
             horizontalalignment="center",
             color="white" if cm[i, j] > thresh else "black")

plt.tight_layout()
plt.ylabel('True label')
plt.xlabel('Predicted label')

```

### 6.0.3 Generic function to run any model specified

```

In [177]: from datetime import datetime
def perform_model(model, X_train, y_train, X_test, y_test, class_labels, cm_normalize,
                  print_cm=True, cm_cmap=plt.cm.Greens):

    # to store results at various phases
    results = dict()

    # time at which model starts training
    train_start_time = datetime.now()
    print('training the model..')
    model.fit(X_train, y_train)
    print('Done \n \n')
    train_end_time = datetime.now()
    results['training_time'] = train_end_time - train_start_time
    print('training_time(HH:MM:SS.ms) - {}'.format(results['training_time']))

    # predict test data
    print('Predicting test data')
    test_start_time = datetime.now()
    y_pred = model.predict(X_test)
    test_end_time = datetime.now()
    print('Done \n \n')
    results['testing_time'] = test_end_time - test_start_time
    print('testing_time(HH:MM:SS.ms) - {}'.format(results['testing_time']))
    results['predicted'] = y_pred

```

```

# calculate overall accuracy of the model
accuracy = metrics.accuracy_score(y_true=y_test, y_pred=y_pred)
# store accuracy in results
results['accuracy'] = accuracy
print('-----')
print('|      Accuracy      |')
print('-----')
print('\n    {} \n \n'.format(accuracy))

# confusion matrix
cm = metrics.confusion_matrix(y_test, y_pred)
results['confusion_matrix'] = cm
if print_cm:
    print('-----')
    print('| Confusion Matrix |')
    print('-----')
    print('\n {} \n'.format(cm))

# plot confusion matrix
plt.figure(figsize=(8,8))
plt.grid(b=False)
plot_confusion_matrix(cm, classes=class_labels, normalize=True, title='Normalized Confusion Matrix')
plt.show()

# get classification report
print('-----')
print('| Classification Report |')
print('-----')
classification_report = metrics.classification_report(y_test, y_pred)
# store report in results
results['classification_report'] = classification_report
print(classification_report)

# add the trained model to the results
results['model'] = model

return results

```

#### 6.0.4 Method to print the gridsearch Attributes

```

In [178]: def print_grid_search_attributes(model):
# Estimator that gave highest score among all the estimators formed in GridSearchCV
print('-----')
print('|      Best Estimator      |')
print('-----')
print('\n \t {} \n'.format(model.best_estimator_))

```

```

# parameters that gave best results while performing grid search
print('-----')
print('|      Best parameters      |')
print('-----')
print('\tParameters of best estimator : \n\n\t{}\n'.format(model.best_params_))

# number of cross validation splits
print('-----')
print('|  No of CrossValidation sets  |')
print('-----')
print('\n\tTotal numbre of cross validation sets: {}\n'.format(model.n_splits_))

# Average cross validated score of the best estimator, from the Grid Search
print('-----')
print('|      Best Score      |')
print('-----')
print('\n\tAverage Cross Validate scores of best estimator : \n\n\t{}\n'.format(model.best_score_))

```

## 7 1. Logistic Regression with Grid Search

```

In [11]: from sklearn import linear_model
         from sklearn import metrics

         from sklearn.model_selection import GridSearchCV

In [12]: # start Grid search
         parameters = {'C':[0.01, 0.1, 1, 10, 20, 30], 'penalty':['l2','l1']}
         log_reg = linear_model.LogisticRegression()
         log_reg_grid = GridSearchCV(log_reg, param_grid=parameters, cv=3, verbose=1, n_jobs=8)
         log_reg_grid_results = perform_model(log_reg_grid, X_train, y_train, X_test, y_test,

training the model..
Fitting 3 folds for each of 12 candidates, totalling 36 fits

[Parallel(n_jobs=8)]: Done 36 out of 36 | elapsed: 31.3s finished

Done

training_time(HH:MM:SS.ms) - 0:00:41.152479

```

```
Predicting test data
Done
```

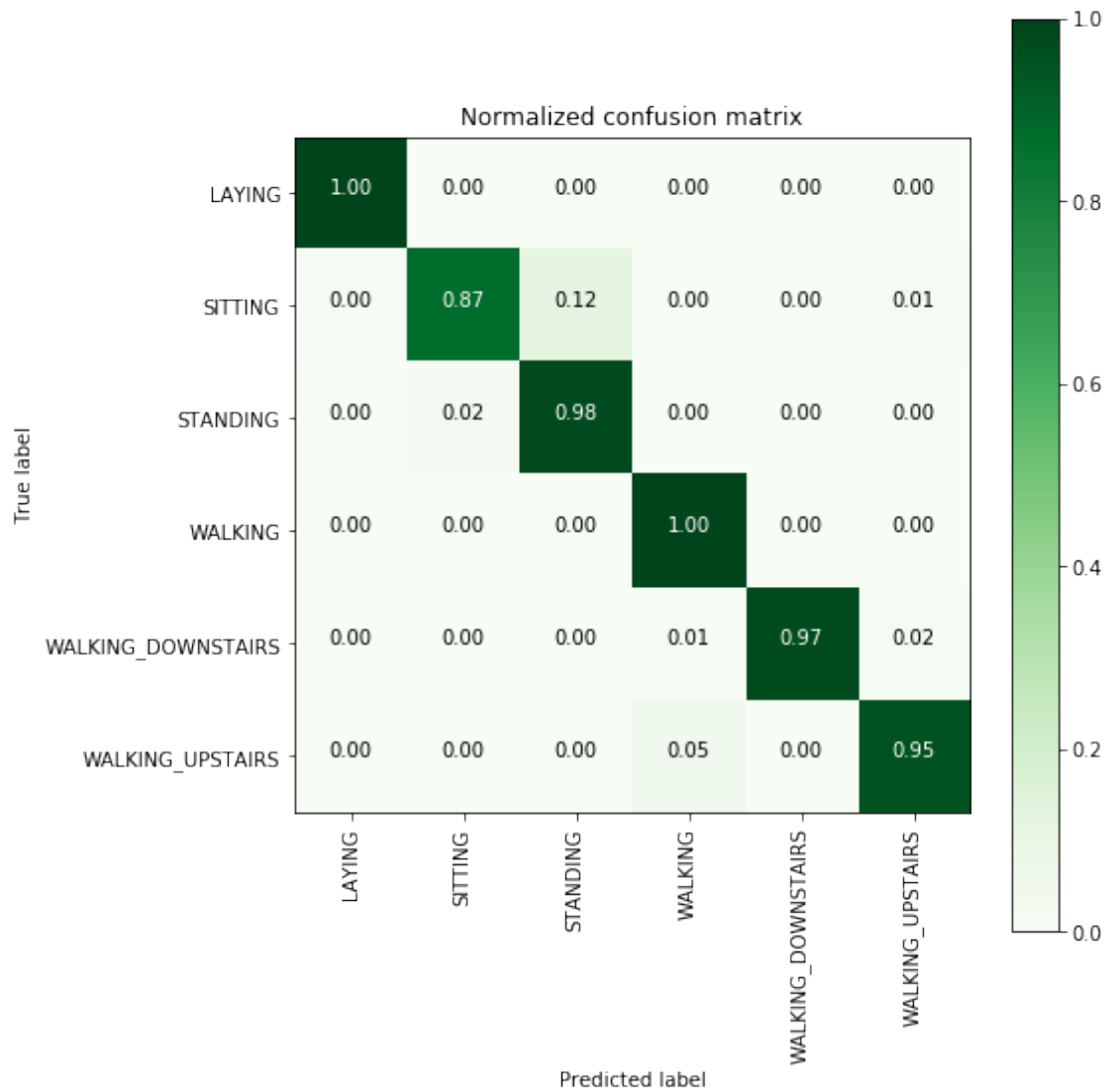
```
testing time(HH:MM:SS:ms) - 0:00:00.021982
```

```
-----
|      Accuracy      |
|-----|
```

```
0.9630132337970818
```

```
-----
| Confusion Matrix |
|-----|
```

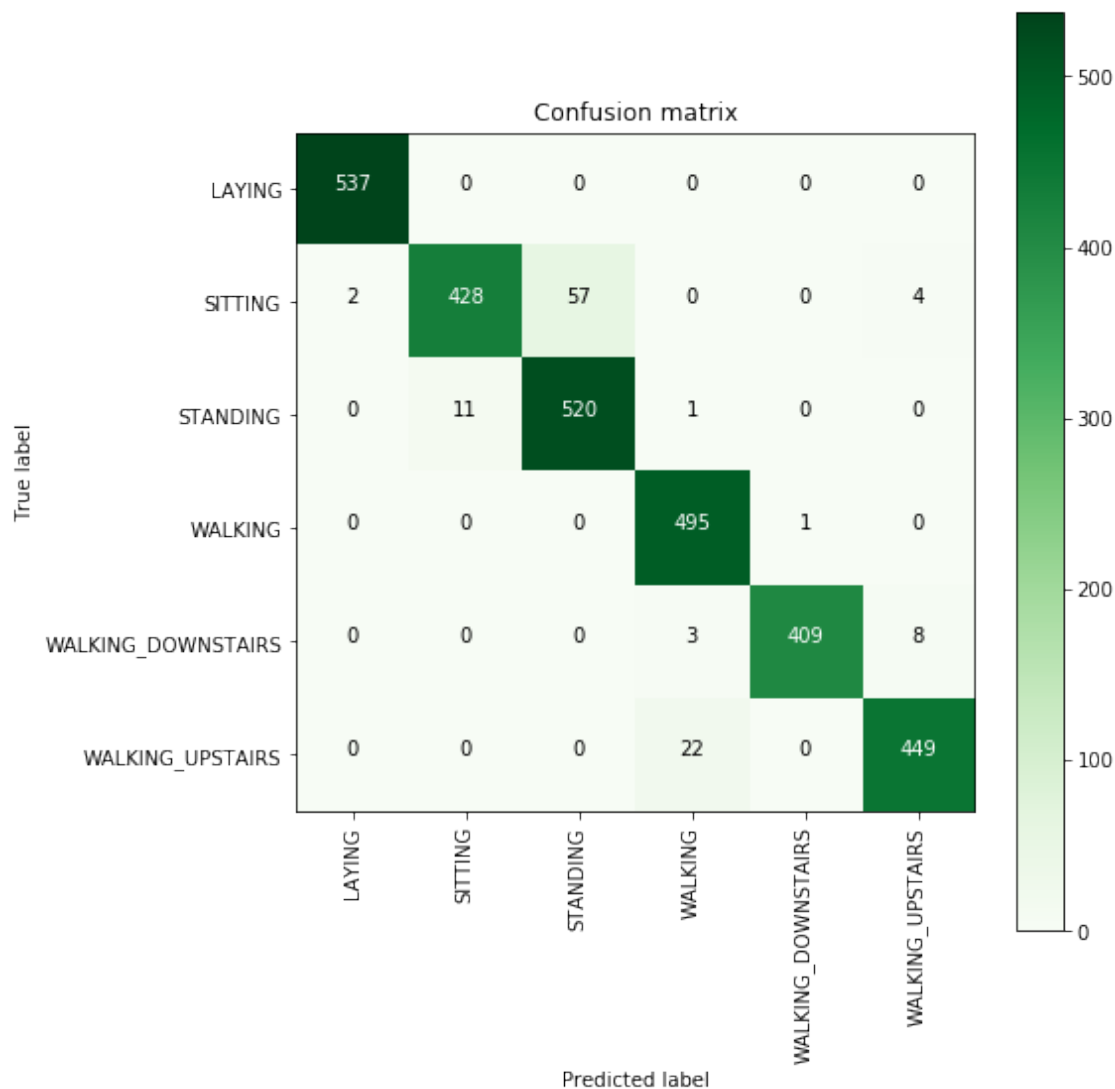
```
[[537  0  0  0  0  0]
 [ 2 428 57  0  0  4]
 [ 0 11 520  1  0  0]
 [ 0  0  0 495  1  0]
 [ 0  0  0  3 409  8]
 [ 0  0  0 22  0 449]]
```



-----  
Classification Report

	precision	recall	f1-score	support
LAYING	1.00	1.00	1.00	537
SITTING	0.97	0.87	0.92	491
STANDING	0.90	0.98	0.94	532
WALKING	0.95	1.00	0.97	496
WALKING_DOWNSTAIRS	1.00	0.97	0.99	420
WALKING_UPSTAIRS	0.97	0.95	0.96	471
avg / total	0.96	0.96	0.96	2947

```
In [13]: plt.figure(figsize=(8,8))
plt.grid(b=False)
plot_confusion_matrix(log_reg_grid_results['confusion_matrix'], classes=labels, cmap=)
plt.show()
```



```
In [14]: # observe the attributes of the model
print_grid_search_attributes(log_reg_grid_results['model'])
```

```
-----
| Best Estimator |
-----
```

```
LogisticRegression(C=30, class_weight=None, dual=False, fit_intercept=True,
    intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
    penalty='l2', random_state=None, solver='liblinear', tol=0.0001,
    verbose=0, warm_start=False)
```

```
-----
|      Best parameters      |
|-----|
```

Parameters of best estimator :

```
{'C': 30, 'penalty': 'l2'}
```

```
-----
|  No of CrossValidation sets  |
|-----|
```

Total nombre of cross validation sets: 3

```
-----
|      Best Score      |
|-----|
```

Average Cross Validate scores of best estimator :

```
0.9460010881392819
```

## 8 2. Linear SVC with GridSearch

```
In [15]: from sklearn.svm import LinearSVC
```

```
In [16]: parameters = {'C':[0.125, 0.5, 1, 2, 8, 16]}
         lr_svc = LinearSVC(tol=0.00005)
         lr_svc_grid = GridSearchCV(lr_svc, param_grid=parameters, n_jobs=8, verbose=1)
         lr_svc_grid_results = perform_model(lr_svc_grid, X_train, y_train, X_test, y_test, cl
```

training the model..

Fitting 3 folds for each of 6 candidates, totalling 18 fits

```
[Parallel(n_jobs=8)]: Done 18 out of 18 | elapsed: 9.5s finished
```

Done

```
training_time(HH:MM:SS.ms) - 0:00:13.065672
```

```
Predicting test data  
Done
```

```
testing time(HH:MM:SS.ms) - 0:00:00.003324
```

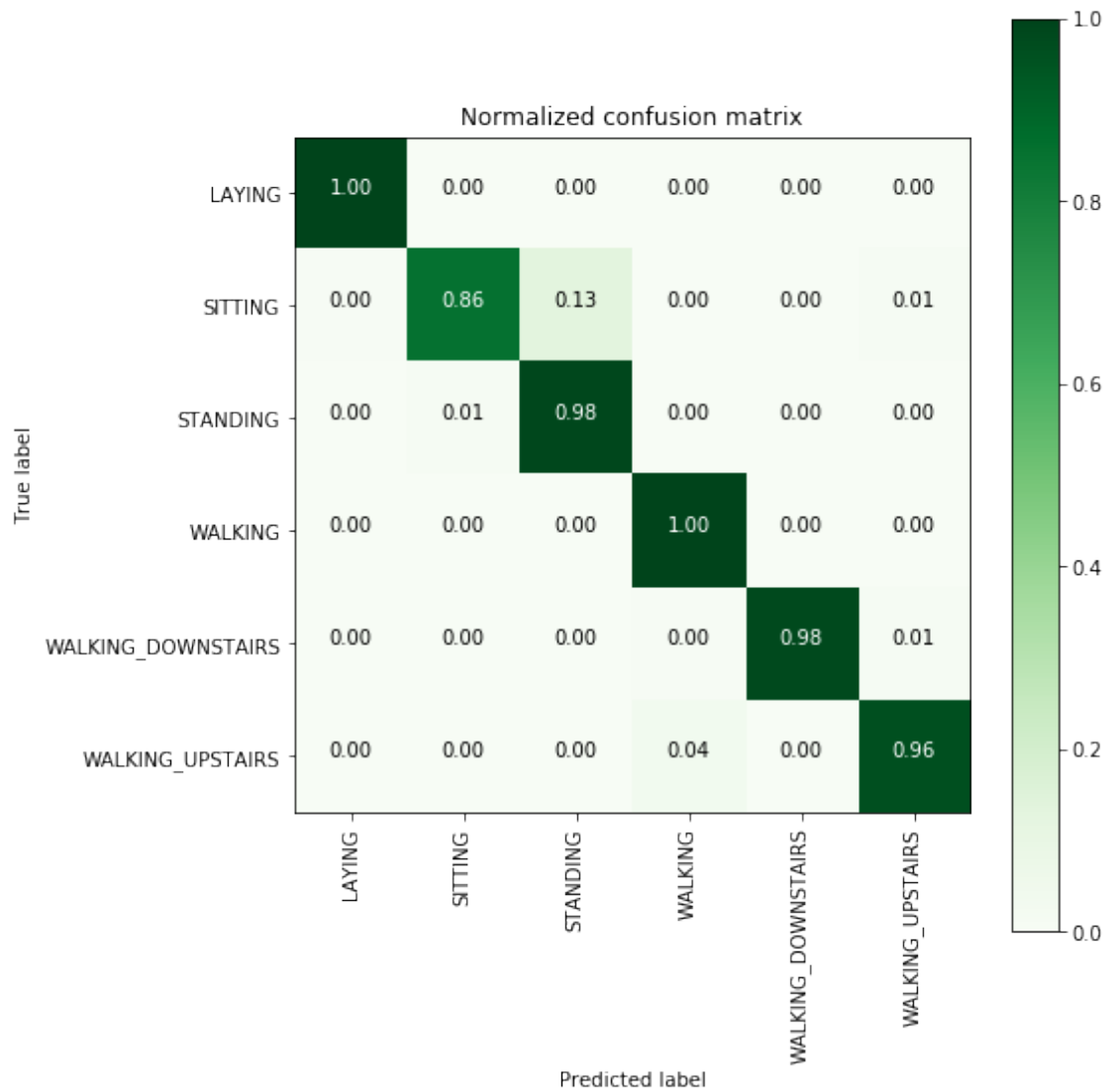
```
-----  
|      Accuracy      |  
-----
```

```
0.9650492025788938
```

```
-----  
| Confusion Matrix |  
-----
```

```
[[537  0  0  0  0  0]  
[ 2 420 65  0  0  4]  
[ 0  7 524  1  0  0]  
[ 0  0  0 496  0  0]  
[ 0  0  0  2 413  5]  
[ 0  0  0  17  0 454]]
```





-----  
Classification Report

	precision	recall	f1-score	support
LAYING	1.00	1.00	1.00	537
SITTING	0.98	0.86	0.92	491
STANDING	0.89	0.98	0.93	532
WALKING	0.96	1.00	0.98	496
WALKING_DOWNSTAIRS	1.00	0.98	0.99	420
WALKING_UPSTAIRS	0.98	0.96	0.97	471
avg / total	0.97	0.97	0.96	2947

```
In [17]: print_grid_search_attributes(lr_svc_grid_results['model'])
```

```
-----  
|      Best Estimator      |  
-----
```

```
LinearSVC(C=1, class_weight=None, dual=True, fit_intercept=True,  
intercept_scaling=1, loss='squared_hinge', max_iter=1000,  
multi_class='ovr', penalty='l2', random_state=None, tol=5e-05,  
verbose=0)
```

```
-----  
|    Best parameters      |  
-----
```

```
Parameters of best estimator :
```

```
{'C': 1}
```

```
-----  
| No of CrossValidation sets |  
-----
```

```
Total nombre of cross validation sets: 3
```

```
-----  
|      Best Score      |  
-----
```

```
Average Cross Validate scores of best estimator :
```

```
0.9455930359085963
```

## 9 3. Kernel SVM with GridSearch

```
In [18]: from sklearn.svm import SVC  
         parameters = {'C': [2,8,16],\  
                       'gamma': [ 0.0078125, 0.125, 2]}  
         rbf_svm = SVC(kernel='rbf')  
         rbf_svm_grid = GridSearchCV(rbf_svm,param_grid=parameters,n_jobs=8)  
         rbf_svm_grid_results = perform_model(rbf_svm_grid, X_train, y_train, X_test, y_test, c  
  
training the model..  
Done
```

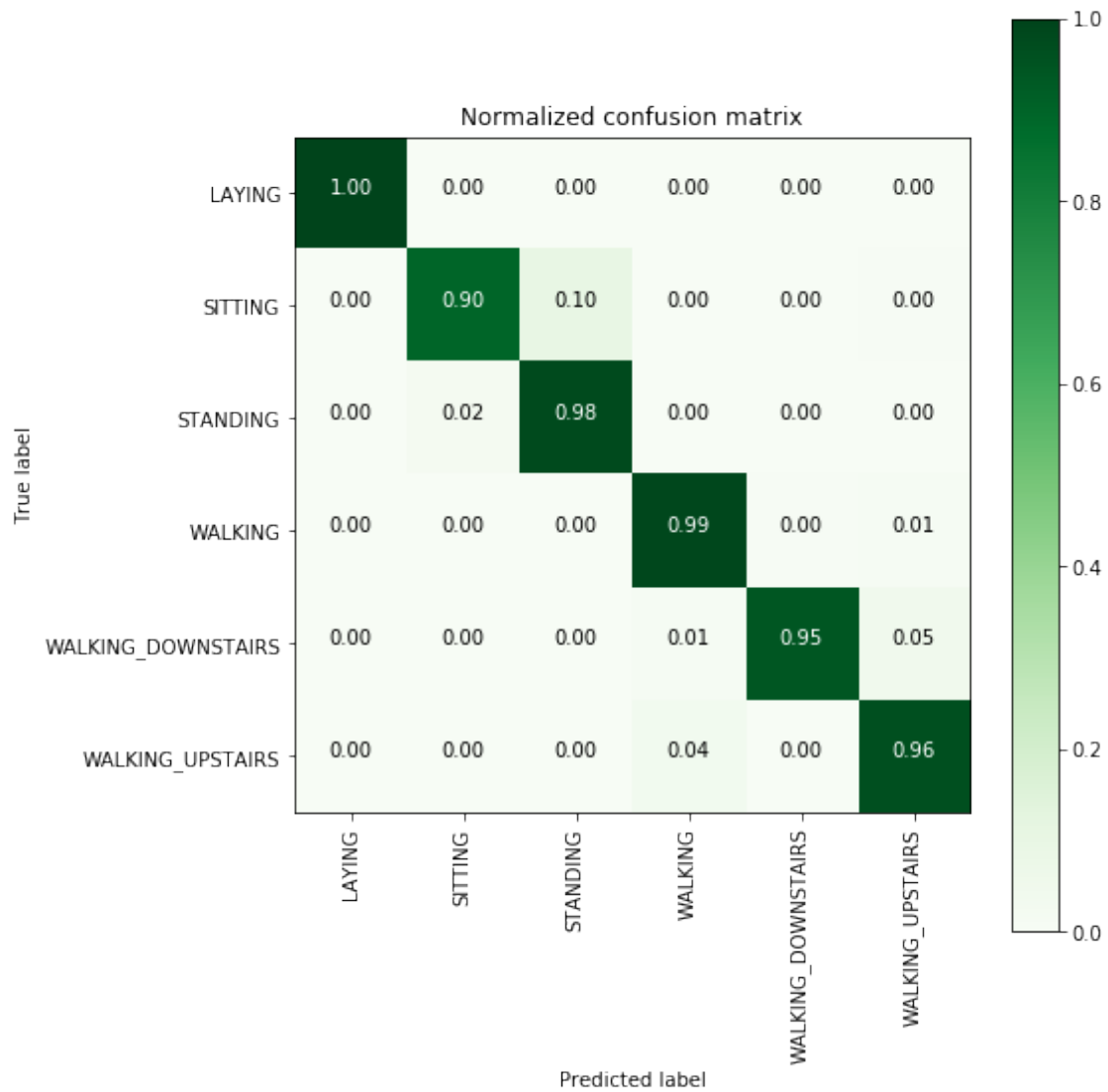
```
training_time(HH:MM:SS.ms) - 0:02:21.703537
```

```
Predicting test data  
Done
```

```
testing time(HH:MM:SS.ms) - 0:00:02.286671
```

```
-----  
|      Accuracy      |  
-----  
  
0.9626739056667798
```

```
-----  
| Confusion Matrix |  
-----  
  
[[537  0  0  0  0  0]  
[  0 441 48  0  0  2]  
[  0 12 520  0  0  0]  
[  0  0  0 489  2  5]  
[  0  0  0  4 397 19]  
[  0  0  0 17  1 453]]
```



-----  
Classification Report

	precision	recall	f1-score	support
LAYING	1.00	1.00	1.00	537
SITTING	0.97	0.90	0.93	491
STANDING	0.92	0.98	0.95	532
WALKING	0.96	0.99	0.97	496
WALKING_DOWNSTAIRS	0.99	0.95	0.97	420
WALKING_UPSTAIRS	0.95	0.96	0.95	471
avg / total	0.96	0.96	0.96	2947

## 10 4. Decision Trees with GridSearchCV

```
In [19]: from sklearn.tree import DecisionTreeClassifier
         parameters = {'max_depth':np.arange(3,10,2)}
         dt = DecisionTreeClassifier()
         dt_grid = GridSearchCV(dt,param_grid=parameters, n_jobs=8)
         dt_grid_results = perform_model(dt_grid, X_train, y_train, X_test, y_test, class_labels)
         print_grid_search_attributes(dt_grid_results['model'])
```

```
training the model..
Done
```

```
training_time(HH:MM:SS.ms) - 0:00:05.120427
```

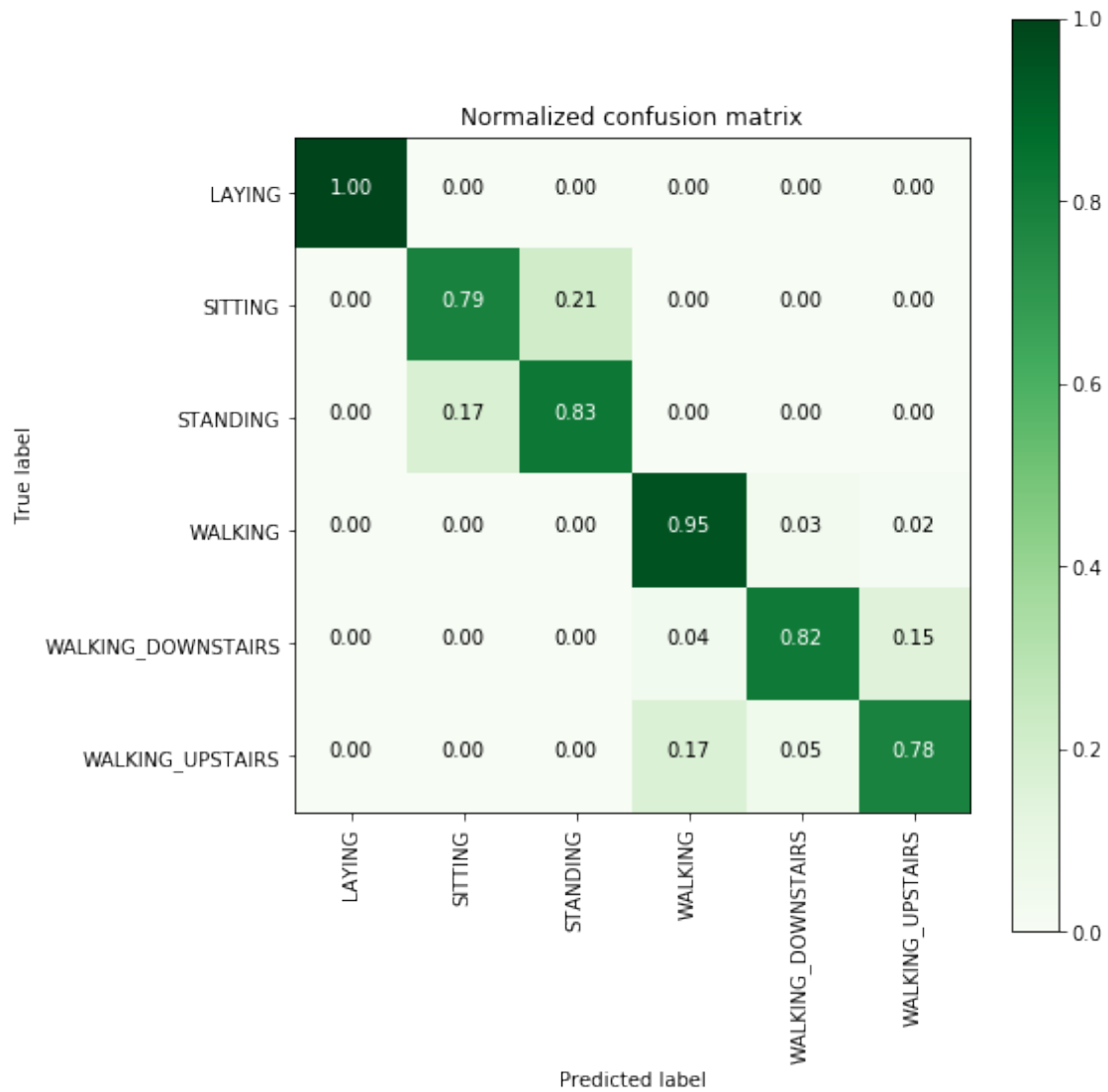
```
Predicting test data
Done
```

```
testing time(HH:MM:SS.ms) - 0:00:00.002483
```

```
-----
|      Accuracy      |
-----
0.8639294197488971
```

```
-----
| Confusion Matrix |
-----

[[537   0   0   0   0   0]
 [  0 386 105   0   0   0]
 [  0  93 439   0   0   0]
 [  0   0   0 472  16   8]
 [  0   0   0  16 343  61]
 [  0   0   0  78  24 369]]
```



-----  
Classification Report

	precision	recall	f1-score	support
LAYING	1.00	1.00	1.00	537
SITTING	0.81	0.79	0.80	491
STANDING	0.81	0.83	0.82	532
WALKING	0.83	0.95	0.89	496
WALKING_DOWNSTAIRS	0.90	0.82	0.85	420
WALKING_UPSTAIRS	0.84	0.78	0.81	471
avg / total	0.86	0.86	0.86	2947

```
-----
|      Best Estimator      |
-----
```

```
DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=7,
                        max_features=None, max_leaf_nodes=None,
                        min_impurity_decrease=0.0, min_impurity_split=None,
                        min_samples_leaf=1, min_samples_split=2,
                        min_weight_fraction_leaf=0.0, presort=False, random_state=None,
                        splitter='best')
```

```
-----
|    Best parameters      |
-----
```

```
Parameters of best estimator :
```

```
{'max_depth': 7}
```

```
-----
| No of CrossValidation sets |
-----
```

```
Total numbere of cross validation sets: 3
```

```
-----
|      Best Score        |
-----
```

```
Average Cross Validate scores of best estimator :
```

```
0.8382752992383025
```

## 11 5. Random Forest Classifier with GridSearch

```
In [20]: from sklearn.ensemble import RandomForestClassifier
         params = {'n_estimators': np.arange(10,201,20), 'max_depth':np.arange(3,15,2)}
         rfc = RandomForestClassifier()
         rfc_grid = GridSearchCV(rfc, param_grid=params, n_jobs=8)
         rfc_grid_results = perform_model(rfc_grid, X_train, y_train, X_test, y_test, class_label)
         print_grid_search_attributes(rfc_grid_results['model'])
```

```
training the model..
```

```
Done
```

```
training_time(HH:MM:SS.ms) - 0:01:59.069438
```

```
Predicting test data  
Done
```

```
testing time(HH:MM:SS.ms) - 0:00:00.033301
```

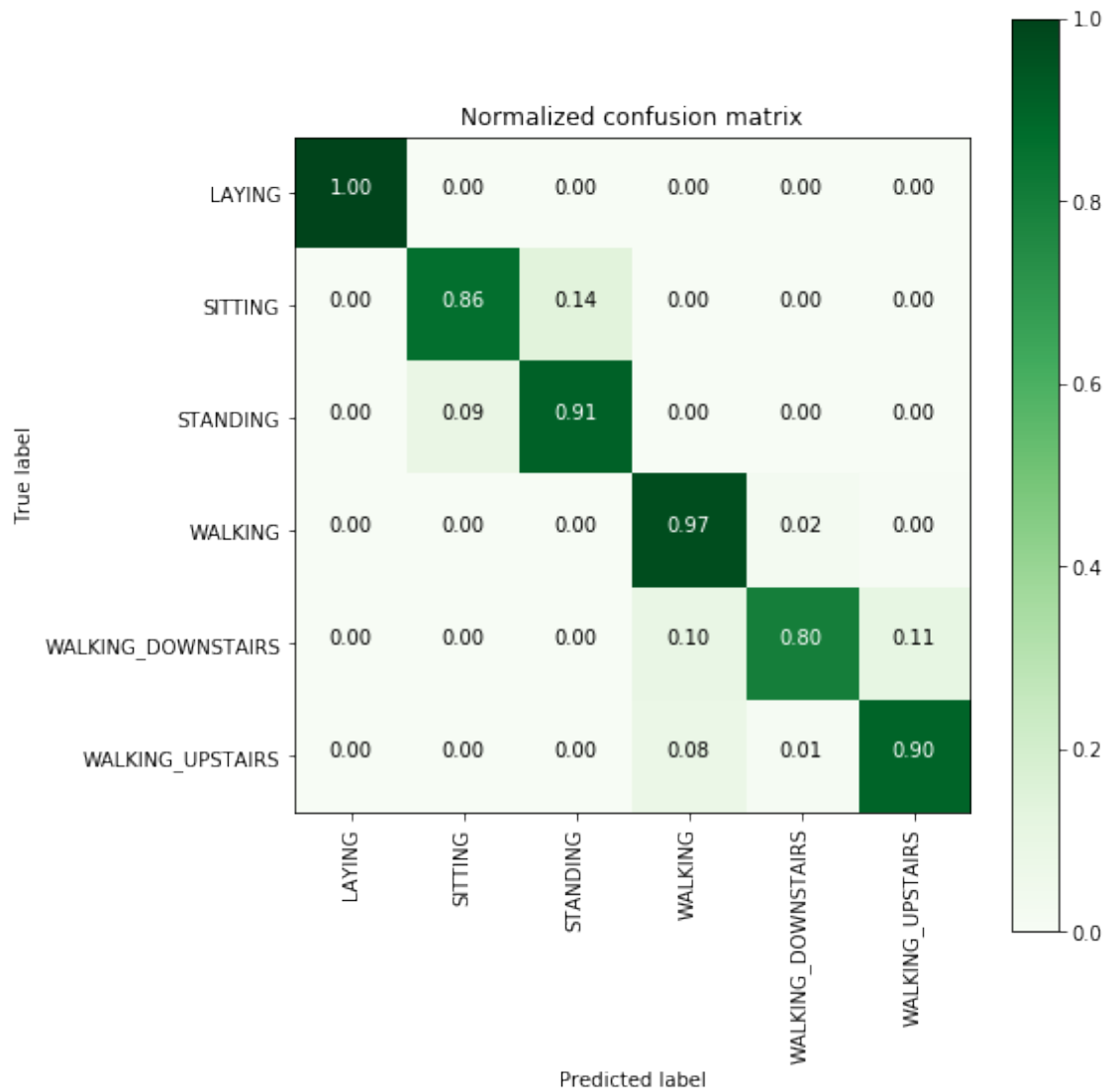
```
-----  
|      Accuracy      |  
-----
```

```
0.9107567017305734
```

```
-----  
| Confusion Matrix |  
-----
```

```
[[537  0  0  0  0  0]  
[  0 422 69  0  0  0]  
[  0 49 483  0  0  0]  
[  0  0  0 482 12  2]  
[  0  0  0 40 335 45]  
[  0  0  0 40  6 425]]
```





-----  
Classification Report

	precision	recall	f1-score	support
LAYING	1.00	1.00	1.00	537
SITTING	0.90	0.86	0.88	491
STANDING	0.88	0.91	0.89	532
WALKING	0.86	0.97	0.91	496
WALKING_DOWNSTAIRS	0.95	0.80	0.87	420
WALKING_UPSTAIRS	0.90	0.90	0.90	471
avg / total	0.91	0.91	0.91	2947

```
-----
|      Best Estimator      |
-----
```

```
RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini',
    max_depth=7, max_features='auto', max_leaf_nodes=None,
    min_impurity_decrease=0.0, min_impurity_split=None,
    min_samples_leaf=1, min_samples_split=2,
    min_weight_fraction_leaf=0.0, n_estimators=130, n_jobs=1,
    oob_score=False, random_state=None, verbose=0,
    warm_start=False)
```

```
-----
|    Best parameters      |
-----
```

```
Parameters of best estimator :
```

```
{'max_depth': 7, 'n_estimators': 130}
```

```
-----
|  No of CrossValidation sets  |
-----
```

```
Total nombre of cross validation sets: 3
```

```
-----
|      Best Score        |
-----
```

```
Average Cross Validate scores of best estimator :
```

```
0.9124047878128401
```

## 12 6. Gradient Boosted Decision Trees With GridSearch

```
In [21]: from sklearn.ensemble import GradientBoostingClassifier
    param_grid = {'max_depth': np.arange(5,8,1), \
                  'n_estimators': np.arange(130,170,10)}
    gbdet = GradientBoostingClassifier()
    gbdet_grid = GridSearchCV(gbdet, param_grid=param_grid, n_jobs=8)
    gbdet_grid_results = perform_model(gbdet_grid, X_train, y_train, X_test, y_test, class_)
    print_grid_search_attributes(gbdet_grid_results['model'])
```

```
training the model..
```

```
Done
```

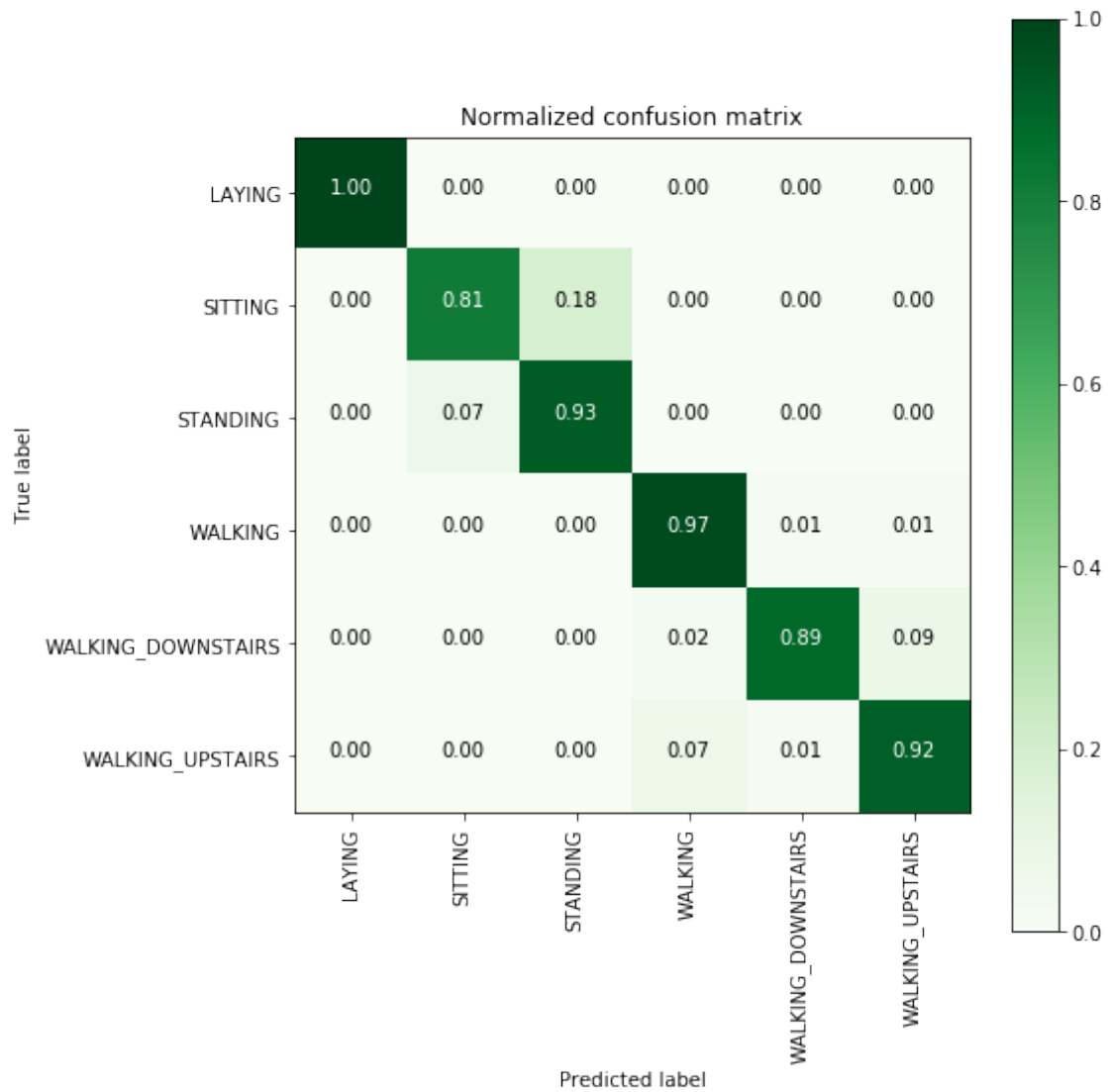
```
training_time(HH:MM:SS.ms) - 0:17:12.707284
```

```
Predicting test data  
Done
```

```
testing time(HH:MM:SS.ms) - 0:00:00.039210
```

```
-----  
|      Accuracy      |  
-----  
  
0.9226331862911435
```

```
-----  
| Confusion Matrix |  
-----  
  
[[537  0  0  0  0  0]  
[  0 399 90  0  0  2]  
[  0 38 494  0  0  0]  
[  0  0  0 483  7  6]  
[  0  0  0 10 374 36]  
[  0  1  0 32  6 432]]
```



-----  
Classification Report

	precision	recall	f1-score	support
LAYING	1.00	1.00	1.00	537
SITTING	0.91	0.81	0.86	491
STANDING	0.85	0.93	0.89	532
WALKING	0.92	0.97	0.95	496
WALKING_DOWNSTAIRS	0.97	0.89	0.93	420
WALKING_UPSTAIRS	0.91	0.92	0.91	471
avg / total	0.92	0.92	0.92	2947

Best Estimator
----------------

```
GradientBoostingClassifier(criterion='friedman_mse', init=None,
    learning_rate=0.1, loss='deviance', max_depth=5,
    max_features=None, max_leaf_nodes=None,
    min_impurity_decrease=0.0, min_impurity_split=None,
    min_samples_leaf=1, min_samples_split=2,
    min_weight_fraction_leaf=0.0, n_estimators=150,
    presort='auto', random_state=None, subsample=1.0, verbose=0,
    warm_start=False)
```

Best parameters

Parameters of best estimator :

```
{'max_depth': 5, 'n_estimators': 150}
```

No of CrossValidation sets
----------------------------

Total nombre de cross validation sets: 3

-----  
Best Score

Average Cross Validate scores of best estimator :

0.9036996735582155

## 13 7. Comparing all models

[illegible]

```

print('rbf SVM classifier   : {:.04}%      {:.04}% '.format(rbf_svm_grid_results['accuracy'],
                                                             100-(rbf_svm_grid_results['accuracy']
                                                             -100)))

print('DecisionTree        : {:.04}%      {:.04}% '.format(dt_grid_results['accuracy'],
                                                             100-(dt_grid_results['accuracy']
                                                             -100)))

print('Random Forest       : {:.04}%      {:.04}% '.format(rfc_grid_results['accuracy'],
                                                             100-(rfc_grid_results['accuracy']
                                                             -100)))

print('GradientBoosting DT : {:.04}%      {:.04}% '.format(rfc_grid_results['accuracy'],
                                                             100-(rfc_grid_results['accuracy']
                                                             -100)))

```

	Accuracy	Error
	-----	-----
Logistic Regression :	96.3%	3.699%
Linear SVC :	96.5%	3.495%
rbf SVM classifier :	96.27%	3.733%
DecisionTree :	86.39%	13.61%
Random Forest :	91.08%	8.924%
GradientBoosting DT :	91.08%	8.924%

### 13.1 Using raw time series data and deep learning methods:

Approch 1 - Using LSTM

Approch 2 - Using CNN - CNN are useful to get best features and realtions between sequece data using convolution.

Approch 3 - Using some cascading techniques.

### 13.2 LSTM

```

In [6]: # Importing libraries
import numpy as np
import pandas as pd
from numpy import mean
from numpy import std
from numpy import dstack
from pandas import read_csv
from matplotlib import pyplot
from sklearn.preprocessing import StandardScaler
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Flatten
from keras.layers import Dropout
from keras.layers.convolutional import Conv1D
from keras.layers.convolutional import MaxPooling1D
from keras.utils import to_categorical
from keras.models import Sequential

```

```

from keras.layers import LSTM
from keras.layers.core import Dense, Dropout

```

Using TensorFlow backend.

```

In [9]: # Activities are the class labels
# It is a 6 class classification
ACTIVITIES = {
    0: 'WALKING',
    1: 'WALKING_UPSTAIRS',
    2: 'WALKING_DOWNSTAIRS',
    3: 'SITTING',
    4: 'STANDING',
    5: 'LAYING',
}

# Utility function to print the confusion matrix
def confusion_matrix(Y_true, Y_pred):
    Y_true = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_true, axis=1)])
    Y_pred = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_pred, axis=1)])

    return pd.crosstab(Y_true, Y_pred, rownames=['True'], colnames=['Pred'])

```

```

In [10]: # Data directory
DATADIR = 'UCI_HAR_Dataset'
# Raw data signals
# Signals are from Accelerometer and Gyroscope
# The signals are in x,y,z directions
# Sensor signals are filtered to have only body acceleration
# excluding the acceleration due to gravity
# Triaxial acceleration from the accelerometer is total acceleration
SIGNALS = [
    "body_acc_x",
    "body_acc_y",
    "body_acc_z",
    "body_gyro_x",
    "body_gyro_y",
    "body_gyro_z",
    "total_acc_x",
    "total_acc_y",
    "total_acc_z"
]

```

```

In [11]: # Utility function to read the data from csv file
def _read_csv(filename):
    return pd.read_csv(filename, delim_whitespace=True, header=None)

# Utility function to load the load

```

```

def load_signals(subset):
    signals_data = []

    for signal in SIGNALS:
        filename = f'UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.txt'
        signals_data.append(
            _read_csv(filename).as_matrix()
        )

    # Transpose is used to change the dimensionality of the output,
    # aggregating the signals by combination of sample/timestep.
    # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
    return np.transpose(signals_data, (1, 2, 0))

In [12]: def load_y(subset):
    """
    The objective that we are trying to predict is a integer, from 1 to 6,
    that represents a human activity. We return a binary representation of
    every sample objective as a 6 bits vector using One Hot Encoding
    (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.html)
    """
    filename = f'UCI_HAR_Dataset/{subset}/y_{subset}.txt'
    y = _read_csv(filename)[0]

    return pd.get_dummies(y).as_matrix()

In [13]: def load_data():
    """
    Obtain the dataset from multiple files.
    Returns: X_train, X_test, y_train, y_test
    """
    X_train, X_test = load_signals('train'), load_signals('test')
    y_train, y_test = load_y('train'), load_y('test')

    return X_train, y_train, X_test, y_test

In [12]: # Importing tensorflow
np.random.seed(42)
import tensorflow as tf
tf.set_random_seed(42)

In [13]: # Importing libraries
from keras.models import Sequential
from keras.layers import LSTM
from keras.layers.core import Dense, Dropout

In [14]: # Initializing parameters
epochs = 30
batch_size = 16
n_hidden = 32

```



```

In [14]: # Utility function to count the number of classes
def _count_classes(y):
    return len(set([tuple(category) for category in y]))

In [16]: # Loading the train and test data
X_train, Y_train, X_test, Y_test = load_data()

In [17]: timesteps = len(X_train[0])
input_dim = len(X_train[0][0])
n_classes = _count_classes(Y_train)
#n_classes = 6
print(timesteps)
print(input_dim)
print(len(X_train))

128
9
7352

```

## Base Model

```

In [14]: # Initiliazing the sequential model
model = Sequential()
# Configuring the parameters
model.add(LSTM(n_hidden, input_shape=(timesteps, input_dim)))
# Adding a dropout layer
model.add(Dropout(0.5))
# Adding a dense output layer with sigmoid activation
model.add(Dense(n_classes, activation='sigmoid'))
model.summary()

```

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 32)	5376
dropout_1 (Dropout)	(None, 32)	0
dense_1 (Dense)	(None, 6)	198

=====  
 Total params: 5,574  
 Trainable params: 5,574  
 Non-trainable params: 0  
 =====

```

In [22]: # Compiling the model
model.compile(loss='categorical_crossentropy',

```

```
optimizer='rmsprop',
metrics=['accuracy'])
```

In [23]: # Training the model

```
model.fit(X_train,
          Y_train,
          batch_size=batch_size,
          validation_data=(X_test, Y_test),
          epochs=epochs)
```

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

7352/7352 [=====] - 54s 7ms/step - loss: 1.3194 - acc: 0.4376 - val\_loss: 1.3194

Epoch 2/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.9842 - acc: 0.5749 - val\_loss: 0.9842

Epoch 3/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.7991 - acc: 0.6470 - val\_loss: 0.7991

Epoch 4/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.6984 - acc: 0.6661 - val\_loss: 0.6984

Epoch 5/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.6306 - acc: 0.6876 - val\_loss: 0.6306

Epoch 6/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.6168 - acc: 0.7084 - val\_loss: 0.6168

Epoch 7/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.6056 - acc: 0.7361 - val\_loss: 0.6056

Epoch 8/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.5260 - acc: 0.7719 - val\_loss: 0.5260

Epoch 9/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.4605 - acc: 0.7900 - val\_loss: 0.4605

Epoch 10/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.4405 - acc: 0.7999 - val\_loss: 0.4405

Epoch 11/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.4180 - acc: 0.8013 - val\_loss: 0.4180

Epoch 12/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.4083 - acc: 0.8198 - val\_loss: 0.4083

Epoch 13/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.3706 - acc: 0.8560 - val\_loss: 0.3706

Epoch 14/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.3456 - acc: 0.8832 - val\_loss: 0.3456

Epoch 15/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.2947 - acc: 0.9135 - val\_loss: 0.2947

Epoch 16/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.3015 - acc: 0.9159 - val\_loss: 0.3015

Epoch 17/30

7352/7352 [=====] - 52s 7ms/step - loss: 0.2472 - acc: 0.9317 - val\_loss: 0.2472

Epoch 18/30

7352/7352 [=====] - 53s 7ms/step - loss: 0.2784 - acc: 0.9271 - val\_loss: 0.2784

Epoch 19/30

```

7352/7352 [=====] - 53s 7ms/step - loss: 0.2505 - acc: 0.9306 - val_1
Epoch 20/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.2093 - acc: 0.9344 - val_1
Epoch 21/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.2218 - acc: 0.9370 - val_1
Epoch 22/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.1966 - acc: 0.9414 - val_1
Epoch 23/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.1827 - acc: 0.9403 - val_1
Epoch 24/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.1801 - acc: 0.9393 - val_1
Epoch 25/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.1896 - acc: 0.9433 - val_1
Epoch 26/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.2555 - acc: 0.9334 - val_1
Epoch 27/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.1791 - acc: 0.9434 - val_1
Epoch 28/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.2444 - acc: 0.9339 - val_1
Epoch 29/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.1938 - acc: 0.9393 - val_1
Epoch 30/30
7352/7352 [=====] - 53s 7ms/step - loss: 0.1598 - acc: 0.9450 - val_1

```

Out [23]: <keras.callbacks.History at 0x14f1ed870710>

## Multi layer LSTM

```

In [16]: # Initiliazing the sequential model
        model = Sequential()
        # Configuring the parameters
        model.add(LSTM(32,return_sequences=True,input_shape=(timesteps, input_dim)))
        # Adding a dropout layer
        model.add(Dropout(0.5))

        model.add(LSTM(28,input_shape=(timesteps, input_dim)))
        # Adding a dropout layer
        model.add(Dropout(0.6))
        # Adding a dense output layer with sigmoid activation
        model.add(Dense(n_classes, activation='sigmoid'))
        model.summary()

```

Layer (type)	Output Shape	Param #
lstm_5 (LSTM)	(None, 128, 32)	5376

dropout_5 (Dropout)	(None, 128, 32)	0
-----		
lstm_6 (LSTM)	(None, 28)	6832
-----		
dropout_6 (Dropout)	(None, 28)	0
-----		
dense_3 (Dense)	(None, 6)	174
=====		
Total params: 12,382		
Trainable params: 12,382		
Non-trainable params: 0		
-----		

```
In [17]: # Compiling the model
        model.compile(loss='categorical_crossentropy',
                      optimizer='rmsprop',
                      metrics=['accuracy'])
```

```
In [18]: # Training the model
        model.fit(X_train,
                  Y_train,
                  batch_size=batch_size,
                  validation_data=(X_test, Y_test),
                  epochs=epochs)
```

Train on 7352 samples, validate on 2947 samples

```
Epoch 1/30
7352/7352 [=====] - 109s 15ms/step - loss: 1.3081 - acc: 0.4561 - val.
Epoch 2/30
7352/7352 [=====] - 107s 15ms/step - loss: 0.8821 - acc: 0.6051 - val.
Epoch 3/30
7352/7352 [=====] - 106s 14ms/step - loss: 0.7624 - acc: 0.6359 - val.
Epoch 4/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.7258 - acc: 0.6302 - val.
Epoch 5/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.7122 - acc: 0.6474 - val.
Epoch 6/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.6977 - acc: 0.6515 - val.
Epoch 7/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.6750 - acc: 0.6790 - val.
Epoch 8/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.6167 - acc: 0.7329 - val.
Epoch 9/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.5178 - acc: 0.7889 - val.
Epoch 10/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.4557 - acc: 0.8215 - val.
Epoch 11/30
```

```

7352/7352 [=====] - 104s 14ms/step - loss: 0.4006 - acc: 0.8554 - val.
Epoch 12/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.3518 - acc: 0.8936 - val.
Epoch 13/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.2959 - acc: 0.9102 - val.
Epoch 14/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.2716 - acc: 0.9240 - val.
Epoch 15/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.2532 - acc: 0.9223 - val.
Epoch 16/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.2409 - acc: 0.9295 - val.
Epoch 17/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.2296 - acc: 0.9342 - val.
Epoch 18/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.2039 - acc: 0.9377 - val.
Epoch 19/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.2141 - acc: 0.9331 - val.
Epoch 20/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.2001 - acc: 0.9382 - val.
Epoch 21/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1917 - acc: 0.9348 - val.
Epoch 22/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1970 - acc: 0.9362 - val.
Epoch 23/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1801 - acc: 0.9425 - val.
Epoch 24/30
7352/7352 [=====] - 106s 14ms/step - loss: 0.1680 - acc: 0.9446 - val.
Epoch 25/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1835 - acc: 0.9418 - val.
Epoch 26/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1692 - acc: 0.9449 - val.
Epoch 27/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1722 - acc: 0.9421 - val.
Epoch 28/30
7352/7352 [=====] - 104s 14ms/step - loss: 0.1739 - acc: 0.9434 - val.
Epoch 29/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1833 - acc: 0.9421 - val.
Epoch 30/30
7352/7352 [=====] - 105s 14ms/step - loss: 0.1730 - acc: 0.9431 - val.

```

Out[18]: <keras.callbacks.History at 0x14f13724bc88>

Above 2 layer LSTM is giving similar score as 1 layer LSTM which we trained above.

```
In [14]: from keras.regularizers import l2
```

```
In [20]: # Initiliazing the sequential model
        model = Sequential()
```

```

# Configuring the parameters
model.add(LSTM(32, recurrent_regularizer=l2(0.003), return_sequences=True, input_shape=(
# Adding a dropout layer
model.add(Dropout(0.5))

model.add(LSTM(28, input_shape=(timesteps, input_dim)))
# Adding a dropout layer
model.add(Dropout(0.6))
# Adding a dense output layer with sigmoid activation
model.add(Dense(n_classes, activation='sigmoid'))
model.summary()

```

Layer (type)	Output Shape	Param #
lstm_7 (LSTM)	(None, 128, 32)	5376
dropout_7 (Dropout)	(None, 128, 32)	0
lstm_8 (LSTM)	(None, 28)	6832
dropout_8 (Dropout)	(None, 28)	0
dense_4 (Dense)	(None, 6)	174
Total params: 12,382		
Trainable params: 12,382		
Non-trainable params: 0		

```

In [21]: # Compiling the model
model.compile(loss='categorical_crossentropy',
              optimizer='adam',
              metrics=['accuracy'])

```

```

In [22]: # Training the model
History = model.fit(X_train,
                    Y_train,
                    batch_size=batch_size,
                    validation_data=(X_test, Y_test),
                    epochs=10)

```

Train on 7352 samples, validate on 2947 samples

Epoch 1/10

7352/7352 [=====] - 107s 15ms/step - loss: 1.4263 - acc: 0.4241 - val.

Epoch 2/10

7352/7352 [=====] - 105s 14ms/step - loss: 1.2066 - acc: 0.5011 - val.

Epoch 3/10

```

7352/7352 [=====] - 105s 14ms/step - loss: 0.9923 - acc: 0.5695 - val.
Epoch 4/10
7352/7352 [=====] - 105s 14ms/step - loss: 0.9109 - acc: 0.5839 - val.
Epoch 5/10
7352/7352 [=====] - 105s 14ms/step - loss: 0.7995 - acc: 0.6223 - val.
Epoch 6/10
7352/7352 [=====] - 105s 14ms/step - loss: 0.8123 - acc: 0.6062 - val.
Epoch 7/10
7352/7352 [=====] - 105s 14ms/step - loss: 0.7574 - acc: 0.6319 - val.
Epoch 8/10
7352/7352 [=====] - 105s 14ms/step - loss: 0.7699 - acc: 0.6411 - val.
Epoch 9/10
7352/7352 [=====] - 106s 14ms/step - loss: 0.7106 - acc: 0.6493 - val.
Epoch 10/10
7352/7352 [=====] - 105s 14ms/step - loss: 0.7854 - acc: 0.6389 - val.

```

### 13.2.1 Hyperparameter Tuning Using Hyperas:

```

In [18]: # Importing tensorflow
         np.random.seed(36)
         import tensorflow as tf
         tf.set_random_seed(36)

In [5]: # Importing libraries
         from keras.models import Sequential
         from keras.layers import LSTM
         from keras.layers.core import Dense, Dropout
         from hyperopt import Trials, STATUS_OK, tpe
         from hyperas import optim
         from hyperas.distributions import choice, uniform
         from hyperas.utils import eval_hyperopt_space

In [6]: ##gives train and validation data
         def data():
             """
             Obtain the dataset from multiple files.
             Returns: X_train, X_test, y_train, y_test
             """

             # Data directory
             DATADIR = 'UCI_HAR_Dataset'

             # Raw data signals
             # Signals are from Accelerometer and Gyroscope
             # The signals are in x,y,z directions
             # Sensor signals are filtered to have only body acceleration
             # excluding the acceleration due to gravity
             # Triaxial acceleration from the accelerometer is total acceleration
             SIGNALS = [

```

```

        "body_acc_x",
        "body_acc_y",
        "body_acc_z",
        "body_gyro_x",
        "body_gyro_y",
        "body_gyro_z",
        "total_acc_x",
        "total_acc_y",
        "total_acc_z"
    ]

    # Utility function to read the data from csv file
    def _read_csv(filename):
        return pd.read_csv(filename, delim_whitespace=True, header=None)

    # Utility function to load the load
    def load_signals(subset):
        signals_data = []

        for signal in SIGNALS:
            filename = f'UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.txt'
            signals_data.append( _read_csv(filename).as_matrix())

        # Transpose is used to change the dimensionality of the output,
        # aggregating the signals by combination of sample/timestep.
        # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
        return np.transpose(signals_data, (1, 2, 0))

    def load_y(subset):
        """
        The objective that we are trying to predict is a integer, from 1 to 6,
        that represents a human activity. We return a binary representation of
        every sample objective as a 6 bits vector using One Hot Encoding
        (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.html)
        """
        filename = f'UCI_HAR_Dataset/{subset}/y_{subset}.txt'
        y = _read_csv(filename)[0]
        return pd.get_dummies(y).as_matrix()

    X_train, X_val = load_signals('train'), load_signals('test')
    Y_train, Y_val = load_y('train'), load_y('test')

    return X_train, Y_train, X_val, Y_val

```

```

In [7]: from keras.regularizers import l2
import keras

```

```

In [8]: ##model
def model(X_train, Y_train, X_val, Y_val):

```



```

# Importing tensorflow
np.random.seed(36)
import tensorflow as tf
tf.set_random_seed(36)
# Initiliazing the sequential model
model = Sequential()
if conditional({{choice(['one', 'two'])}}) == 'two':
    # Configuring the parameters
    model.add(LSTM({{choice([28,32,38])}}, recurrent_regularizer=l2({{uniform(0,0.001)}}))
    # Adding a dropout layer
    model.add(Dropout({{uniform(0.35,0.65)}}), name='Dropout2_1')
    model.add(LSTM({{choice([26,32,36])}}, recurrent_regularizer=l2({{uniform(0,0.001)}}))
    model.add(Dropout({{uniform(0.5,0.7)}}), name='Dropout2_2')
    # Adding a dense output layer with sigmoid activation
    model.add(Dense(6, activation='sigmoid'))
else:
    # Configuring the parameters
    model.add(LSTM({{choice([28,32,36])}}, recurrent_regularizer=l2({{uniform(0,0.001)}}))
    # Adding a dropout layer
    model.add(Dropout({{uniform(0.35,0.55)}}), name='Dropout1_1')
    # Adding a dense output layer with sigmoid activation
    model.add(Dense(6, activation='sigmoid'))

adam = keras.optimizers.Adam(lr={{uniform(0.009,0.025)}})
rmsprop = keras.optimizers.RMSprop(lr={{uniform(0.009,0.025)}})

choiceval = {{choice(['adam', 'rmsprop'])}}

if choiceval == 'adam':
    optim = adam
else:
    optim = rmsprop

print(model.summary())

model.compile(loss='categorical_crossentropy', metrics=['accuracy'], optimizer=optim)

result = model.fit(X_train, Y_train,
                    batch_size=16,
                    nb_epoch=30,
                    verbose=2,
                    validation_data=(X_val, Y_val))

score, acc = model.evaluate(X_val, Y_val, verbose=0)
print('Test accuracy:', acc)
print('-----')
return {'loss': -acc, 'status': STATUS_OK, 'model': model}

```

```

In [43]: X_train, Y_train, X_val, Y_val = data()
        trials = Trials()
        best_run, best_model, space = optim.minimize(model=model,
                                                    data=data,
                                                    algo=tpe.suggest,
                                                    max_evals=15,
                                                    trials=trials, notebook_name = 'Human Activity D
                                                    return_space = True)

>>> Imports:
#coding=utf-8

try:
    from keras.models import Sequential
except:
    pass

try:
    from keras.layers import LSTM
except:
    pass

try:
    from keras.layers.core import Dense, Dropout
except:
    pass

try:
    from hyperopt import Trials, STATUS_OK, tpe
except:
    pass

try:
    from hyperas import optim
except:
    pass

try:
    from hyperas.distributions import choice, uniform
except:
    pass

try:
    import pandas as pd
except:
    pass

try:

```

```

import numpy as np
except:
    pass

try:
    import tensorflow as tf
except:
    pass

try:
    from keras.regularizers import l2
except:
    pass

try:
    import tensorflow as tf
except:
    pass

try:
    import keras
except:
    pass

try:
    import pickle
except:
    pass

try:
    from hyperas.utils import eval_hyperopt_space
except:
    pass

>>> Hyperas search space:

def get_space():
    return {
        'conditional': hp.choice('conditional', ['one', 'two']),
        'LSTM': hp.choice('LSTM', [28,32,38]),
        'l2': hp.uniform('l2', 0,0.0002),
        'Dropout': hp.uniform('Dropout', 0.35,0.65),
        'LSTM_1': hp.choice('LSTM_1', [26,32,36]),
        'l2_1': hp.uniform('l2_1', 0,0.001),
        'Dropout_1': hp.uniform('Dropout_1', 0.5,0.7),
        'LSTM_2': hp.choice('LSTM_2', [28,32,36]),
        'l2_2': hp.uniform('l2_2', 0,0.001),
        'Dropout_2': hp.uniform('Dropout_2', 0.35,0.55),

```

```

        'lr': hp.uniform('lr', 0.009,0.025),
        'lr_1': hp.uniform('lr_1', 0.009,0.025),
        'choiceval': hp.choice('choiceval', ['adam', 'rmsprop']),
    }

>>> Data
1:
2: """
3: Obtain the dataset from multiple files.
4: Returns: X_train, X_test, y_train, y_test
5: """
6: # Data directory
7: DATADIR = 'UCI_HAR_Dataset'
8: # Raw data signals
9: # Signals are from Accelerometer and Gyroscope
10: # The signals are in x,y,z directions
11: # Sensor signals are filtered to have only body acceleration
12: # excluding the acceleration due to gravity
13: # Triaxial acceleration from the accelerometer is total acceleration
14: SIGNALS = [
15:     "body_acc_x",
16:     "body_acc_y",
17:     "body_acc_z",
18:     "body_gyro_x",
19:     "body_gyro_y",
20:     "body_gyro_z",
21:     "total_acc_x",
22:     "total_acc_y",
23:     "total_acc_z"
24: ]
25: # Utility function to read the data from csv file
26: def _read_csv(filename):
27:     return pd.read_csv(filename, delim_whitespace=True, header=None)
28:
29: # Utility function to load the load
30: def load_signals(subset):
31:     signals_data = []
32:
33:     for signal in SIGNALS:
34:         filename = f'HAR/UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.txt
35:         signals_data.append( _read_csv(filename).as_matrix())
36:
37:     # Transpose is used to change the dimensionality of the output,
38:     # aggregating the signals by combination of sample/timestep.
39:     # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
40:     return np.transpose(signals_data, (1, 2, 0))
41:
42: def load_y(subset):

```

```

43:     """
44:     The objective that we are trying to predict is a integer, from 1 to 6,
45:     that represents a human activity. We return a binary representation of
46:     every sample objective as a 6 bits vector using One Hot Encoding
47:     (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.html)
48:     """
49:     filename = f'HAR/UCI_HAR_Dataset/{subset}/y_{subset}.txt'
50:     y = _read_csv(filename)[0]
51:     return pd.get_dummies(y).as_matrix()
52:
53: X_train, X_val = load_signals('train'), load_signals('test')
54: Y_train, Y_val = load_y('train'), load_y('test')
55:
56:
57:
58:
>>> Resulting replaced keras model:

1: def keras_fmin_fnct(space):
2:
3:     # Importing tensorflow
4:     np.random.seed(36)
5:     tf.set_random_seed(36)
6:     # Initiliazing the sequential model
7:     model = Sequential()
8:     if conditional(space['conditional']) == 'two':
9:         # Configuring the parameters
10:        model.add(LSTM(space['LSTM'], recurrent_regularizer=l2(space['l2']), return_sequences=True))
11:        # Adding a dropout layer
12:        model.add(Dropout(space['Dropout'], name='Dropout2_1'))
13:        model.add(LSTM(space['LSTM_1'], recurrent_regularizer=l2(space['l2_1']), input_shape=(1, space['LSTM_1'])))
14:        model.add(Dropout(space['Dropout_1'], name='Dropout2_2'))
15:        # Adding a dense output layer with sigmoid activation
16:        model.add(Dense(6, activation='sigmoid'))
17:    else:
18:        # Configuring the parameters
19:        model.add(LSTM(space['LSTM_2'], recurrent_regularizer=l2(space['l2_2']), input_shape=(1, space['LSTM_2'])))
20:        # Adding a dropout layer
21:        model.add(Dropout(space['Dropout_2'], name='Dropout1_1'))
22:        # Adding a dense output layer with sigmoid activation
23:        model.add(Dense(6, activation='sigmoid'))
24:
25:    adam = keras.optimizers.Adam(lr=space['lr'])
26:    rmsprop = keras.optimizers.RMSprop(lr=space['lr_1'])
27:
28:    choiceval = space['choiceval']
29:
30:    if choiceval == 'adam':

```

```

31:         optim = adam
32:     else:
33:         optim = rmsprop
34:
35:     print(model.summary())
36:
37:     model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=optim)
38:
39:     result = model.fit(X_train, Y_train,
40:                       batch_size=16,
41:                       nb_epoch=30,
42:                       verbose=2,
43:                       validation_data=(X_val, Y_val))
44:
45:     score, acc = model.evaluate(X_val, Y_val, verbose=0)
46:     print('Test accuracy:', acc)
47:     print('-----')
48:     return {'loss': -acc, 'status': STATUS_OK, 'model': model}
49:

```

Layer (type)	Output Shape	Param #
LSTM1_1 (LSTM)	(None, 32)	5376
Dropout1_1 (Dropout)	(None, 32)	0
dense_1 (Dense)	(None, 6)	198

```

Total params: 5,574
Trainable params: 5,574
Non-trainable params: 0

```

```

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 54s - loss: 1.2450 - acc: 0.4542 - val_loss: 1.3427 - val_acc: 0.3712
Epoch 2/30
- 53s - loss: 0.9058 - acc: 0.5974 - val_loss: 0.7812 - val_acc: 0.6379
Epoch 3/30
- 52s - loss: 0.7532 - acc: 0.6465 - val_loss: 0.6822 - val_acc: 0.7207
Epoch 4/30
- 51s - loss: 0.5511 - acc: 0.8190 - val_loss: 0.4388 - val_acc: 0.8626
Epoch 5/30
- 51s - loss: 0.3685 - acc: 0.9067 - val_loss: 0.7325 - val_acc: 0.8124
Epoch 6/30
- 52s - loss: 0.3109 - acc: 0.9203 - val_loss: 0.4244 - val_acc: 0.8863
Epoch 7/30
- 52s - loss: 0.2748 - acc: 0.9271 - val_loss: 0.4503 - val_acc: 0.8948

```

Epoch 8/30  
- 52s - loss: 0.2566 - acc: 0.9238 - val\_loss: 0.5668 - val\_acc: 0.8670  
Epoch 9/30  
- 51s - loss: 0.2533 - acc: 0.9306 - val\_loss: 0.4599 - val\_acc: 0.9013  
Epoch 10/30  
- 51s - loss: 0.2503 - acc: 0.9287 - val\_loss: 0.3217 - val\_acc: 0.9009  
Epoch 11/30  
- 52s - loss: 0.2251 - acc: 0.9388 - val\_loss: 0.3650 - val\_acc: 0.9104  
Epoch 12/30  
- 51s - loss: 0.2239 - acc: 0.9363 - val\_loss: 0.5278 - val\_acc: 0.9053  
Epoch 13/30  
- 51s - loss: 0.2239 - acc: 0.9324 - val\_loss: 0.4011 - val\_acc: 0.8924  
Epoch 14/30  
- 52s - loss: 0.2066 - acc: 0.9385 - val\_loss: 0.5576 - val\_acc: 0.8999  
Epoch 15/30  
- 52s - loss: 0.2208 - acc: 0.9370 - val\_loss: 0.6006 - val\_acc: 0.8833  
Epoch 16/30  
- 52s - loss: 0.2124 - acc: 0.9392 - val\_loss: 0.6876 - val\_acc: 0.8666  
Epoch 17/30  
- 52s - loss: 0.2021 - acc: 0.9399 - val\_loss: 0.4828 - val\_acc: 0.9023  
Epoch 18/30  
- 52s - loss: 0.2058 - acc: 0.9372 - val\_loss: 0.5229 - val\_acc: 0.9077  
Epoch 19/30  
- 53s - loss: 0.2071 - acc: 0.9392 - val\_loss: 0.5419 - val\_acc: 0.8904  
Epoch 20/30  
- 53s - loss: 0.2081 - acc: 0.9378 - val\_loss: 0.7437 - val\_acc: 0.8843  
Epoch 21/30  
- 52s - loss: 0.2032 - acc: 0.9407 - val\_loss: 0.8337 - val\_acc: 0.8911  
Epoch 22/30  
- 52s - loss: 0.2136 - acc: 0.9404 - val\_loss: 0.6945 - val\_acc: 0.8897  
Epoch 23/30  
- 53s - loss: 0.1895 - acc: 0.9388 - val\_loss: 0.5063 - val\_acc: 0.8999  
Epoch 24/30  
- 53s - loss: 0.1968 - acc: 0.9468 - val\_loss: 0.4665 - val\_acc: 0.9074  
Epoch 25/30  
- 52s - loss: 0.1866 - acc: 0.9450 - val\_loss: 0.7473 - val\_acc: 0.8856  
Epoch 26/30  
- 52s - loss: 0.1845 - acc: 0.9412 - val\_loss: 0.6272 - val\_acc: 0.8901  
Epoch 27/30  
- 52s - loss: 0.2020 - acc: 0.9426 - val\_loss: 0.5100 - val\_acc: 0.8975  
Epoch 28/30  
- 52s - loss: 0.1866 - acc: 0.9406 - val\_loss: 0.6803 - val\_acc: 0.8887  
Epoch 29/30  
- 52s - loss: 0.1897 - acc: 0.9434 - val\_loss: 0.6320 - val\_acc: 0.8982  
Epoch 30/30  
- 52s - loss: 0.1871 - acc: 0.9486 - val\_loss: 0.6176 - val\_acc: 0.9002  
Test accuracy: 0.9002375296912114

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Layer (type)	Output Shape	Param #
LSTM2_1 (LSTM)	(None, 128, 28)	4256
Dropout2_1 (Dropout)	(None, 128, 28)	0
LSTM2_2 (LSTM)	(None, 32)	7808
Dropout2_2 (Dropout)	(None, 32)	0
dense_2 (Dense)	(None, 6)	198

Total params: 12,262  
 Trainable params: 12,262  
 Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30  
 - 116s - loss: 1.3509 - acc: 0.4094 - val\_loss: 1.2985 - val\_acc: 0.4211

Epoch 2/30  
 - 114s - loss: 1.1227 - acc: 0.5048 - val\_loss: 0.9203 - val\_acc: 0.5840

Epoch 3/30  
 - 114s - loss: 0.9163 - acc: 0.5909 - val\_loss: 0.7878 - val\_acc: 0.5979

Epoch 4/30  
 - 113s - loss: 0.7372 - acc: 0.6355 - val\_loss: 0.8733 - val\_acc: 0.6576

Epoch 5/30  
 - 113s - loss: 0.7606 - acc: 0.6559 - val\_loss: 0.7596 - val\_acc: 0.6627

Epoch 6/30  
 - 113s - loss: 0.6631 - acc: 0.7126 - val\_loss: 0.6731 - val\_acc: 0.7272

Epoch 7/30  
 - 112s - loss: 0.6001 - acc: 0.7648 - val\_loss: 0.6734 - val\_acc: 0.7401

Epoch 8/30  
 - 112s - loss: 0.5491 - acc: 0.8194 - val\_loss: 0.7685 - val\_acc: 0.7767

Epoch 9/30  
 - 113s - loss: 0.4469 - acc: 0.8749 - val\_loss: 0.6154 - val\_acc: 0.8039

Epoch 10/30  
 - 113s - loss: 0.3422 - acc: 0.9060 - val\_loss: 0.4643 - val\_acc: 0.8728

Epoch 11/30  
 - 113s - loss: 0.3277 - acc: 0.9120 - val\_loss: 0.5444 - val\_acc: 0.8935

Epoch 12/30  
 - 113s - loss: 0.2989 - acc: 0.9165 - val\_loss: 0.5426 - val\_acc: 0.8873

Epoch 13/30  
 - 113s - loss: 0.3066 - acc: 0.9183 - val\_loss: 0.5929 - val\_acc: 0.8890

Epoch 14/30  
 - 113s - loss: 0.2790 - acc: 0.9238 - val\_loss: 0.8567 - val\_acc: 0.8605

Epoch 15/30



```

- 113s - loss: 0.2381 - acc: 0.9308 - val_loss: 0.4199 - val_acc: 0.8795
Epoch 16/30
- 113s - loss: 0.2765 - acc: 0.9237 - val_loss: 0.4038 - val_acc: 0.9009
Epoch 17/30
- 113s - loss: 0.2222 - acc: 0.9347 - val_loss: 0.9794 - val_acc: 0.8558
Epoch 18/30
- 113s - loss: 0.2855 - acc: 0.9245 - val_loss: 0.5541 - val_acc: 0.8721
Epoch 19/30
- 113s - loss: 0.2214 - acc: 0.9329 - val_loss: 0.6838 - val_acc: 0.8890
Epoch 20/30
- 113s - loss: 0.2382 - acc: 0.9294 - val_loss: 0.6224 - val_acc: 0.8975
Epoch 21/30
- 113s - loss: 0.2227 - acc: 0.9377 - val_loss: 0.9649 - val_acc: 0.8761
Epoch 22/30
- 113s - loss: 0.2391 - acc: 0.9344 - val_loss: 0.7248 - val_acc: 0.8945
Epoch 23/30
- 112s - loss: 0.2880 - acc: 0.9316 - val_loss: 0.6072 - val_acc: 0.8928
Epoch 24/30
- 113s - loss: 0.2283 - acc: 0.9309 - val_loss: 0.5543 - val_acc: 0.8958
Epoch 25/30
- 113s - loss: 0.2152 - acc: 0.9378 - val_loss: 0.7930 - val_acc: 0.8558
Epoch 26/30
- 113s - loss: 0.2582 - acc: 0.9338 - val_loss: 0.6463 - val_acc: 0.8836
Epoch 27/30
- 113s - loss: 0.2352 - acc: 0.9317 - val_loss: 0.5760 - val_acc: 0.8884
Epoch 28/30
- 113s - loss: 0.2256 - acc: 0.9378 - val_loss: 0.7432 - val_acc: 0.8755
Epoch 29/30
- 114s - loss: 0.2372 - acc: 0.9453 - val_loss: 0.6815 - val_acc: 0.8948
Epoch 30/30
- 113s - loss: 0.2550 - acc: 0.9340 - val_loss: 0.6620 - val_acc: 0.8721
Test accuracy: 0.8720732948761453

```

---

Layer (type)	Output Shape	Param #
=====		
LSTM2_1 (LSTM)	(None, 128, 38)	7296
-----		
Dropout2_1 (Dropout)	(None, 128, 38)	0
-----		
LSTM2_2 (LSTM)	(None, 36)	10800
-----		
Dropout2_2 (Dropout)	(None, 36)	0
-----		
dense_3 (Dense)	(None, 6)	222
=====		

```

Total params: 18,318
Trainable params: 18,318

```

Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 119s - loss: 1.1983 - acc: 0.4893 - val\_loss: 0.8035 - val\_acc: 0.6149

Epoch 2/30

- 116s - loss: 0.7894 - acc: 0.6400 - val\_loss: 0.8551 - val\_acc: 0.6111

Epoch 3/30

- 116s - loss: 0.7522 - acc: 0.6668 - val\_loss: 0.9096 - val\_acc: 0.6844

Epoch 4/30

- 116s - loss: 0.5412 - acc: 0.7935 - val\_loss: 0.8693 - val\_acc: 0.8110

Epoch 5/30

- 116s - loss: 0.4574 - acc: 0.8808 - val\_loss: 0.6524 - val\_acc: 0.8880

Epoch 6/30

- 116s - loss: 0.3585 - acc: 0.9127 - val\_loss: 0.6781 - val\_acc: 0.8758

Epoch 7/30

- 116s - loss: 0.3066 - acc: 0.9203 - val\_loss: 0.7484 - val\_acc: 0.8890

Epoch 8/30

- 117s - loss: 0.2817 - acc: 0.9278 - val\_loss: 0.8017 - val\_acc: 0.8690

Epoch 9/30

- 116s - loss: 0.2543 - acc: 0.9283 - val\_loss: 1.2660 - val\_acc: 0.8320

Epoch 10/30

- 116s - loss: 0.2435 - acc: 0.9365 - val\_loss: 0.8145 - val\_acc: 0.8646

Epoch 11/30

- 116s - loss: 0.2767 - acc: 0.9317 - val\_loss: 0.5959 - val\_acc: 0.8979

Epoch 12/30

- 116s - loss: 0.2265 - acc: 0.9373 - val\_loss: 0.6543 - val\_acc: 0.8935

Epoch 13/30

- 116s - loss: 0.2253 - acc: 0.9363 - val\_loss: 0.5145 - val\_acc: 0.9216

Epoch 14/30

- 116s - loss: 0.2458 - acc: 0.9310 - val\_loss: 0.4773 - val\_acc: 0.9175

Epoch 15/30

- 116s - loss: 0.2122 - acc: 0.9389 - val\_loss: 0.6626 - val\_acc: 0.8958

Epoch 16/30

- 116s - loss: 0.2367 - acc: 0.9393 - val\_loss: 0.6204 - val\_acc: 0.8965

Epoch 17/30

- 116s - loss: 0.2317 - acc: 0.9414 - val\_loss: 0.9979 - val\_acc: 0.8772

Epoch 18/30

- 116s - loss: 0.2406 - acc: 0.9350 - val\_loss: 0.9485 - val\_acc: 0.8744

Epoch 19/30

- 116s - loss: 0.2186 - acc: 0.9408 - val\_loss: 0.7989 - val\_acc: 0.8870

Epoch 20/30

- 116s - loss: 0.2050 - acc: 0.9427 - val\_loss: 0.8482 - val\_acc: 0.8738

Epoch 21/30

- 117s - loss: 0.1984 - acc: 0.9415 - val\_loss: 0.6845 - val\_acc: 0.8945

Epoch 22/30

- 116s - loss: 0.1928 - acc: 0.9445 - val\_loss: 0.5078 - val\_acc: 0.9192

Epoch 23/30  
 - 116s - loss: 0.2071 - acc: 0.9427 - val\_loss: 0.6209 - val\_acc: 0.9172  
 Epoch 24/30  
 - 116s - loss: 0.2433 - acc: 0.9381 - val\_loss: 0.6083 - val\_acc: 0.9091  
 Epoch 25/30  
 - 117s - loss: 0.2048 - acc: 0.9429 - val\_loss: 0.6255 - val\_acc: 0.8772  
 Epoch 26/30  
 - 116s - loss: 0.1990 - acc: 0.9397 - val\_loss: 0.9037 - val\_acc: 0.8809  
 Epoch 27/30  
 - 116s - loss: 0.1816 - acc: 0.9426 - val\_loss: 0.8393 - val\_acc: 0.8748  
 Epoch 28/30  
 - 116s - loss: 0.2225 - acc: 0.9412 - val\_loss: 0.6894 - val\_acc: 0.9070  
 Epoch 29/30  
 - 116s - loss: 0.2070 - acc: 0.9449 - val\_loss: 0.7186 - val\_acc: 0.9063  
 Epoch 30/30  
 - 116s - loss: 0.2195 - acc: 0.9421 - val\_loss: 0.8332 - val\_acc: 0.8972  
 Test accuracy: 0.8971835765184933

Layer (type)	Output Shape	Param #
LSTM2_1 (LSTM)	(None, 128, 32)	5376
Dropout2_1 (Dropout)	(None, 128, 32)	0
LSTM2_2 (LSTM)	(None, 32)	8320
Dropout2_2 (Dropout)	(None, 32)	0
dense_4 (Dense)	(None, 6)	198

Total params: 13,894  
 Trainable params: 13,894  
 Non-trainable params: 0

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 115s - loss: 1.4372 - acc: 0.3659 - val\_loss: 1.4671 - val\_acc: 0.3539  
 Epoch 2/30  
 - 113s - loss: 1.3271 - acc: 0.4178 - val\_loss: 1.1843 - val\_acc: 0.4785  
 Epoch 3/30  
 - 112s - loss: 1.1944 - acc: 0.5075 - val\_loss: 1.0682 - val\_acc: 0.5185  
 Epoch 4/30  
 - 112s - loss: 0.9614 - acc: 0.5405 - val\_loss: 0.9636 - val\_acc: 0.5450  
 Epoch 5/30  
 - 112s - loss: 0.8921 - acc: 0.5649 - val\_loss: 1.0393 - val\_acc: 0.5697  
 Epoch 6/30

- 112s - loss: 0.9083 - acc: 0.5941 - val\_loss: 1.0248 - val\_acc: 0.5938  
Epoch 7/30  
- 112s - loss: 0.8562 - acc: 0.6053 - val\_loss: 0.8309 - val\_acc: 0.6081  
Epoch 8/30  
- 112s - loss: 0.7939 - acc: 0.6302 - val\_loss: 0.7886 - val\_acc: 0.6210  
Epoch 9/30  
- 112s - loss: 0.7313 - acc: 0.6542 - val\_loss: 0.7931 - val\_acc: 0.6356  
Epoch 10/30  
- 112s - loss: 0.7418 - acc: 0.6492 - val\_loss: 0.7654 - val\_acc: 0.6305  
Epoch 11/30  
- 112s - loss: 0.7019 - acc: 0.6542 - val\_loss: 0.7826 - val\_acc: 0.6261  
Epoch 12/30  
- 112s - loss: 0.6793 - acc: 0.6644 - val\_loss: 0.7845 - val\_acc: 0.6244  
Epoch 13/30  
- 112s - loss: 0.6800 - acc: 0.6647 - val\_loss: 0.7932 - val\_acc: 0.6200  
Epoch 14/30  
- 112s - loss: 0.6687 - acc: 0.6666 - val\_loss: 0.7532 - val\_acc: 0.6295  
Epoch 15/30  
- 112s - loss: 0.7405 - acc: 0.6615 - val\_loss: 0.7667 - val\_acc: 0.6261  
Epoch 16/30  
- 112s - loss: 0.6780 - acc: 0.6643 - val\_loss: 0.7667 - val\_acc: 0.6172  
Epoch 17/30  
- 112s - loss: 0.6512 - acc: 0.6696 - val\_loss: 0.7582 - val\_acc: 0.6295  
Epoch 18/30  
- 112s - loss: 0.6180 - acc: 0.6904 - val\_loss: 0.6705 - val\_acc: 0.6423  
Epoch 19/30  
- 112s - loss: 0.5738 - acc: 0.7399 - val\_loss: 0.8903 - val\_acc: 0.6834  
Epoch 20/30  
- 112s - loss: 0.5144 - acc: 0.7964 - val\_loss: 0.7585 - val\_acc: 0.7564  
Epoch 21/30  
- 112s - loss: 0.5651 - acc: 0.7982 - val\_loss: 0.6209 - val\_acc: 0.7893  
Epoch 22/30  
- 112s - loss: 0.4844 - acc: 0.8009 - val\_loss: 0.6228 - val\_acc: 0.8249  
Epoch 23/30  
- 111s - loss: 0.4312 - acc: 0.8070 - val\_loss: 0.5516 - val\_acc: 0.7516  
Epoch 24/30  
- 112s - loss: 0.4394 - acc: 0.8192 - val\_loss: 0.6016 - val\_acc: 0.7845  
Epoch 25/30  
- 112s - loss: 0.4126 - acc: 0.8383 - val\_loss: 0.6123 - val\_acc: 0.8205  
Epoch 26/30  
- 112s - loss: 0.4230 - acc: 0.8743 - val\_loss: 0.4831 - val\_acc: 0.8734  
Epoch 27/30  
- 112s - loss: 0.3373 - acc: 0.9131 - val\_loss: 0.5120 - val\_acc: 0.8870  
Epoch 28/30  
- 112s - loss: 0.2753 - acc: 0.9346 - val\_loss: 0.5130 - val\_acc: 0.8724  
Epoch 29/30  
- 112s - loss: 0.2642 - acc: 0.9325 - val\_loss: 0.3661 - val\_acc: 0.8985  
Epoch 30/30

- 112s - loss: 0.2854 - acc: 0.9282 - val\_loss: 0.4492 - val\_acc: 0.8958  
Test accuracy: 0.8958262639972854

Layer (type)	Output Shape	Param #
LSTM2_1 (LSTM)	(None, 128, 32)	5376
Dropout2_1 (Dropout)	(None, 128, 32)	0
LSTM2_2 (LSTM)	(None, 32)	8320
Dropout2_2 (Dropout)	(None, 32)	0
dense_5 (Dense)	(None, 6)	198

Total params: 13,894  
Trainable params: 13,894  
Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 116s - loss: 1.5210 - acc: 0.3177 - val\_loss: 1.8157 - val\_acc: 0.1805

Epoch 2/30

- 113s - loss: 1.7460 - acc: 0.2628 - val\_loss: 1.4418 - val\_acc: 0.3529

Epoch 3/30

- 113s - loss: 1.4133 - acc: 0.3596 - val\_loss: 1.3828 - val\_acc: 0.3617

Epoch 4/30

- 113s - loss: 1.3750 - acc: 0.3727 - val\_loss: 1.4695 - val\_acc: 0.3536

Epoch 5/30

- 113s - loss: 1.3640 - acc: 0.3776 - val\_loss: 1.4747 - val\_acc: 0.3536

Epoch 6/30

- 113s - loss: 1.3579 - acc: 0.3674 - val\_loss: 1.3544 - val\_acc: 0.3624

Epoch 7/30

- 113s - loss: 1.3526 - acc: 0.3740 - val\_loss: 1.4759 - val\_acc: 0.3536

Epoch 8/30

- 113s - loss: 1.3457 - acc: 0.3681 - val\_loss: 1.2573 - val\_acc: 0.4133

Epoch 9/30

- 112s - loss: 1.4167 - acc: 0.3753 - val\_loss: 1.3990 - val\_acc: 0.3536

Epoch 10/30

- 112s - loss: 1.3734 - acc: 0.3826 - val\_loss: 1.3683 - val\_acc: 0.3685

Epoch 11/30

- 114s - loss: 1.3230 - acc: 0.4319 - val\_loss: 1.3894 - val\_acc: 0.3756

Epoch 12/30

- 112s - loss: 1.3716 - acc: 0.3898 - val\_loss: 1.4371 - val\_acc: 0.3512

Epoch 13/30

- 113s - loss: 1.3323 - acc: 0.4132 - val\_loss: 1.2813 - val\_acc: 0.4011

Epoch 14/30  
 - 113s - loss: 1.1793 - acc: 0.4763 - val\_loss: 1.2701 - val\_acc: 0.4435  
 Epoch 15/30  
 - 112s - loss: 1.0988 - acc: 0.4761 - val\_loss: 1.0824 - val\_acc: 0.4130  
 Epoch 16/30  
 - 113s - loss: 0.9046 - acc: 0.5589 - val\_loss: 1.1002 - val\_acc: 0.5395  
 Epoch 17/30  
 - 113s - loss: 0.8583 - acc: 0.5683 - val\_loss: 0.9662 - val\_acc: 0.5161  
 Epoch 18/30  
 - 113s - loss: 0.7778 - acc: 0.6159 - val\_loss: 0.9013 - val\_acc: 0.5836  
 Epoch 19/30  
 - 113s - loss: 0.8041 - acc: 0.6264 - val\_loss: 0.8678 - val\_acc: 0.6149  
 Epoch 20/30  
 - 113s - loss: 0.7989 - acc: 0.6192 - val\_loss: 0.9060 - val\_acc: 0.5769  
 Epoch 21/30  
 - 114s - loss: 0.7531 - acc: 0.6269 - val\_loss: 0.8337 - val\_acc: 0.5772  
 Epoch 22/30  
 - 112s - loss: 0.7393 - acc: 0.6353 - val\_loss: 0.8051 - val\_acc: 0.5853  
 Epoch 23/30  
 - 113s - loss: 0.8261 - acc: 0.5998 - val\_loss: 1.2974 - val\_acc: 0.3695  
 Epoch 24/30  
 - 113s - loss: 1.1817 - acc: 0.4483 - val\_loss: 0.9910 - val\_acc: 0.5555  
 Epoch 25/30  
 - 113s - loss: 0.7748 - acc: 0.6117 - val\_loss: 0.7969 - val\_acc: 0.6023  
 Epoch 26/30  
 - 113s - loss: 0.8745 - acc: 0.5828 - val\_loss: 0.9096 - val\_acc: 0.5599  
 Epoch 27/30  
 - 113s - loss: 0.9154 - acc: 0.5937 - val\_loss: 0.8608 - val\_acc: 0.5738  
 Epoch 28/30  
 - 113s - loss: 0.9566 - acc: 0.5649 - val\_loss: 1.0465 - val\_acc: 0.5209  
 Epoch 29/30  
 - 113s - loss: 0.9162 - acc: 0.5412 - val\_loss: 0.8763 - val\_acc: 0.5344  
 Epoch 30/30  
 - 113s - loss: 0.9363 - acc: 0.5345 - val\_loss: 0.9800 - val\_acc: 0.4856  
 Test accuracy: 0.4855785544621649

---

Layer (type)	Output Shape	Param #
LSTM2_1 (LSTM)	(None, 128, 28)	4256
Dropout2_1 (Dropout)	(None, 128, 28)	0
LSTM2_2 (LSTM)	(None, 32)	7808
Dropout2_2 (Dropout)	(None, 32)	0
dense_6 (Dense)	(None, 6)	198

---

```

=====
Total params: 12,262
Trainable params: 12,262
Non-trainable params: 0

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 114s - loss: 1.2473 - acc: 0.4480 - val_loss: 0.8644 - val_acc: 0.6189
Epoch 2/30
  - 112s - loss: 0.9461 - acc: 0.5958 - val_loss: 0.9319 - val_acc: 0.5304
Epoch 3/30
  - 112s - loss: 0.8364 - acc: 0.6109 - val_loss: 0.8742 - val_acc: 0.6532
Epoch 4/30
  - 112s - loss: 0.7885 - acc: 0.6352 - val_loss: 0.7957 - val_acc: 0.6054
Epoch 5/30
  - 112s - loss: 0.7112 - acc: 0.6623 - val_loss: 0.8570 - val_acc: 0.7038
Epoch 6/30
  - 112s - loss: 0.5906 - acc: 0.7859 - val_loss: 0.7603 - val_acc: 0.8297
Epoch 7/30
  - 112s - loss: 0.4219 - acc: 0.8789 - val_loss: 0.7585 - val_acc: 0.8470
Epoch 8/30
  - 111s - loss: 0.3792 - acc: 0.9044 - val_loss: 0.7414 - val_acc: 0.8765
Epoch 9/30
  - 112s - loss: 0.3187 - acc: 0.9166 - val_loss: 0.6164 - val_acc: 0.9057
Epoch 10/30
  - 112s - loss: 0.2635 - acc: 0.9264 - val_loss: 0.6408 - val_acc: 0.8812
Epoch 11/30
  - 112s - loss: 0.3462 - acc: 0.9204 - val_loss: 0.8713 - val_acc: 0.8602
Epoch 12/30
  - 112s - loss: 0.2796 - acc: 0.9270 - val_loss: 1.0391 - val_acc: 0.8629
Epoch 13/30
  - 112s - loss: 0.3115 - acc: 0.9234 - val_loss: 0.8092 - val_acc: 0.8548
Epoch 14/30
  - 112s - loss: 0.2593 - acc: 0.9331 - val_loss: 0.9853 - val_acc: 0.8826
Epoch 15/30
  - 111s - loss: 0.2985 - acc: 0.9310 - val_loss: 0.7689 - val_acc: 0.8901
Epoch 16/30
  - 112s - loss: 0.3149 - acc: 0.9268 - val_loss: 0.7485 - val_acc: 0.9040
Epoch 17/30
  - 111s - loss: 0.2692 - acc: 0.9327 - val_loss: 0.9946 - val_acc: 0.8887
Epoch 18/30
  - 112s - loss: 0.2224 - acc: 0.9412 - val_loss: 0.8671 - val_acc: 0.9040
Epoch 19/30
  - 112s - loss: 0.2948 - acc: 0.9355 - val_loss: 0.9961 - val_acc: 0.8911
Epoch 20/30
  - 112s - loss: 0.3114 - acc: 0.9335 - val_loss: 0.8864 - val_acc: 0.8907
Epoch 21/30

```

```

- 112s - loss: 0.2119 - acc: 0.9395 - val_loss: 0.9013 - val_acc: 0.8951
Epoch 22/30
- 112s - loss: 0.1955 - acc: 0.9472 - val_loss: 1.2858 - val_acc: 0.8863
Epoch 23/30
- 112s - loss: 0.2033 - acc: 0.9476 - val_loss: 1.1028 - val_acc: 0.8853
Epoch 24/30
- 112s - loss: 0.2260 - acc: 0.9448 - val_loss: 0.7571 - val_acc: 0.9169
Epoch 25/30
- 111s - loss: 0.2121 - acc: 0.9489 - val_loss: 0.9081 - val_acc: 0.8979
Epoch 26/30
- 111s - loss: 0.2351 - acc: 0.9480 - val_loss: 0.6938 - val_acc: 0.9053
Epoch 27/30
- 112s - loss: 0.1817 - acc: 0.9489 - val_loss: 0.8636 - val_acc: 0.9118
Epoch 28/30
- 112s - loss: 0.2097 - acc: 0.9480 - val_loss: 0.7828 - val_acc: 0.9019
Epoch 29/30
- 112s - loss: 0.2703 - acc: 0.9436 - val_loss: 0.7614 - val_acc: 0.9060
Epoch 30/30
- 112s - loss: 0.2324 - acc: 0.9459 - val_loss: 0.8418 - val_acc: 0.8914
Test accuracy: 0.8914149983033594

```

---

Layer (type)	Output Shape	Param #
LSTM2_1 (LSTM)	(None, 128, 38)	7296
Dropout2_1 (Dropout)	(None, 128, 38)	0
LSTM2_2 (LSTM)	(None, 32)	9088
Dropout2_2 (Dropout)	(None, 32)	0
dense_7 (Dense)	(None, 6)	198

---

```

Total params: 16,582
Trainable params: 16,582
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 117s - loss: 1.5296 - acc: 0.3341 - val_loss: 1.4561 - val_acc: 0.4876
Epoch 2/30
- 115s - loss: 1.2383 - acc: 0.4608 - val_loss: 0.9390 - val_acc: 0.5667
Epoch 3/30
- 115s - loss: 0.9184 - acc: 0.5537 - val_loss: 0.9031 - val_acc: 0.5721
Epoch 4/30
- 115s - loss: 1.2038 - acc: 0.4587 - val_loss: 1.4212 - val_acc: 0.3556

```



Epoch 5/30  
- 115s - loss: 1.1103 - acc: 0.4985 - val\_loss: 0.9811 - val\_acc: 0.5687  
Epoch 6/30  
- 115s - loss: 0.9085 - acc: 0.5677 - val\_loss: 1.0072 - val\_acc: 0.5389  
Epoch 7/30  
- 115s - loss: 0.8435 - acc: 0.5822 - val\_loss: 0.9197 - val\_acc: 0.5819  
Epoch 8/30  
- 115s - loss: 0.8009 - acc: 0.6193 - val\_loss: 0.8783 - val\_acc: 0.5979  
Epoch 9/30  
- 115s - loss: 0.8192 - acc: 0.6200 - val\_loss: 0.9072 - val\_acc: 0.6026  
Epoch 10/30  
- 115s - loss: 0.7571 - acc: 0.6187 - val\_loss: 0.8579 - val\_acc: 0.6162  
Epoch 11/30  
- 115s - loss: 0.7762 - acc: 0.6315 - val\_loss: 0.8407 - val\_acc: 0.6254  
Epoch 12/30  
- 115s - loss: 1.0781 - acc: 0.5133 - val\_loss: 1.2932 - val\_acc: 0.4147  
Epoch 13/30  
- 115s - loss: 1.2008 - acc: 0.4531 - val\_loss: 1.0318 - val\_acc: 0.5684  
Epoch 14/30  
- 115s - loss: 0.8106 - acc: 0.6344 - val\_loss: 0.7879 - val\_acc: 0.6203  
Epoch 15/30  
- 114s - loss: 0.7129 - acc: 0.6447 - val\_loss: 0.7458 - val\_acc: 0.6274  
Epoch 16/30  
- 115s - loss: 0.6834 - acc: 0.6595 - val\_loss: 0.7537 - val\_acc: 0.6247  
Epoch 17/30  
- 115s - loss: 0.6826 - acc: 0.6499 - val\_loss: 0.7547 - val\_acc: 0.5908  
Epoch 18/30  
- 115s - loss: 0.7327 - acc: 0.6394 - val\_loss: 0.8384 - val\_acc: 0.6183  
Epoch 19/30  
- 115s - loss: 0.6892 - acc: 0.6489 - val\_loss: 0.7795 - val\_acc: 0.6196  
Epoch 20/30  
- 115s - loss: 0.7285 - acc: 0.6459 - val\_loss: 0.8308 - val\_acc: 0.6050  
Epoch 21/30  
- 115s - loss: 0.7120 - acc: 0.6402 - val\_loss: 0.8046 - val\_acc: 0.6067  
Epoch 22/30  
- 115s - loss: 0.6636 - acc: 0.6532 - val\_loss: 0.7412 - val\_acc: 0.6216  
Epoch 23/30  
- 114s - loss: 0.7886 - acc: 0.6255 - val\_loss: 1.1953 - val\_acc: 0.4910  
Epoch 24/30  
- 115s - loss: 1.0712 - acc: 0.4948 - val\_loss: 0.7798 - val\_acc: 0.6162  
Epoch 25/30  
- 115s - loss: 0.7376 - acc: 0.6514 - val\_loss: 0.7224 - val\_acc: 0.6274  
Epoch 26/30  
- 115s - loss: 0.7513 - acc: 0.6495 - val\_loss: 0.7578 - val\_acc: 0.6244  
Epoch 27/30  
- 115s - loss: 0.6702 - acc: 0.6591 - val\_loss: 0.7168 - val\_acc: 0.6800  
Epoch 28/30  
- 115s - loss: 0.6637 - acc: 0.6695 - val\_loss: 0.7188 - val\_acc: 0.6688

Epoch 29/30

- 115s - loss: 0.7230 - acc: 0.6480 - val\_loss: 0.7956 - val\_acc: 0.6512

Epoch 30/30

- 115s - loss: 0.7597 - acc: 0.6450 - val\_loss: 0.7395 - val\_acc: 0.6736

Test accuracy: 0.673566338649474

---

Layer (type)	Output Shape	Param #
=====		
LSTM2_1 (LSTM)	(None, 128, 32)	5376
-----		
Dropout2_1 (Dropout)	(None, 128, 32)	0
-----		
LSTM2_2 (LSTM)	(None, 26)	6136
-----		
Dropout2_2 (Dropout)	(None, 26)	0
-----		
dense_8 (Dense)	(None, 6)	162
=====		

Total params: 11,674

Trainable params: 11,674

Non-trainable params: 0

---

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 116s - loss: 1.3997 - acc: 0.3817 - val\_loss: 1.4977 - val\_acc: 0.3139

Epoch 2/30

- 113s - loss: 1.1907 - acc: 0.4922 - val\_loss: 1.0425 - val\_acc: 0.4971

Epoch 3/30

- 113s - loss: 0.8832 - acc: 0.5906 - val\_loss: 0.8801 - val\_acc: 0.6077

Epoch 4/30

- 113s - loss: 0.8497 - acc: 0.6089 - val\_loss: 1.0227 - val\_acc: 0.5395

Epoch 5/30

- 113s - loss: 0.8742 - acc: 0.6083 - val\_loss: 0.8807 - val\_acc: 0.6016

Epoch 6/30

- 114s - loss: 0.8527 - acc: 0.6085 - val\_loss: 0.9190 - val\_acc: 0.5646

Epoch 7/30

- 113s - loss: 0.9217 - acc: 0.5895 - val\_loss: 0.9211 - val\_acc: 0.5925

Epoch 8/30

- 114s - loss: 0.8325 - acc: 0.6280 - val\_loss: 0.8287 - val\_acc: 0.6050

Epoch 9/30

- 113s - loss: 0.7780 - acc: 0.6338 - val\_loss: 0.8622 - val\_acc: 0.6101

Epoch 10/30

- 113s - loss: 1.4237 - acc: 0.4249 - val\_loss: 1.4747 - val\_acc: 0.5029

Epoch 11/30

- 113s - loss: 1.2080 - acc: 0.4835 - val\_loss: 1.0813 - val\_acc: 0.5633

Epoch 12/30

```

- 114s - loss: 0.8836 - acc: 0.5924 - val_loss: 0.9811 - val_acc: 0.5959
Epoch 13/30
- 114s - loss: 1.0894 - acc: 0.5231 - val_loss: 1.1186 - val_acc: 0.5151
Epoch 14/30
- 113s - loss: 0.9932 - acc: 0.5367 - val_loss: 1.0401 - val_acc: 0.5053
Epoch 15/30
- 113s - loss: 0.9519 - acc: 0.5646 - val_loss: 1.0127 - val_acc: 0.5097
Epoch 16/30
- 114s - loss: 0.9355 - acc: 0.6186 - val_loss: 0.9665 - val_acc: 0.5847
Epoch 17/30
- 113s - loss: 0.8531 - acc: 0.6378 - val_loss: 0.8733 - val_acc: 0.6088
Epoch 18/30
- 114s - loss: 0.8238 - acc: 0.6472 - val_loss: 0.8909 - val_acc: 0.6006
Epoch 19/30
- 113s - loss: 0.7985 - acc: 0.6564 - val_loss: 0.9155 - val_acc: 0.5422
Epoch 20/30
- 114s - loss: 0.8029 - acc: 0.6555 - val_loss: 0.9345 - val_acc: 0.6094
Epoch 21/30
- 113s - loss: 0.7954 - acc: 0.6575 - val_loss: 0.9065 - val_acc: 0.6410
Epoch 22/30
- 113s - loss: 0.7906 - acc: 0.6700 - val_loss: 0.9385 - val_acc: 0.5443
Epoch 23/30
- 113s - loss: 0.7928 - acc: 0.6568 - val_loss: 0.9592 - val_acc: 0.5592
Epoch 24/30
- 114s - loss: 0.7944 - acc: 0.6620 - val_loss: 0.9956 - val_acc: 0.5304
Epoch 25/30
- 114s - loss: 0.7747 - acc: 0.6609 - val_loss: 1.0209 - val_acc: 0.5249
Epoch 26/30
- 114s - loss: 0.7727 - acc: 0.6680 - val_loss: 0.9124 - val_acc: 0.6376
Epoch 27/30
- 113s - loss: 0.7619 - acc: 0.6710 - val_loss: 0.9372 - val_acc: 0.5236
Epoch 28/30
- 113s - loss: 0.7483 - acc: 0.6744 - val_loss: 0.9400 - val_acc: 0.6135
Epoch 29/30
- 113s - loss: 0.7346 - acc: 0.6794 - val_loss: 0.9644 - val_acc: 0.6328
Epoch 30/30
- 114s - loss: 0.7393 - acc: 0.6857 - val_loss: 0.9658 - val_acc: 0.5962
Test accuracy: 0.5961995249507304

```

---

Layer (type)	Output Shape	Param #
=====		
LSTM1_1 (LSTM)	(None, 28)	4256
-----		
Dropout1_1 (Dropout)	(None, 28)	0
-----		
dense_9 (Dense)	(None, 6)	174
=====		

Total params: 4,430  
Trainable params: 4,430  
Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 56s - loss: 1.1159 - acc: 0.4990 - val\_loss: 0.8833 - val\_acc: 0.6060

Epoch 2/30

- 53s - loss: 0.7621 - acc: 0.6319 - val\_loss: 0.8008 - val\_acc: 0.5955

Epoch 3/30

- 54s - loss: 0.7072 - acc: 0.6363 - val\_loss: 0.6816 - val\_acc: 0.6064

Epoch 4/30

- 54s - loss: 0.6291 - acc: 0.6567 - val\_loss: 0.7050 - val\_acc: 0.6247

Epoch 5/30

- 54s - loss: 0.5655 - acc: 0.7236 - val\_loss: 0.5158 - val\_acc: 0.7564

Epoch 6/30

- 53s - loss: 0.4537 - acc: 0.8071 - val\_loss: 0.6697 - val\_acc: 0.7581

Epoch 7/30

- 54s - loss: 0.3525 - acc: 0.8992 - val\_loss: 0.6083 - val\_acc: 0.8588

Epoch 8/30

- 53s - loss: 0.2895 - acc: 0.9185 - val\_loss: 0.4039 - val\_acc: 0.8863

Epoch 9/30

- 54s - loss: 0.2687 - acc: 0.9267 - val\_loss: 0.4397 - val\_acc: 0.8948

Epoch 10/30

- 54s - loss: 0.2544 - acc: 0.9321 - val\_loss: 0.5715 - val\_acc: 0.8649

Epoch 11/30

- 53s - loss: 0.2165 - acc: 0.9378 - val\_loss: 0.4928 - val\_acc: 0.8660

Epoch 12/30

- 53s - loss: 0.2228 - acc: 0.9365 - val\_loss: 0.3271 - val\_acc: 0.9101

Epoch 13/30

- 54s - loss: 0.2147 - acc: 0.9392 - val\_loss: 0.4956 - val\_acc: 0.8918

Epoch 14/30

- 54s - loss: 0.2089 - acc: 0.9384 - val\_loss: 0.3574 - val\_acc: 0.9135

Epoch 15/30

- 54s - loss: 0.2050 - acc: 0.9361 - val\_loss: 0.4138 - val\_acc: 0.9182

Epoch 16/30

- 53s - loss: 0.2098 - acc: 0.9377 - val\_loss: 0.3259 - val\_acc: 0.9135

Epoch 17/30

- 53s - loss: 0.1989 - acc: 0.9385 - val\_loss: 0.4665 - val\_acc: 0.9009

Epoch 18/30

- 53s - loss: 0.2019 - acc: 0.9392 - val\_loss: 0.8034 - val\_acc: 0.8588

Epoch 19/30

- 54s - loss: 0.1824 - acc: 0.9468 - val\_loss: 0.3951 - val\_acc: 0.8945

Epoch 20/30

- 54s - loss: 0.1787 - acc: 0.9419 - val\_loss: 0.3930 - val\_acc: 0.9026

Epoch 21/30

- 54s - loss: 0.1685 - acc: 0.9471 - val\_loss: 0.6037 - val\_acc: 0.8951

Epoch 22/30  
 - 54s - loss: 0.1908 - acc: 0.9455 - val\_loss: 1.0361 - val\_acc: 0.8259  
 Epoch 23/30  
 - 53s - loss: 0.1743 - acc: 0.9464 - val\_loss: 0.5038 - val\_acc: 0.9111  
 Epoch 24/30  
 - 53s - loss: 0.1644 - acc: 0.9504 - val\_loss: 0.5073 - val\_acc: 0.9046  
 Epoch 25/30  
 - 54s - loss: 0.1617 - acc: 0.9497 - val\_loss: 0.6129 - val\_acc: 0.8846  
 Epoch 26/30  
 - 54s - loss: 0.1754 - acc: 0.9480 - val\_loss: 0.6234 - val\_acc: 0.8989  
 Epoch 27/30  
 - 54s - loss: 0.1600 - acc: 0.9514 - val\_loss: 0.6284 - val\_acc: 0.8948  
 Epoch 28/30  
 - 53s - loss: 0.1748 - acc: 0.9476 - val\_loss: 0.5432 - val\_acc: 0.9006  
 Epoch 29/30  
 - 54s - loss: 0.1575 - acc: 0.9518 - val\_loss: 0.6938 - val\_acc: 0.8802  
 Epoch 30/30  
 - 54s - loss: 0.1635 - acc: 0.9502 - val\_loss: 0.5709 - val\_acc: 0.9080  
 Test accuracy: 0.9080420766881574

---

Layer (type)	Output Shape	Param #
=====		
LSTM1_1 (LSTM)	(None, 28)	4256
-----		
Dropout1_1 (Dropout)	(None, 28)	0
-----		
dense_10 (Dense)	(None, 6)	174
=====		

Total params: 4,430  
 Trainable params: 4,430  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 57s - loss: 1.1384 - acc: 0.4871 - val\_loss: 0.9078 - val\_acc: 0.5752  
 Epoch 2/30  
 - 55s - loss: 0.7859 - acc: 0.6450 - val\_loss: 0.6904 - val\_acc: 0.7234  
 Epoch 3/30  
 - 55s - loss: 0.5756 - acc: 0.7835 - val\_loss: 0.6575 - val\_acc: 0.7743  
 Epoch 4/30  
 - 54s - loss: 0.4032 - acc: 0.8697 - val\_loss: 0.5826 - val\_acc: 0.8124  
 Epoch 5/30  
 - 54s - loss: 0.3922 - acc: 0.8872 - val\_loss: 0.5953 - val\_acc: 0.8276  
 Epoch 6/30  
 - 55s - loss: 0.3531 - acc: 0.8987 - val\_loss: 0.5288 - val\_acc: 0.8751  
 Epoch 7/30

```

- 55s - loss: 0.2814 - acc: 0.9208 - val_loss: 0.7520 - val_acc: 0.8493
Epoch 8/30
- 54s - loss: 0.2437 - acc: 0.9300 - val_loss: 0.5382 - val_acc: 0.8707
Epoch 9/30
- 55s - loss: 0.2432 - acc: 0.9294 - val_loss: 0.8665 - val_acc: 0.8649
Epoch 10/30
- 54s - loss: 0.2525 - acc: 0.9332 - val_loss: 0.6180 - val_acc: 0.8823
Epoch 11/30
- 55s - loss: 0.2438 - acc: 0.9350 - val_loss: 0.8062 - val_acc: 0.8812
Epoch 12/30
- 54s - loss: 0.2181 - acc: 0.9359 - val_loss: 0.5735 - val_acc: 0.8867
Epoch 13/30
- 55s - loss: 0.2097 - acc: 0.9363 - val_loss: 0.8048 - val_acc: 0.8711
Epoch 14/30
- 55s - loss: 0.1825 - acc: 0.9422 - val_loss: 0.5308 - val_acc: 0.8884
Epoch 15/30
- 55s - loss: 0.2044 - acc: 0.9389 - val_loss: 0.8616 - val_acc: 0.8592
Epoch 16/30
- 54s - loss: 0.1932 - acc: 0.9407 - val_loss: 0.8238 - val_acc: 0.8850
Epoch 17/30
- 55s - loss: 0.2073 - acc: 0.9350 - val_loss: 1.0110 - val_acc: 0.8575
Epoch 18/30
- 55s - loss: 0.2428 - acc: 0.9370 - val_loss: 0.8547 - val_acc: 0.8826
Epoch 19/30
- 55s - loss: 0.1989 - acc: 0.9404 - val_loss: 0.8010 - val_acc: 0.8856
Epoch 20/30
- 54s - loss: 0.2050 - acc: 0.9404 - val_loss: 0.6379 - val_acc: 0.8812
Epoch 21/30
- 55s - loss: 0.1937 - acc: 0.9393 - val_loss: 0.6550 - val_acc: 0.9040
Epoch 22/30
- 54s - loss: 0.1771 - acc: 0.9426 - val_loss: 0.5317 - val_acc: 0.8968
Epoch 23/30
- 55s - loss: 0.1857 - acc: 0.9430 - val_loss: 0.7792 - val_acc: 0.8775
Epoch 24/30
- 54s - loss: 0.1789 - acc: 0.9453 - val_loss: 0.6949 - val_acc: 0.8870
Epoch 25/30
- 55s - loss: 0.1665 - acc: 0.9430 - val_loss: 0.7166 - val_acc: 0.8694
Epoch 26/30
- 54s - loss: 0.1960 - acc: 0.9437 - val_loss: 0.8243 - val_acc: 0.8799
Epoch 27/30
- 55s - loss: 0.2010 - acc: 0.9426 - val_loss: 0.6781 - val_acc: 0.8951
Epoch 28/30
- 55s - loss: 0.1664 - acc: 0.9476 - val_loss: 0.8844 - val_acc: 0.8839
Epoch 29/30
- 55s - loss: 0.1778 - acc: 0.9468 - val_loss: 0.7395 - val_acc: 0.8744
Epoch 30/30
- 54s - loss: 0.1610 - acc: 0.9471 - val_loss: 0.8714 - val_acc: 0.8585
Test accuracy: 0.8585001696640652

```

---

Layer (type)	Output Shape	Param #
LSTM1_1 (LSTM)	(None, 32)	5376
Dropout1_1 (Dropout)	(None, 32)	0
dense_11 (Dense)	(None, 6)	198

---

Total params: 5,574  
Trainable params: 5,574  
Non-trainable params: 0

---

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 56s - loss: 1.1627 - acc: 0.4997 - val\_loss: 1.0767 - val\_acc: 0.5395

Epoch 2/30

- 54s - loss: 0.7603 - acc: 0.6753 - val\_loss: 0.6746 - val\_acc: 0.7024

Epoch 3/30

- 54s - loss: 0.5395 - acc: 0.8118 - val\_loss: 0.4673 - val\_acc: 0.8293

Epoch 4/30

- 54s - loss: 0.3655 - acc: 0.8972 - val\_loss: 0.4531 - val\_acc: 0.8521

Epoch 5/30

- 54s - loss: 0.3289 - acc: 0.9109 - val\_loss: 0.3577 - val\_acc: 0.8833

Epoch 6/30

- 54s - loss: 0.2702 - acc: 0.9276 - val\_loss: 0.5242 - val\_acc: 0.8687

Epoch 7/30

- 54s - loss: 0.2520 - acc: 0.9314 - val\_loss: 0.3830 - val\_acc: 0.8965

Epoch 8/30

- 54s - loss: 0.2218 - acc: 0.9348 - val\_loss: 0.4224 - val\_acc: 0.9030

Epoch 9/30

- 54s - loss: 0.2194 - acc: 0.9385 - val\_loss: 0.4662 - val\_acc: 0.8826

Epoch 10/30

- 55s - loss: 0.2095 - acc: 0.9384 - val\_loss: 0.4849 - val\_acc: 0.8880

Epoch 11/30

- 55s - loss: 0.2168 - acc: 0.9392 - val\_loss: 0.3884 - val\_acc: 0.9016

Epoch 12/30

- 55s - loss: 0.2031 - acc: 0.9387 - val\_loss: 0.4717 - val\_acc: 0.8836

Epoch 13/30

- 55s - loss: 0.1956 - acc: 0.9429 - val\_loss: 0.3812 - val\_acc: 0.8955

Epoch 14/30

- 55s - loss: 0.1765 - acc: 0.9472 - val\_loss: 0.5949 - val\_acc: 0.8958

Epoch 15/30

- 54s - loss: 0.1944 - acc: 0.9436 - val\_loss: 0.4595 - val\_acc: 0.9026

Epoch 16/30

- 54s - loss: 0.1752 - acc: 0.9484 - val\_loss: 0.4092 - val\_acc: 0.9046

Epoch 17/30  
 - 55s - loss: 0.1727 - acc: 0.9453 - val\_loss: 0.3518 - val\_acc: 0.8965  
 Epoch 18/30  
 - 54s - loss: 0.1679 - acc: 0.9438 - val\_loss: 0.4842 - val\_acc: 0.8989  
 Epoch 19/30  
 - 54s - loss: 0.1715 - acc: 0.9479 - val\_loss: 0.4790 - val\_acc: 0.8911  
 Epoch 20/30  
 - 55s - loss: 0.1777 - acc: 0.9463 - val\_loss: 0.6256 - val\_acc: 0.8748  
 Epoch 21/30  
 - 54s - loss: 0.1576 - acc: 0.9491 - val\_loss: 0.4094 - val\_acc: 0.9094  
 Epoch 22/30  
 - 54s - loss: 0.1655 - acc: 0.9472 - val\_loss: 0.4630 - val\_acc: 0.9019  
 Epoch 23/30  
 - 54s - loss: 0.1548 - acc: 0.9486 - val\_loss: 0.4075 - val\_acc: 0.9009  
 Epoch 24/30  
 - 55s - loss: 0.1537 - acc: 0.9498 - val\_loss: 0.5320 - val\_acc: 0.8904  
 Epoch 25/30  
 - 55s - loss: 0.1508 - acc: 0.9512 - val\_loss: 0.6119 - val\_acc: 0.9050  
 Epoch 26/30  
 - 54s - loss: 0.1562 - acc: 0.9470 - val\_loss: 0.4720 - val\_acc: 0.8975  
 Epoch 27/30  
 - 54s - loss: 0.1473 - acc: 0.9499 - val\_loss: 0.8082 - val\_acc: 0.8809  
 Epoch 28/30  
 - 54s - loss: 0.1444 - acc: 0.9524 - val\_loss: 0.6733 - val\_acc: 0.8897  
 Epoch 29/30  
 - 55s - loss: 0.1508 - acc: 0.9510 - val\_loss: 0.5657 - val\_acc: 0.9030  
 Epoch 30/30  
 - 54s - loss: 0.1428 - acc: 0.9512 - val\_loss: 0.4780 - val\_acc: 0.9172  
 Test accuracy: 0.9172039362063115

---

Layer (type)	Output Shape	Param #
=====		
LSTM1_1 (LSTM)	(None, 36)	6624
-----		
Dropout1_1 (Dropout)	(None, 36)	0
-----		
dense_12 (Dense)	(None, 6)	222
=====		

Total params: 6,846  
 Trainable params: 6,846  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 57s - loss: 1.1751 - acc: 0.5121 - val\_loss: 0.8565 - val\_acc: 0.6386  
 Epoch 2/30



- 55s - loss: 1.3933 - acc: 0.5654 - val\_loss: 1.4125 - val\_acc: 0.5898  
Epoch 3/30  
- 55s - loss: 1.0599 - acc: 0.6488 - val\_loss: 0.9485 - val\_acc: 0.6189  
Epoch 4/30  
- 55s - loss: 0.8547 - acc: 0.6576 - val\_loss: 0.9183 - val\_acc: 0.6685  
Epoch 5/30  
- 55s - loss: 0.6698 - acc: 0.7356 - val\_loss: 0.8007 - val\_acc: 0.7509  
Epoch 6/30  
- 55s - loss: 0.5329 - acc: 0.8184 - val\_loss: 0.6638 - val\_acc: 0.8334  
Epoch 7/30  
- 55s - loss: 0.4624 - acc: 0.8626 - val\_loss: 1.1916 - val\_acc: 0.6030  
Epoch 8/30  
- 55s - loss: 0.6670 - acc: 0.7958 - val\_loss: 0.7028 - val\_acc: 0.8476  
Epoch 9/30  
- 55s - loss: 0.3917 - acc: 0.9041 - val\_loss: 0.6530 - val\_acc: 0.8636  
Epoch 10/30  
- 55s - loss: 0.3107 - acc: 0.9161 - val\_loss: 0.5861 - val\_acc: 0.8775  
Epoch 11/30  
- 55s - loss: 0.3224 - acc: 0.9132 - val\_loss: 0.5838 - val\_acc: 0.8673  
Epoch 12/30  
- 55s - loss: 0.2968 - acc: 0.9217 - val\_loss: 0.5438 - val\_acc: 0.8697  
Epoch 13/30  
- 55s - loss: 0.2591 - acc: 0.9280 - val\_loss: 0.6289 - val\_acc: 0.8772  
Epoch 14/30  
- 55s - loss: 0.2558 - acc: 0.9309 - val\_loss: 0.5403 - val\_acc: 0.8680  
Epoch 15/30  
- 55s - loss: 0.2329 - acc: 0.9329 - val\_loss: 0.6780 - val\_acc: 0.8578  
Epoch 16/30  
- 55s - loss: 0.2715 - acc: 0.9312 - val\_loss: 0.5799 - val\_acc: 0.8775  
Epoch 17/30  
- 55s - loss: 0.3103 - acc: 0.9173 - val\_loss: 0.4122 - val\_acc: 0.8880  
Epoch 18/30  
- 55s - loss: 0.2286 - acc: 0.9362 - val\_loss: 0.6918 - val\_acc: 0.8510  
Epoch 19/30  
- 55s - loss: 0.2378 - acc: 0.9336 - val\_loss: 0.5272 - val\_acc: 0.8877  
Epoch 20/30  
- 55s - loss: 0.2437 - acc: 0.9339 - val\_loss: 0.4316 - val\_acc: 0.8846  
Epoch 21/30  
- 55s - loss: 0.2078 - acc: 0.9377 - val\_loss: 0.5531 - val\_acc: 0.8799  
Epoch 22/30  
- 55s - loss: 0.2344 - acc: 0.9328 - val\_loss: 0.4419 - val\_acc: 0.8890  
Epoch 23/30  
- 55s - loss: 0.2114 - acc: 0.9385 - val\_loss: 0.4200 - val\_acc: 0.8806  
Epoch 24/30  
- 55s - loss: 0.1937 - acc: 0.9419 - val\_loss: 0.4129 - val\_acc: 0.8935  
Epoch 25/30  
- 55s - loss: 0.2091 - acc: 0.9392 - val\_loss: 0.5488 - val\_acc: 0.8646  
Epoch 26/30

```

- 55s - loss: 0.2399 - acc: 0.9347 - val_loss: 0.4561 - val_acc: 0.8935
Epoch 27/30
- 55s - loss: 0.2055 - acc: 0.9387 - val_loss: 0.4420 - val_acc: 0.8985
Epoch 28/30
- 55s - loss: 0.2788 - acc: 0.9283 - val_loss: 0.4602 - val_acc: 0.8897
Epoch 29/30
- 55s - loss: 0.2292 - acc: 0.9381 - val_loss: 0.4052 - val_acc: 0.8958
Epoch 30/30
- 55s - loss: 0.2152 - acc: 0.9388 - val_loss: 0.4672 - val_acc: 0.8894
Test accuracy: 0.8893790295215473

```

---

Layer (type)	Output Shape	Param #
LSTM2_1 (LSTM)	(None, 128, 38)	7296
Dropout2_1 (Dropout)	(None, 128, 38)	0
LSTM2_2 (LSTM)	(None, 32)	9088
Dropout2_2 (Dropout)	(None, 32)	0
dense_13 (Dense)	(None, 6)	198

---

```

Total params: 16,582
Trainable params: 16,582
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 119s - loss: 1.3962 - acc: 0.3897 - val_loss: 1.1641 - val_acc: 0.4649
Epoch 2/30
- 116s - loss: 0.9053 - acc: 0.6020 - val_loss: 0.7868 - val_acc: 0.5853
Epoch 3/30
- 116s - loss: 0.7861 - acc: 0.6479 - val_loss: 0.7485 - val_acc: 0.6240
Epoch 4/30
- 116s - loss: 0.7637 - acc: 0.6405 - val_loss: 0.8719 - val_acc: 0.6162
Epoch 5/30
- 116s - loss: 0.6971 - acc: 0.6980 - val_loss: 1.0038 - val_acc: 0.6345
Epoch 6/30
- 115s - loss: 0.5672 - acc: 0.8048 - val_loss: 0.7988 - val_acc: 0.8280
Epoch 7/30
- 116s - loss: 0.4332 - acc: 0.8856 - val_loss: 0.7549 - val_acc: 0.8307
Epoch 8/30
- 116s - loss: 0.3788 - acc: 0.9042 - val_loss: 0.6115 - val_acc: 0.8795
Epoch 9/30
- 115s - loss: 0.3367 - acc: 0.9138 - val_loss: 0.7760 - val_acc: 0.8663

```

Epoch 10/30  
 - 116s - loss: 0.3072 - acc: 0.9139 - val\_loss: 0.5898 - val\_acc: 0.9094  
 Epoch 11/30  
 - 115s - loss: 0.2979 - acc: 0.9217 - val\_loss: 0.7345 - val\_acc: 0.8897  
 Epoch 12/30  
 - 115s - loss: 0.2988 - acc: 0.9212 - val\_loss: 0.5408 - val\_acc: 0.8914  
 Epoch 13/30  
 - 116s - loss: 0.2695 - acc: 0.9267 - val\_loss: 0.7084 - val\_acc: 0.8904  
 Epoch 14/30  
 - 115s - loss: 0.2583 - acc: 0.9285 - val\_loss: 0.7715 - val\_acc: 0.8894  
 Epoch 15/30  
 - 115s - loss: 0.2734 - acc: 0.9267 - val\_loss: 0.9041 - val\_acc: 0.8982  
 Epoch 16/30  
 - 116s - loss: 0.2625 - acc: 0.9294 - val\_loss: 0.7045 - val\_acc: 0.8979  
 Epoch 17/30  
 - 116s - loss: 0.2606 - acc: 0.9289 - val\_loss: 0.6480 - val\_acc: 0.9006  
 Epoch 18/30  
 - 116s - loss: 0.2542 - acc: 0.9314 - val\_loss: 0.7842 - val\_acc: 0.8819  
 Epoch 19/30  
 - 115s - loss: 0.2445 - acc: 0.9313 - val\_loss: 0.8210 - val\_acc: 0.8928  
 Epoch 20/30  
 - 115s - loss: 0.2520 - acc: 0.9321 - val\_loss: 0.6904 - val\_acc: 0.9050  
 Epoch 21/30  
 - 115s - loss: 0.2544 - acc: 0.9317 - val\_loss: 0.7692 - val\_acc: 0.8911  
 Epoch 22/30  
 - 116s - loss: 0.2450 - acc: 0.9310 - val\_loss: 0.6523 - val\_acc: 0.9057  
 Epoch 23/30  
 - 115s - loss: 0.2483 - acc: 0.9329 - val\_loss: 0.6386 - val\_acc: 0.9040  
 Epoch 24/30  
 - 116s - loss: 0.2394 - acc: 0.9372 - val\_loss: 0.6962 - val\_acc: 0.8945  
 Epoch 25/30  
 - 115s - loss: 0.2238 - acc: 0.9336 - val\_loss: 0.7469 - val\_acc: 0.8901  
 Epoch 26/30  
 - 115s - loss: nan - acc: 0.7690 - val\_loss: nan - val\_acc: 0.1683  
 Epoch 27/30  
 - 116s - loss: nan - acc: 0.1668 - val\_loss: nan - val\_acc: 0.1683  
 Epoch 28/30  
 - 115s - loss: nan - acc: 0.1668 - val\_loss: nan - val\_acc: 0.1683  
 Epoch 29/30  
 - 116s - loss: nan - acc: 0.1668 - val\_loss: nan - val\_acc: 0.1683  
 Epoch 30/30  
 - 116s - loss: nan - acc: 0.1668 - val\_loss: nan - val\_acc: 0.1683  
 Test accuracy: 0.168306752629793

```

-----
Layer (type)                Output Shape                Param #
=====
LSTM1_1 (LSTM)              (None, 32)                  5376

```

```

-----
Dropout1_1 (Dropout)                (None, 32)                0
-----
dense_14 (Dense)                    (None, 6)                  198
=====
Total params: 5,574
Trainable params: 5,574
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 56s - loss: 1.1571 - acc: 0.5097 - val_loss: 1.0674 - val_acc: 0.5833
Epoch 2/30
  - 54s - loss: 1.1179 - acc: 0.5733 - val_loss: 0.9277 - val_acc: 0.5874
Epoch 3/30
  - 54s - loss: 0.8314 - acc: 0.6604 - val_loss: 0.8207 - val_acc: 0.6417
Epoch 4/30
  - 54s - loss: 0.7140 - acc: 0.7183 - val_loss: 0.6658 - val_acc: 0.7710
Epoch 5/30
  - 54s - loss: 0.5664 - acc: 0.8232 - val_loss: 0.6426 - val_acc: 0.8083
Epoch 6/30
  - 54s - loss: 0.3956 - acc: 0.8815 - val_loss: 0.6067 - val_acc: 0.8517
Epoch 7/30
  - 54s - loss: 0.4281 - acc: 0.8859 - val_loss: 0.5300 - val_acc: 0.8799
Epoch 8/30
  - 54s - loss: 0.3570 - acc: 0.9131 - val_loss: 0.5881 - val_acc: 0.8812
Epoch 9/30
  - 54s - loss: 0.3461 - acc: 0.9195 - val_loss: 0.4996 - val_acc: 0.8792
Epoch 10/30
  - 54s - loss: 0.2919 - acc: 0.9267 - val_loss: 0.5529 - val_acc: 0.8768
Epoch 11/30
  - 54s - loss: 0.3594 - acc: 0.9144 - val_loss: 0.5464 - val_acc: 0.8707
Epoch 12/30
  - 54s - loss: 0.3306 - acc: 0.9276 - val_loss: 0.7686 - val_acc: 0.8405
Epoch 13/30
  - 54s - loss: 0.3139 - acc: 0.9253 - val_loss: 0.5115 - val_acc: 0.8721
Epoch 14/30
  - 54s - loss: 0.2549 - acc: 0.9329 - val_loss: 0.4201 - val_acc: 0.8860
Epoch 15/30
  - 54s - loss: 0.2187 - acc: 0.9415 - val_loss: 0.3677 - val_acc: 0.9033
Epoch 16/30
  - 54s - loss: 0.2296 - acc: 0.9346 - val_loss: 0.3998 - val_acc: 0.8951
Epoch 17/30
  - 54s - loss: 0.2213 - acc: 0.9363 - val_loss: 0.4440 - val_acc: 0.8972
Epoch 18/30
  - 54s - loss: 0.2298 - acc: 0.9343 - val_loss: 0.5169 - val_acc: 0.8806
Epoch 19/30

```

```

- 54s - loss: 0.2469 - acc: 0.9358 - val_loss: 0.4917 - val_acc: 0.8992
Epoch 20/30
- 54s - loss: 0.1910 - acc: 0.9400 - val_loss: 0.3785 - val_acc: 0.9046
Epoch 21/30
- 54s - loss: 0.1775 - acc: 0.9472 - val_loss: 0.4941 - val_acc: 0.9016
Epoch 22/30
- 54s - loss: 0.2179 - acc: 0.9376 - val_loss: 0.5053 - val_acc: 0.8972
Epoch 23/30
- 54s - loss: 0.2553 - acc: 0.9328 - val_loss: 0.4692 - val_acc: 0.8884
Epoch 24/30
- 54s - loss: 0.1926 - acc: 0.9421 - val_loss: 0.3857 - val_acc: 0.8965
Epoch 25/30
- 54s - loss: 0.1970 - acc: 0.9395 - val_loss: 0.4568 - val_acc: 0.8962
Epoch 26/30
- 54s - loss: 0.2238 - acc: 0.9354 - val_loss: 0.5431 - val_acc: 0.8945
Epoch 27/30
- 54s - loss: 0.1852 - acc: 0.9427 - val_loss: 0.5686 - val_acc: 0.9063
Epoch 28/30
- 54s - loss: 0.2364 - acc: 0.9343 - val_loss: 0.4388 - val_acc: 0.9006
Epoch 29/30
- 54s - loss: 0.2425 - acc: 0.9324 - val_loss: 0.4072 - val_acc: 0.9118
Epoch 30/30
- 54s - loss: 0.1823 - acc: 0.9457 - val_loss: 0.3116 - val_acc: 0.9199
Test accuracy: 0.9199185612487275

```

---

Layer (type)	Output Shape	Param #
LSTM2_1 (LSTM)	(None, 128, 32)	5376
Dropout2_1 (Dropout)	(None, 128, 32)	0
LSTM2_2 (LSTM)	(None, 32)	8320
Dropout2_2 (Dropout)	(None, 32)	0
dense_15 (Dense)	(None, 6)	198

---

```

Total params: 13,894
Trainable params: 13,894
Non-trainable params: 0

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 116s - loss: 1.4041 - acc: 0.3607 - val_loss: 1.4238 - val_acc: 0.3448
Epoch 2/30
- 112s - loss: 1.3603 - acc: 0.3855 - val_loss: 1.4379 - val_acc: 0.4038

```

Epoch 3/30  
- 112s - loss: 1.3052 - acc: 0.4049 - val\_loss: 1.0620 - val\_acc: 0.3882

Epoch 4/30  
- 113s - loss: 1.2095 - acc: 0.4909 - val\_loss: 1.0250 - val\_acc: 0.5083

Epoch 5/30  
- 113s - loss: 0.9901 - acc: 0.5301 - val\_loss: 0.8279 - val\_acc: 0.6159

Epoch 6/30  
- 112s - loss: 0.8973 - acc: 0.5941 - val\_loss: 0.8105 - val\_acc: 0.6220

Epoch 7/30  
- 112s - loss: 0.7839 - acc: 0.6291 - val\_loss: 0.7552 - val\_acc: 0.6176

Epoch 8/30  
- 112s - loss: 0.7660 - acc: 0.6219 - val\_loss: 0.8569 - val\_acc: 0.5948

Epoch 9/30  
- 112s - loss: 0.7627 - acc: 0.6240 - val\_loss: 0.7599 - val\_acc: 0.6220

Epoch 10/30  
- 113s - loss: 0.7986 - acc: 0.6296 - val\_loss: 0.8444 - val\_acc: 0.6172

Epoch 11/30  
- 112s - loss: 0.7062 - acc: 0.6669 - val\_loss: 0.8629 - val\_acc: 0.6223

Epoch 12/30  
- 112s - loss: 0.6929 - acc: 0.6608 - val\_loss: 0.8061 - val\_acc: 0.6240

Epoch 13/30  
- 112s - loss: 0.6894 - acc: 0.6632 - val\_loss: 0.8014 - val\_acc: 0.6264

Epoch 14/30  
- 112s - loss: 0.7562 - acc: 0.6458 - val\_loss: 0.8395 - val\_acc: 0.6200

Epoch 15/30  
- 112s - loss: 0.7116 - acc: 0.6639 - val\_loss: 0.8772 - val\_acc: 0.6206

Epoch 16/30  
- 112s - loss: 0.7058 - acc: 0.6564 - val\_loss: 0.7293 - val\_acc: 0.6213

Epoch 17/30  
- 112s - loss: 0.6849 - acc: 0.6560 - val\_loss: 0.7797 - val\_acc: 0.6342

Epoch 18/30  
- 112s - loss: 0.6793 - acc: 0.6612 - val\_loss: 0.7296 - val\_acc: 0.6359

Epoch 19/30  
- 112s - loss: 0.7748 - acc: 0.6462 - val\_loss: 0.7778 - val\_acc: 0.6210

Epoch 20/30  
- 112s - loss: 0.6893 - acc: 0.6576 - val\_loss: 0.7779 - val\_acc: 0.6240

Epoch 21/30  
- 112s - loss: 0.6725 - acc: 0.6560 - val\_loss: 0.7446 - val\_acc: 0.6186

Epoch 22/30  
- 112s - loss: 0.6960 - acc: 0.6564 - val\_loss: 0.7433 - val\_acc: 0.6301

Epoch 23/30  
- 112s - loss: 0.6884 - acc: 0.6557 - val\_loss: 0.7521 - val\_acc: 0.6240

Epoch 24/30  
- 112s - loss: 0.6909 - acc: 0.6613 - val\_loss: 0.7613 - val\_acc: 0.6267

Epoch 25/30  
- 112s - loss: 0.6607 - acc: 0.6676 - val\_loss: 0.8038 - val\_acc: 0.6172

Epoch 26/30  
- 112s - loss: 0.6454 - acc: 0.6693 - val\_loss: 0.8014 - val\_acc: 0.6200

```

Epoch 27/30
- 112s - loss: 0.6491 - acc: 0.6624 - val_loss: 0.7241 - val_acc: 0.6261
Epoch 28/30
- 112s - loss: 0.6288 - acc: 0.6723 - val_loss: 0.7202 - val_acc: 0.6318
Epoch 29/30
- 113s - loss: 0.6441 - acc: 0.6695 - val_loss: 0.7551 - val_acc: 0.6257
Epoch 30/30
- 112s - loss: 0.6480 - acc: 0.6634 - val_loss: 0.7780 - val_acc: 0.6210
Test accuracy: 0.6209704784526637
-----

```

```

In [48]: total_trials = dict()
        for t, trial in enumerate(trials):
            vals = trial.get('misc').get('vals')
            print('Model',t+1,'parameters')
            print(vals)
            print()
            z = eval_hyperopt_space(space, vals)
            total_trials['M'+str(t+1)] = z
            print(z)
            print('-----')

```

Model 1 parameters

```
{'Dropout': [0.36598023572757926], 'Dropout_1': [0.6047146037530785], 'Dropout_2': [0.5188826519950]}
```

```
{'Dropout': 0.36598023572757926, 'Dropout_1': 0.6047146037530785, 'Dropout_2': 0.5188826519950}
```

Model 2 parameters

```
{'Dropout': [0.604072168386432], 'Dropout_1': [0.5642077861572957], 'Dropout_2': [0.468974251368865]}
```

```
{'Dropout': 0.604072168386432, 'Dropout_1': 0.5642077861572957, 'Dropout_2': 0.468974251368865}
```

Model 3 parameters

```
{'Dropout': [0.649118836907314], 'Dropout_1': [0.6408661828169875], 'Dropout_2': [0.502511631899755]}
```

```
{'Dropout': 0.649118836907314, 'Dropout_1': 0.6408661828169875, 'Dropout_2': 0.502511631899755}
```

Model 4 parameters

```
{'Dropout': [0.5709919477993022], 'Dropout_1': [0.6574295784428639], 'Dropout_2': [0.39377498664819]}
```

```
{'Dropout': 0.5709919477993022, 'Dropout_1': 0.6574295784428639, 'Dropout_2': 0.39377498664819}
```

Model 5 parameters

```
{'Dropout': [0.48051787644406624], 'Dropout_1': [0.5744163772727372], 'Dropout_2': [0.5086629864785]}
```

```
{'Dropout': 0.48051787644406624, 'Dropout_1': 0.5744163772727372, 'Dropout_2': 0.5086629864785}
```

Model 6 parameters

{'Dropout': [0.5813560517914963], 'Dropout\_1': [0.6046109124722276], 'Dropout\_2': [0.53558326352904]}

{'Dropout': 0.5813560517914963, 'Dropout\_1': 0.6046109124722276, 'Dropout\_2': 0.53558326352904}

Model 7 parameters

{'Dropout': [0.5293597400197904], 'Dropout\_1': [0.5958807193410454], 'Dropout\_2': [0.42617520692074]}

{'Dropout': 0.5293597400197904, 'Dropout\_1': 0.5958807193410454, 'Dropout\_2': 0.42617520692074}

Model 8 parameters

{'Dropout': [0.5950749367948185], 'Dropout\_1': [0.5997621117444732], 'Dropout\_2': [0.49996215722658]}

{'Dropout': 0.5950749367948185, 'Dropout\_1': 0.5997621117444732, 'Dropout\_2': 0.49996215722658}

Model 9 parameters

{'Dropout': [0.45037579382108217], 'Dropout\_1': [0.6781762554752515], 'Dropout\_2': [0.4794831735512]}

{'Dropout': 0.45037579382108217, 'Dropout\_1': 0.6781762554752515, 'Dropout\_2': 0.4794831735512}

Model 10 parameters

{'Dropout': [0.45714950357785966], 'Dropout\_1': [0.6894085538291769], 'Dropout\_2': [0.4521671387578]}

{'Dropout': 0.45714950357785966, 'Dropout\_1': 0.6894085538291769, 'Dropout\_2': 0.4521671387578}

Model 11 parameters

{'Dropout': [0.5808002757682877], 'Dropout\_1': [0.660514929179723], 'Dropout\_2': [0.473373430574583]}

{'Dropout': 0.5808002757682877, 'Dropout\_1': 0.660514929179723, 'Dropout\_2': 0.473373430574583}

Model 12 parameters

{'Dropout': [0.5666044972741778], 'Dropout\_1': [0.5837804766498599], 'Dropout\_2': [0.38708976069745]}

{'Dropout': 0.5666044972741778, 'Dropout\_1': 0.5837804766498599, 'Dropout\_2': 0.38708976069745}

Model 13 parameters

{'Dropout': [0.47945603666694214], 'Dropout\_1': [0.6410658485741121], 'Dropout\_2': [0.4314289625256]}

{'Dropout': 0.47945603666694214, 'Dropout\_1': 0.6410658485741121, 'Dropout\_2': 0.4314289625256}

Model 14 parameters

{'Dropout': [0.3802031741395868], 'Dropout\_1': [0.6903389204823146], 'Dropout\_2': [0.36543414253279]}

{'Dropout': 0.3802031741395868, 'Dropout\_1': 0.6903389204823146, 'Dropout\_2': 0.36543414253279}

Model 15 parameters

{'Dropout': [0.578227610775208], 'Dropout\_1': [0.6959943282933752], 'Dropout\_2': [0.4519332465]}



```
{'Dropout': 0.578227610775208, 'Dropout_1': 0.6959943282933752, 'Dropout_2': 0.451933246549509}
```

```
In [54]: best_run
```

```
Out [54]: {'Dropout': 0.3802031741395868,
          'Dropout_1': 0.6903389204823146,
          'Dropout_2': 0.3654341425327902,
          'LSTM': 2,
          'LSTM_1': 2,
          'LSTM_2': 1,
          'choiceval': 0,
          'conditional': 0,
          'l2': 0.00015208023802140732,
          'l2_1': 0.000643128044948208,
          'l2_2': 0.0007102309264917989,
          'lr': 0.016347608866364167,
          'lr_1': 0.024543333891182614}
```

```
In [55]: #BEST MODEL PARAMS
total_trials['M14']
```

```
Out [55]: {'Dropout': 0.3802031741395868,
          'Dropout_1': 0.6903389204823146,
          'Dropout_2': 0.3654341425327902,
          'LSTM': 38,
          'LSTM_1': 36,
          'LSTM_2': 32,
          'choiceval': 'adam',
          'conditional': 'one',
          'l2': 0.00015208023802140732,
          'l2_1': 0.000643128044948208,
          'l2_2': 0.0007102309264917989,
          'lr': 0.016347608866364167,
          'lr_1': 0.024543333891182614}
```

```
In [50]: #layes of best model
best_model.layers
```

```
Out [50]: [<keras.layers.recurrent.LSTM at 0x146c379d2ac8>,
          <keras.layers.core.Dropout at 0x146c379d2cc0>,
          <keras.layers.core.Dense at 0x146c379d2a90>]
```

```
In [51]: X_train, Y_train, X_val, Y_val = data()
```

```
In [56]: _, val_acc = best_model.evaluate(X_val, Y_val, verbose=0)
_, train_acc = best_model.evaluate(X_train, Y_train, verbose=0)
print('Train_accuracy', val_acc)
print('validation accuracy', val_acc)
```

```
Train_accuracy 0.94560663764961915
validation accuracy 0.9199185612487275
```

```
In [15]: # Activities are the class labels
# It is a 6 class classification
ACTIVITIES = {
    0: 'WALKING',
    1: 'WALKING_UPSTAIRS',
    2: 'WALKING_DOWNSTAIRS',
    3: 'SITTING',
    4: 'STANDING',
    5: 'LAYING',
}

# Utility function to print the confusion matrix
def confusion_matrix_rnn(Y_true, Y_pred):
    Y_true = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_true, axis=1)])
    Y_pred = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_pred, axis=1)])

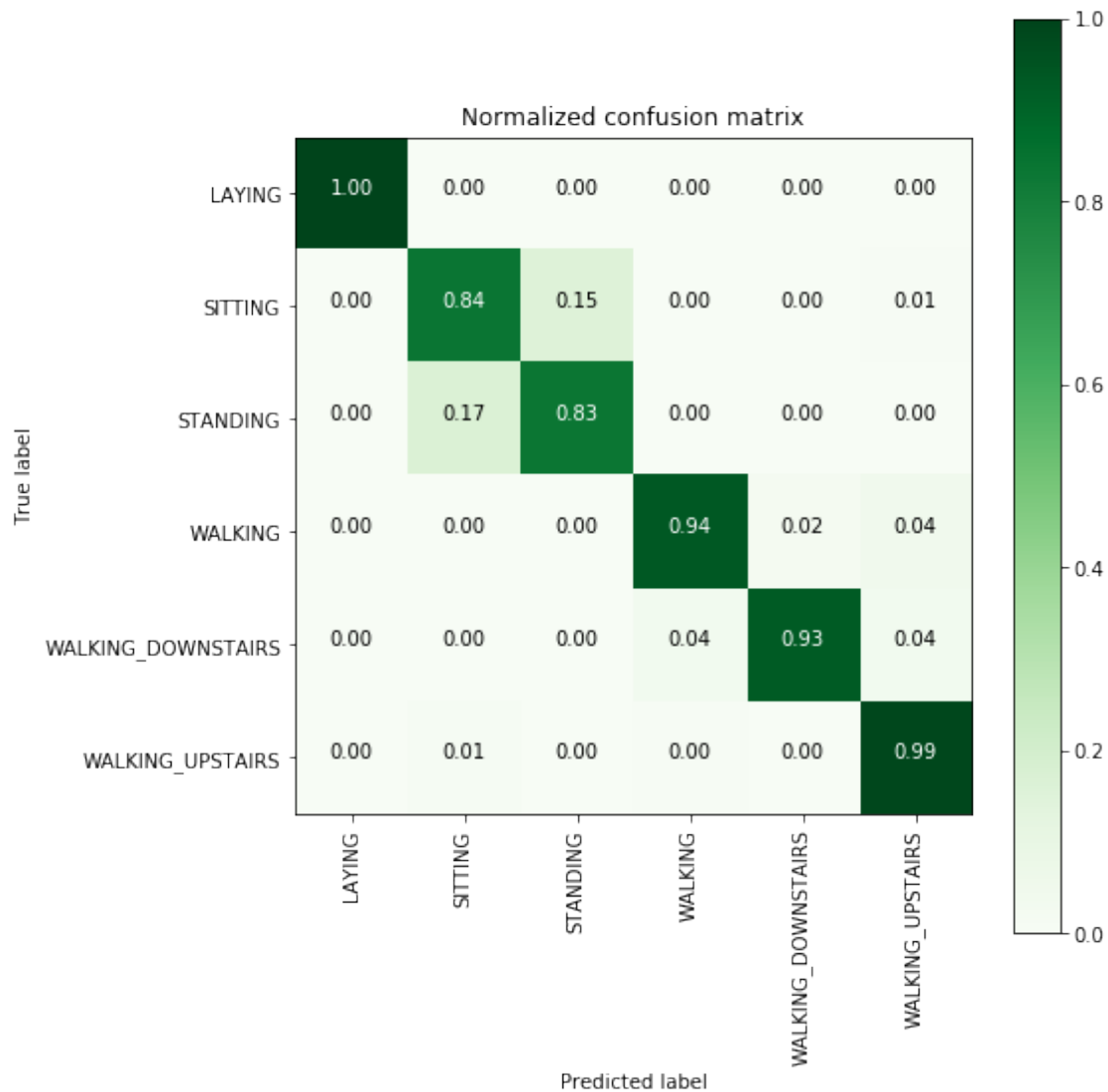
    #return pd.crosstab(Y_true, Y_pred, rownames=['True'], colnames=['Pred'])
    return metrics.confusion_matrix(Y_true, Y_pred)

In [74]: # Confusion Matrix
print(confusion_matrix_rnn(Y_val, best_model.predict(X_val)))

[[537   0   0   0   0   0]
 [  1 412  75   0   0   3]
 [  0  88 444   0   0   0]
 [  0   0   0 464  10  22]
 [  0   0   0  15 390  15]
 [  0   4   0   2   1 464]]

In [16]: from sklearn import metrics

In [80]: plt.figure(figsize=(8,8))
cm = confusion_matrix_rnn(Y_val, best_model.predict(X_val))
plot_confusion_matrix(cm, classes=labels, normalize=True, title='Normalized confusion
plt.show()
```



### 13.3 Using CNN

```
In [2]: import os
os.environ['PYTHONHASHSEED'] = '0'
import numpy as np
import tensorflow as tf
import random as rn
np.random.seed(36)
rn.seed(36)
tf.set_random_seed(36)
# Force TensorFlow to use single thread.
# Multiple threads are a potential source of non-reproducible results.
# For further details, see: https://stackoverflow.com/questions/42022950/
```

```

session_conf = tf.ConfigProto(intra_op_parallelism_threads=1,
                              inter_op_parallelism_threads=1)

from keras import backend as K

# The below tf.set_random_seed() will make random number generation
# in the TensorFlow backend have a well-defined initial state.
# For further details, see:
# https://www.tensorflow.org/api_docs/python/tf/set_random_seed

tf.set_random_seed(36)

sess = tf.Session(graph=tf.get_default_graph(), config=session_conf)
K.set_session(sess)

```

Using TensorFlow backend.

```

In [3]: # Importing libraries
import pandas as pd
from matplotlib import pyplot
from sklearn.preprocessing import StandardScaler
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Flatten
from keras.layers import Dropout
from keras.layers.convolutional import Conv1D
from keras.layers.convolutional import MaxPooling1D
from keras.utils import to_categorical
from keras.models import Sequential
from keras.layers import LSTM
from keras.layers.core import Dense, Dropout

In [18]: X_train, Y_train, X_val, Y_val = data()

In [19]: ###Scaling data
from sklearn.base import BaseEstimator, TransformerMixin
class scaling_tseries_data(BaseEstimator, TransformerMixin):
    from sklearn.preprocessing import StandardScaler
    def __init__(self):
        self.scale = None

    def transform(self, X):
        temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
        temp_X1 = self.scale.transform(temp_X1)
        return temp_X1.reshape(X.shape)

    def fit(self, X):
        # remove overlapping

```

```

remove = int(X.shape[1] / 2)
temp_X = X[:, -remove:, :]
# flatten data
temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape[2]))
scale = StandardScaler()
scale.fit(temp_X)
self.scale = scale
return self

```

```

In [20]: Scale = scaling_tseries_data()
Scale.fit(X_train)
X_train_sc = Scale.transform(X_train)
X_val_sc = Scale.transform(X_val)

```

```

In [21]: print('Shape of scaled X train',X_train_sc.shape)
print('Shape of scaled X test',X_val_sc.shape)

```

```

Shape of scaled X train (7352, 128, 9)
Shape of scaled X test (2947, 128, 9)

```

## Base Model

```

In [26]: model = Sequential()
model.add(Conv1D(filters=32, kernel_size=3, activation='relu',kernel_initializer='he_
model.add(Conv1D(filters=32, kernel_size=3, activation='relu',kernel_initializer='he_
model.add(Dropout(0.6))
model.add(MaxPooling1D(pool_size=2))
model.add(Flatten())
model.add(Dense(50, activation='relu'))
model.add(Dense(6, activation='softmax'))
model.summary()

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 124, 32)	3104
dropout_1 (Dropout)	(None, 124, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 62, 32)	0
flatten_1 (Flatten)	(None, 1984)	0
dense_1 (Dense)	(None, 50)	99250
dense_2 (Dense)	(None, 6)	306

```

=====
Total params: 103,556
Trainable params: 103,556
Non-trainable params: 0
-----

```

```
In [27]: model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])
```

```
In [28]: model.fit(X_train_sc,Y_train, epochs=30, batch_size=16,validation_data=(X_val_sc, Y_val_sc))
```

Train on 7352 samples, validate on 2947 samples

```

Epoch 1/30
7352/7352 [=====] - 6s 764us/step - loss: 0.4207 - acc: 0.8403 - val_loss: 0.3507 - val_acc: 0.8500
Epoch 2/30
7352/7352 [=====] - 5s 685us/step - loss: 0.1448 - acc: 0.9411 - val_loss: 0.1448 - val_acc: 0.9411
Epoch 3/30
7352/7352 [=====] - 5s 672us/step - loss: 0.1177 - acc: 0.9486 - val_loss: 0.1177 - val_acc: 0.9486
Epoch 4/30
7352/7352 [=====] - 5s 686us/step - loss: 0.0912 - acc: 0.9566 - val_loss: 0.0912 - val_acc: 0.9566
Epoch 5/30
7352/7352 [=====] - 5s 691us/step - loss: 0.0987 - acc: 0.9567 - val_loss: 0.0987 - val_acc: 0.9567
Epoch 6/30
7352/7352 [=====] - 5s 678us/step - loss: 0.0841 - acc: 0.9619 - val_loss: 0.0841 - val_acc: 0.9619
Epoch 7/30
7352/7352 [=====] - 5s 695us/step - loss: 0.0727 - acc: 0.9659 - val_loss: 0.0727 - val_acc: 0.9659
Epoch 8/30
7352/7352 [=====] - 5s 671us/step - loss: 0.0827 - acc: 0.9630 - val_loss: 0.0827 - val_acc: 0.9630
Epoch 9/30
7352/7352 [=====] - 5s 695us/step - loss: 0.0726 - acc: 0.9690 - val_loss: 0.0726 - val_acc: 0.9690
Epoch 10/30
7352/7352 [=====] - 5s 678us/step - loss: 0.0724 - acc: 0.9694 - val_loss: 0.0724 - val_acc: 0.9694
Epoch 11/30
7352/7352 [=====] - 5s 667us/step - loss: 0.0585 - acc: 0.9746 - val_loss: 0.0585 - val_acc: 0.9746
Epoch 12/30
7352/7352 [=====] - 5s 669us/step - loss: 0.0529 - acc: 0.9767 - val_loss: 0.0529 - val_acc: 0.9767
Epoch 13/30
7352/7352 [=====] - 5s 685us/step - loss: 0.0578 - acc: 0.9742 - val_loss: 0.0578 - val_acc: 0.9742
Epoch 14/30
7352/7352 [=====] - 5s 689us/step - loss: 0.0559 - acc: 0.9751 - val_loss: 0.0559 - val_acc: 0.9751
Epoch 15/30
7352/7352 [=====] - 5s 676us/step - loss: 0.0529 - acc: 0.9771 - val_loss: 0.0529 - val_acc: 0.9771
Epoch 16/30
7352/7352 [=====] - 5s 663us/step - loss: 0.0498 - acc: 0.9785 - val_loss: 0.0498 - val_acc: 0.9785
Epoch 17/30
7352/7352 [=====] - 5s 678us/step - loss: 0.0427 - acc: 0.9833 - val_loss: 0.0427 - val_acc: 0.9833
Epoch 18/30
7352/7352 [=====] - 5s 675us/step - loss: 0.0397 - acc: 0.9841 - val_loss: 0.0397 - val_acc: 0.9841

```

```

Epoch 19/30
7352/7352 [=====] - 5s 651us/step - loss: 0.0475 - acc: 0.9804 - val_
Epoch 20/30
7352/7352 [=====] - 5s 699us/step - loss: 0.0378 - acc: 0.9831 - val_
Epoch 21/30
7352/7352 [=====] - 5s 691us/step - loss: 0.0353 - acc: 0.9867 - val_
Epoch 22/30
7352/7352 [=====] - 5s 692us/step - loss: 0.0427 - acc: 0.9827 - val_
Epoch 23/30
7352/7352 [=====] - 5s 669us/step - loss: 0.0379 - acc: 0.9837 - val_
Epoch 24/30
7352/7352 [=====] - 5s 674us/step - loss: 0.0331 - acc: 0.9871 - val_
Epoch 25/30
7352/7352 [=====] - 5s 687us/step - loss: 0.0259 - acc: 0.9883 - val_
Epoch 26/30
7352/7352 [=====] - 5s 695us/step - loss: 0.0530 - acc: 0.9834 - val_
Epoch 27/30
7352/7352 [=====] - 5s 674us/step - loss: 0.0692 - acc: 0.9822 - val_
Epoch 28/30
7352/7352 [=====] - 5s 676us/step - loss: 0.0664 - acc: 0.9849 - val_
Epoch 29/30
7352/7352 [=====] - 5s 673us/step - loss: 0.0675 - acc: 0.9845 - val_
Epoch 30/30
7352/7352 [=====] - 5s 671us/step - loss: 0.0531 - acc: 0.9897 - val_

```

Out[28]: <keras.callbacks.History at 0x14761b299ac8>

it is giving some good score in train as well as test but it is overfitting so much. i will try some regularization in below models.

```

In [3]: from keras.regularizers import l2,l1
import keras
from keras.layers import BatchNormalization

In [117]: model = Sequential()
model.add(Conv1D(filters=32, kernel_size=3, activation='relu',kernel_initializer='he
kernel_regularizer=l2(0.1),input_shape=(128,9)))
model.add(Conv1D(filters=16, kernel_size=3, activation='relu',kernel_regularizer=l2(
model.add(Dropout(0.65))
model.add(MaxPooling1D(pool_size=2))
model.add(Flatten())
model.add(Dense(32, activation='relu'))
model.add(Dense(6, activation='softmax'))
model.summary()

```

Layer (type)	Output Shape	Param #
=====		

conv1d_67 (Conv1D)	(None, 126, 32)	896
-----		
conv1d_68 (Conv1D)	(None, 124, 16)	1552
-----		
dropout_39 (Dropout)	(None, 124, 16)	0
-----		
max_pooling1d_34 (MaxPooling)	(None, 62, 16)	0
-----		
flatten_34 (Flatten)	(None, 992)	0
-----		
dense_67 (Dense)	(None, 32)	31776
-----		
dense_68 (Dense)	(None, 6)	198
=====		
Total params: 34,422		
Trainable params: 34,422		
Non-trainable params: 0		
-----		

```
In [118]: import math
          adam = keras.optimizers.Adam(lr=0.001)
          rmsprop = keras.optimizers.RMSprop(lr=0.001)
          def step_decay(epoch):
              return float(0.001 * math.pow(0.6, math.floor((1+epoch)/10)))
          from keras.callbacks import LearningRateScheduler
          lrate = LearningRateScheduler(step_decay)
          callbacks_list = [lrate]

          model.compile(loss='categorical_crossentropy', optimizer=adam, metrics=['accuracy'])

In [119]: model.fit(X_train_sc,Y_train, epochs=30, batch_size=16,validation_data=(X_val_sc, Y_val_sc))
```

Train on 7352 samples, validate on 2947 samples

```
Epoch 1/30
7352/7352 [=====] - 6s 879us/step - loss: 4.3454 - acc: 0.7266 - val_loss: 4.3454 - val_acc: 0.7266
Epoch 2/30
7352/7352 [=====] - 5s 676us/step - loss: 0.7579 - acc: 0.9121 - val_loss: 0.7579 - val_acc: 0.9121
Epoch 3/30
7352/7352 [=====] - 5s 668us/step - loss: 0.3876 - acc: 0.9286 - val_loss: 0.3876 - val_acc: 0.9286
Epoch 4/30
7352/7352 [=====] - 5s 673us/step - loss: 0.3123 - acc: 0.9283 - val_loss: 0.3123 - val_acc: 0.9283
Epoch 5/30
7352/7352 [=====] - 5s 680us/step - loss: 0.2729 - acc: 0.9336 - val_loss: 0.2729 - val_acc: 0.9336
Epoch 6/30
7352/7352 [=====] - 5s 676us/step - loss: 0.2629 - acc: 0.9327 - val_loss: 0.2629 - val_acc: 0.9327
Epoch 7/30
7352/7352 [=====] - 5s 664us/step - loss: 0.2423 - acc: 0.9393 - val_loss: 0.2423 - val_acc: 0.9393
```



```

Epoch 8/30
7352/7352 [=====] - 5s 681us/step - loss: 0.2327 - acc: 0.9380 - val_
Epoch 9/30
7352/7352 [=====] - 5s 670us/step - loss: 0.2237 - acc: 0.9372 - val_
Epoch 10/30
7352/7352 [=====] - 5s 687us/step - loss: 0.2221 - acc: 0.9377 - val_
Epoch 11/30
7352/7352 [=====] - 5s 676us/step - loss: 0.2216 - acc: 0.9377 - val_
Epoch 12/30
7352/7352 [=====] - 5s 684us/step - loss: 0.2085 - acc: 0.9416 - val_
Epoch 13/30
7352/7352 [=====] - 5s 646us/step - loss: 0.2005 - acc: 0.9448 - val_
Epoch 14/30
7352/7352 [=====] - 5s 687us/step - loss: 0.2075 - acc: 0.9446 - val_
Epoch 15/30
7352/7352 [=====] - 5s 678us/step - loss: 0.1980 - acc: 0.9434 - val_
Epoch 16/30
7352/7352 [=====] - 5s 696us/step - loss: 0.1891 - acc: 0.9449 - val_
Epoch 17/30
7352/7352 [=====] - 5s 660us/step - loss: 0.1909 - acc: 0.9434 - val_
Epoch 18/30
7352/7352 [=====] - 5s 689us/step - loss: 0.1893 - acc: 0.9429 - val_
Epoch 19/30
7352/7352 [=====] - 5s 661us/step - loss: 0.2002 - acc: 0.9389 - val_
Epoch 20/30
7352/7352 [=====] - 5s 664us/step - loss: 0.1817 - acc: 0.9486 - val_
Epoch 21/30
7352/7352 [=====] - 5s 670us/step - loss: 0.1828 - acc: 0.9472 - val_
Epoch 22/30
7352/7352 [=====] - 5s 661us/step - loss: 0.1851 - acc: 0.9449 - val_
Epoch 23/30
7352/7352 [=====] - 5s 672us/step - loss: 0.1841 - acc: 0.9456 - val_
Epoch 24/30
7352/7352 [=====] - 5s 674us/step - loss: 0.1777 - acc: 0.9463 - val_
Epoch 25/30
7352/7352 [=====] - 5s 683us/step - loss: 0.1785 - acc: 0.9448 - val_
Epoch 26/30
7352/7352 [=====] - 5s 678us/step - loss: 0.1751 - acc: 0.9459 - val_
Epoch 27/30
7352/7352 [=====] - 5s 697us/step - loss: 0.1773 - acc: 0.9476 - val_
Epoch 28/30
7352/7352 [=====] - 5s 672us/step - loss: 0.1692 - acc: 0.9506 - val_
Epoch 29/30
7352/7352 [=====] - 5s 677us/step - loss: 0.1742 - acc: 0.9478 - val_
Epoch 30/30
7352/7352 [=====] - 5s 679us/step - loss: 0.1754 - acc: 0.9467 - val_

```

```
Out[119]: <keras.callbacks.History at 0x14757856a6d8>
```

## Hyper Parameter Tuning Using Hyperas

```
In [4]: def data_scaled():
        """
        Obtain the dataset from multiple files.
        Returns: X_train, X_test, y_train, y_test
        """

        # Data directory
        DATADIR = 'UCI_HAR_Dataset'
        # Raw data signals
        # Signals are from Accelerometer and Gyroscope
        # The signals are in x,y,z directions
        # Sensor signals are filtered to have only body acceleration
        # excluding the acceleration due to gravity
        # Triaxial acceleration from the accelerometer is total acceleration
        SIGNALS = [
            "body_acc_x",
            "body_acc_y",
            "body_acc_z",
            "body_gyro_x",
            "body_gyro_y",
            "body_gyro_z",
            "total_acc_x",
            "total_acc_y",
            "total_acc_z"
        ]

        from sklearn.base import BaseEstimator, TransformerMixin
        class scaling_tseries_data(BaseEstimator, TransformerMixin):
            from sklearn.preprocessing import StandardScaler
            def __init__(self):
                self.scale = None

            def transform(self, X):
                temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
                temp_X1 = self.scale.transform(temp_X1)
                return temp_X1.reshape(X.shape)

            def fit(self, X):
                # remove overlapping
                remove = int(X.shape[1] / 2)
                temp_X = X[:, -remove:, :]
                # flatten data
                temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape[2]))
                scale = StandardScaler()
                scale.fit(temp_X)
                self.scale = scale
```

```

        return self

# Utility function to read the data from csv file
def _read_csv(filename):
    return pd.read_csv(filename, delim_whitespace=True, header=None)

# Utility function to load the load
def load_signals(subset):
    signals_data = []

    for signal in SIGNALS:
        filename = f'UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.txt'
        signals_data.append( _read_csv(filename).as_matrix())

    # Transpose is used to change the dimensionality of the output,
    # aggregating the signals by combination of sample/timestep.
    # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
    return np.transpose(signals_data, (1, 2, 0))

def load_y(subset):
    """
    The objective that we are trying to predict is a integer, from 1 to 6,
    that represents a human activity. We return a binary representation of
    every sample objective as a 6 bits vector using One Hot Encoding
    (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.html)
    """
    filename = f'UCI_HAR_Dataset/{subset}/y_{subset}.txt'
    y = _read_csv(filename)[0]
    return pd.get_dummies(y).as_matrix()

X_train, X_val = load_signals('train'), load_signals('test')
Y_train, Y_val = load_y('train'), load_y('test')
###Scaling data
Scale = scaling_tseries_data()
Scale.fit(X_train)
X_train = Scale.transform(X_train)
X_val = Scale.transform(X_val)

return X_train, Y_train, X_val, Y_val

```

```
In [5]: X_train, Y_train, X_val, Y_val = data_scaled()
```

```
In [6]: def model_cnn(X_train, Y_train, X_val, Y_val):
    # Importing tensorflow
    np.random.seed(36)
    import tensorflow as tf
    tf.set_random_seed(36)
    # Initiliazing the sequential model

```

```

model = Sequential()

model.add(Conv1D(filters={{choice([28,32,42])}}, kernel_size={{choice([3,5,7])}},
                kernel_regularizer=l2({{uniform(0,2.5)}}),input_shape=(128,9)))

model.add(Conv1D(filters={{choice([16,24,32])}}, kernel_size={{choice([3,5,7])}},
                activation='relu',kernel_regularizer=l2({{uniform(0,1.5)}}),kerne

model.add(Dropout({{uniform(0.45,0.7)}}))
model.add(MaxPooling1D(pool_size={{choice([2,3])}}))
model.add(Flatten())
model.add(Dense({{choice([32,64])}}, activation='relu'))
model.add(Dense(6, activation='softmax'))

adam = keras.optimizers.Adam(lr={{uniform(0.00065,0.004)}})
rmsprop = keras.optimizers.RMSprop(lr={{uniform(0.00065,0.004)}})

choiceval = {{choice(['adam', 'rmsprop'])}}

if choiceval == 'adam':
    optim = adam
else:
    optim = rmsprop

print(model.summary())

model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=optim

result = model.fit(X_train, Y_train,
                  batch_size={{choice([16,32,64])}},
                  nb_epoch={{choice([25,30,35])}},
                  verbose=2,
                  validation_data=(X_val, Y_val))

score, acc = model.evaluate(X_val, Y_val, verbose=0)
score1, acc1 = model.evaluate(X_train, Y_train, verbose=0)
print('Train accuracy',acc1,'Test accuracy:', acc)
print('-----')
return {'loss': -acc, 'status': STATUS_OK, 'model': model,'train_acc':acc1}

In [25]: X_train, Y_train, X_val, Y_val = data_scaled()
        trials = Trials()
        best_run, best_model, space = optim.minimize(model=model_cnn,
                                                    data=data_scaled,
                                                    algo=tpe.suggest,
                                                    max_evals=100,
                                                    trials=trials,notebook_name = 'Human Activity D
                                                    return_space = True)

```

>>> Imports:

```

#coding=utf-8

try:
    import numpy as np
except:
    pass

try:
    import tensorflow as tf
except:
    pass

try:
    import random as rn
except:
    pass

try:
    from keras import backend as K
except:
    pass

try:
    import pickle
except:
    pass

try:
    import keras
except:
    pass

try:
    from keras.models import Sequential
except:
    pass

try:
    from keras.layers import LSTM
except:
    pass

try:
    from keras.layers.core import Dense, Dropout
except:
    pass

try:

```

```

    from hyperopt import Trials, STATUS_OK, tpe
except:
    pass

try:
    from hyperas import optim
except:
    pass

try:
    from hyperas.distributions import choice, uniform
except:
    pass

try:
    import pandas as pd
except:
    pass

try:
    from matplotlib import pyplot
except:
    pass

try:
    from sklearn.preprocessing import StandardScaler
except:
    pass

try:
    from keras.models import Sequential
except:
    pass

try:
    from keras.layers import Flatten
except:
    pass

try:
    from keras.regularizers import l2
except:
    pass

try:
    from keras.layers.convolutional import Conv1D
except:
    pass

```

```

try:
    from keras.layers.convolutional import MaxPooling1D
except:
    pass

try:
    from keras.utils import to_categorical
except:
    pass

try:
    from sklearn.base import BaseEstimator, TransformerMixin
except:
    pass

try:
    from sklearn.preprocessing import StandardScaler
except:
    pass

>>> Hyperas search space:

def get_space():
    return {
        'filters': hp.choice('filters', [28,32,42]),
        'kernel_size': hp.choice('kernel_size', [3,5,7]),
        'l2': hp.uniform('l2', 0,2.5),
        'filters_1': hp.choice('filters_1', [16,24,32]),
        'kernel_size_1': hp.choice('kernel_size_1', [3,5,7]),
        'l2_1': hp.uniform('l2_1', 0,1.5),
        'Dropout': hp.uniform('Dropout', 0.45,0.7),
        'pool_size': hp.choice('pool_size', [2,3]),
        'Dense': hp.choice('Dense', [32,64]),
        'lr': hp.uniform('lr', 0.00065,0.004),
        'lr_1': hp.uniform('lr_1', 0.00065,0.004),
        'choiceval': hp.choice('choiceval', ['adam', 'rmsprop']),
        'batch_size': hp.choice('batch_size', [16,32,64]),
        'nb_epoch': hp.choice('nb_epoch', [25,30,35]),
    }

>>> Data
1:
2: """
3: Obtain the dataset from multiple files.
4: Returns: X_train, X_test, y_train, y_test
5: """
6: # Data directory

```

```

7: DATADIR = 'UCI_HAR_Dataset'
8: # Raw data signals
9: # Signals are from Accelerometer and Gyroscope
10: # The signals are in x,y,z directions
11: # Sensor signals are filtered to have only body acceleration
12: # excluding the acceleration due to gravity
13: # Triaxial acceleration from the accelerometer is total acceleration
14: SIGNALS = [
15:     "body_acc_x",
16:     "body_acc_y",
17:     "body_acc_z",
18:     "body_gyro_x",
19:     "body_gyro_y",
20:     "body_gyro_z",
21:     "total_acc_x",
22:     "total_acc_y",
23:     "total_acc_z"
24: ]
25: from sklearn.base import BaseEstimator, TransformerMixin
26: class scaling_tseries_data(BaseEstimator, TransformerMixin):
27:     from sklearn.preprocessing import StandardScaler
28:     def __init__(self):
29:         self.scale = None
30:
31:     def transform(self, X):
32:         temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
33:         temp_X1 = self.scale.transform(temp_X1)
34:         return temp_X1.reshape(X.shape)
35:
36:     def fit(self, X):
37:         # remove overlapping
38:         remove = int(X.shape[1] / 2)
39:         temp_X = X[:, -remove:, :]
40:         # flatten data
41:         temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape[2]))
42:         scale = StandardScaler()
43:         scale.fit(temp_X)
44:         self.scale = scale
45:         return self
46:
47: # Utility function to read the data from csv file
48: def _read_csv(filename):
49:     return pd.read_csv(filename, delim_whitespace=True, header=None)
50:
51: # Utility function to load the load
52: def load_signals(subset):
53:     signals_data = []
54:

```



```

55:     for signal in SIGNALS:
56:         filename = f'HAR/UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.txt'
57:         signals_data.append( _read_csv(filename).as_matrix())
58:
59:     # Transpose is used to change the dimensionality of the output,
60:     # aggregating the signals by combination of sample/timestep.
61:     # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
62:     return np.transpose(signals_data, (1, 2, 0))
63:
64: def load_y(subset):
65:     """
66:     The objective that we are trying to predict is a integer, from 1 to 6,
67:     that represents a human activity. We return a binary representation of
68:     every sample objective as a 6 bits vector using One Hot Encoding
69:     (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.html)
70:     """
71:     filename = f'HAR/UCI_HAR_Dataset/{subset}/y_{subset}.txt'
72:     y = _read_csv(filename)[0]
73:     return pd.get_dummies(y).as_matrix()
74:
75: X_train, X_val = load_signals('train'), load_signals('test')
76: Y_train, Y_val = load_y('train'), load_y('test')
77: ###Scling data
78: Scale = scaling_tseries_data()
79: Scale.fit(X_train)
80: X_train = Scale.transform(X_train)
81: X_val = Scale.transform(X_val)
82:
83:
84:
85:
>>> Resulting replaced keras model:

```

```

1: def keras_fmin_fnct(space):
2:
3:     # Initiliazing the sequential model
4:     model = Sequential()
5:
6:     model.add(Conv1D(filters=space['filters'], kernel_size=space['kernel_size'],activation='relu',
7:         kernel_regularizer=l2(space['l2']),input_shape=(128,9)))
8:
9:     model.add(Conv1D(filters=space['filters_1'], kernel_size=space['kernel_size_1'],
10:         activation='relu',kernel_regularizer=l2(space['l2_1']),kernel_initializer='glorot_uniform'))
11:     model.add(Dropout(space['Dropout']))
12:     model.add(MaxPooling1D(pool_size=space['pool_size']))
13:     model.add(Flatten())
14:     model.add(Dense(space['Dense'], activation='relu'))
15:     model.add(Dense(6, activation='softmax'))

```

```

16:
17:     adam = keras.optimizers.Adam(lr=space['lr'])
18:     rmsprop = keras.optimizers.RMSprop(lr=space['lr_1'])
19:
20:     choiceval = space['choiceval']
21:
22:     if choiceval == 'adam':
23:         optim = adam
24:     else:
25:         optim = rmsprop
26:
27:     print(model.summary())
28:
29:     model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=optim)
30:
31:     result = model.fit(X_train, Y_train,
32:                       batch_size=space['batch_size'],
33:                       nb_epoch=space['nb_epoch'],
34:                       verbose=2,
35:                       validation_data=(X_val, Y_val))
36:
37:     score, acc = model.evaluate(X_val, Y_val, verbose=0)
38:     score1, acc1 = model.evaluate(X_train, Y_train, verbose=0)
39:     print('Train accuracy',acc1,'Test accuracy:', acc)
40:     print('-----')
41:     return {'loss': -acc, 'status': STATUS_OK, 'model': model,'train_acc':acc1}
42:

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 124, 32)            1472
-----
conv1d_2 (Conv1D)           (None, 118, 24)            5400
-----
dropout_1 (Dropout)         (None, 118, 24)            0
-----
max_pooling1d_1 (MaxPooling1 (None, 59, 24)            0
-----
flatten_1 (Flatten)         (None, 1416)                0
-----
dense_1 (Dense)             (None, 64)                  90688
-----
dense_2 (Dense)             (None, 6)                   390
=====
Total params: 97,950
Trainable params: 97,950
Non-trainable params: 0
-----

```

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 3s - loss: 45.3420 - acc: 0.7704 - val\_loss: 3.6639 - val\_acc: 0.7991

Epoch 2/30

- 3s - loss: 1.2333 - acc: 0.8358 - val\_loss: 0.7950 - val\_acc: 0.8205

Epoch 3/30

- 2s - loss: 0.5870 - acc: 0.8638 - val\_loss: 0.8045 - val\_acc: 0.7984

Epoch 4/30

- 2s - loss: 0.5209 - acc: 0.8730 - val\_loss: 0.6645 - val\_acc: 0.8568

Epoch 5/30

- 2s - loss: 0.4995 - acc: 0.8732 - val\_loss: 0.6564 - val\_acc: 0.8392

Epoch 6/30

- 2s - loss: 0.4606 - acc: 0.8889 - val\_loss: 0.6165 - val\_acc: 0.8337

Epoch 7/30

- 2s - loss: 0.4613 - acc: 0.8870 - val\_loss: 0.6127 - val\_acc: 0.8473

Epoch 8/30

- 3s - loss: 0.4429 - acc: 0.8902 - val\_loss: 0.6595 - val\_acc: 0.8015

Epoch 9/30

- 2s - loss: 0.4288 - acc: 0.8932 - val\_loss: 0.6231 - val\_acc: 0.8415

Epoch 10/30

- 2s - loss: 0.3960 - acc: 0.9019 - val\_loss: 0.5389 - val\_acc: 0.8744

Epoch 11/30

- 2s - loss: 0.3759 - acc: 0.9055 - val\_loss: 0.5346 - val\_acc: 0.8670

Epoch 12/30

- 2s - loss: 0.3689 - acc: 0.9091 - val\_loss: 0.6860 - val\_acc: 0.8093

Epoch 13/30

- 3s - loss: 0.3888 - acc: 0.9027 - val\_loss: 0.5244 - val\_acc: 0.8571

Epoch 14/30

- 2s - loss: 0.3829 - acc: 0.9071 - val\_loss: 0.4928 - val\_acc: 0.8636

Epoch 15/30

- 2s - loss: 0.3538 - acc: 0.9127 - val\_loss: 0.5904 - val\_acc: 0.8144

Epoch 16/30

- 2s - loss: 0.3931 - acc: 0.8998 - val\_loss: 0.5092 - val\_acc: 0.8432

Epoch 17/30

- 2s - loss: 0.3480 - acc: 0.9117 - val\_loss: 0.5083 - val\_acc: 0.8551

Epoch 18/30

- 3s - loss: 0.3612 - acc: 0.9079 - val\_loss: 0.5626 - val\_acc: 0.8537

Epoch 19/30

- 2s - loss: 0.4131 - acc: 0.8972 - val\_loss: 0.4857 - val\_acc: 0.8554

Epoch 20/30

- 2s - loss: 0.3518 - acc: 0.9115 - val\_loss: 0.4884 - val\_acc: 0.8717

Epoch 21/30

- 2s - loss: 0.3645 - acc: 0.9132 - val\_loss: 0.5522 - val\_acc: 0.8334

Epoch 22/30

- 2s - loss: 0.3398 - acc: 0.9155 - val\_loss: 0.5387 - val\_acc: 0.8439

Epoch 23/30

- 3s - loss: 0.3558 - acc: 0.9108 - val\_loss: 0.5040 - val\_acc: 0.8663

Epoch 24/30  
 - 2s - loss: 0.3462 - acc: 0.9149 - val\_loss: 0.4547 - val\_acc: 0.8673  
 Epoch 25/30  
 - 2s - loss: 0.3410 - acc: 0.9134 - val\_loss: 0.4967 - val\_acc: 0.8371  
 Epoch 26/30  
 - 2s - loss: 0.3301 - acc: 0.9170 - val\_loss: 0.5228 - val\_acc: 0.8215  
 Epoch 27/30  
 - 2s - loss: 0.3193 - acc: 0.9168 - val\_loss: 0.4587 - val\_acc: 0.8734  
 Epoch 28/30  
 - 3s - loss: 0.3374 - acc: 0.9157 - val\_loss: 0.4538 - val\_acc: 0.8531  
 Epoch 29/30  
 - 2s - loss: 0.3182 - acc: 0.9155 - val\_loss: 0.5331 - val\_acc: 0.8327  
 Epoch 30/30  
 - 2s - loss: 0.3405 - acc: 0.9136 - val\_loss: 0.5148 - val\_acc: 0.8636  
 Train accuracy 0.9110446137105549 Test accuracy: 0.8635900916185952

---

Layer (type)	Output Shape	Param #
conv1d_3 (Conv1D)	(None, 126, 28)	784
conv1d_4 (Conv1D)	(None, 122, 24)	3384
dropout_2 (Dropout)	(None, 122, 24)	0
max_pooling1d_2 (MaxPooling1D)	(None, 61, 24)	0
flatten_2 (Flatten)	(None, 1464)	0
dense_3 (Dense)	(None, 32)	46880
dense_4 (Dense)	(None, 6)	198

---

Total params: 51,246  
 Trainable params: 51,246  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/35  
 - 3s - loss: 5.0640 - acc: 0.6525 - val\_loss: 0.8492 - val\_acc: 0.7553  
 Epoch 2/35  
 - 2s - loss: 0.6052 - acc: 0.8453 - val\_loss: 1.3102 - val\_acc: 0.6607  
 Epoch 3/35  
 - 2s - loss: 0.4757 - acc: 0.8845 - val\_loss: 0.8982 - val\_acc: 0.7129  
 Epoch 4/35  
 - 2s - loss: 0.4345 - acc: 0.8940 - val\_loss: 0.5309 - val\_acc: 0.8582  
 Epoch 5/35

- 2s - loss: 0.3960 - acc: 0.9042 - val\_loss: 0.5224 - val\_acc: 0.8629  
 Epoch 6/35  
 - 2s - loss: 0.3763 - acc: 0.9098 - val\_loss: 0.5749 - val\_acc: 0.8242  
 Epoch 7/35  
 - 2s - loss: 0.3645 - acc: 0.9100 - val\_loss: 1.2467 - val\_acc: 0.6240  
 Epoch 8/35  
 - 2s - loss: 0.3542 - acc: 0.9115 - val\_loss: 0.4757 - val\_acc: 0.8833  
 Epoch 9/35  
 - 2s - loss: 0.3406 - acc: 0.9162 - val\_loss: 0.9492 - val\_acc: 0.6943  
 Epoch 10/35  
 - 2s - loss: 0.3411 - acc: 0.9163 - val\_loss: 0.4281 - val\_acc: 0.8823  
 Epoch 11/35  
 - 2s - loss: 0.3302 - acc: 0.9210 - val\_loss: 0.4763 - val\_acc: 0.8504  
 Epoch 12/35  
 - 2s - loss: 0.3207 - acc: 0.9207 - val\_loss: 0.4172 - val\_acc: 0.8697  
 Epoch 13/35  
 - 2s - loss: 0.3269 - acc: 0.9155 - val\_loss: 0.9915 - val\_acc: 0.6753  
 Epoch 14/35  
 - 2s - loss: 0.3198 - acc: 0.9200 - val\_loss: 0.4152 - val\_acc: 0.8812  
 Epoch 15/35  
 - 2s - loss: 0.3044 - acc: 0.9219 - val\_loss: 0.4032 - val\_acc: 0.8768  
 Epoch 16/35  
 - 2s - loss: 0.3100 - acc: 0.9178 - val\_loss: 0.9914 - val\_acc: 0.6987  
 Epoch 17/35  
 - 2s - loss: 0.3146 - acc: 0.9165 - val\_loss: 0.3897 - val\_acc: 0.8850  
 Epoch 18/35  
 - 2s - loss: 0.3010 - acc: 0.9215 - val\_loss: 0.4310 - val\_acc: 0.8758  
 Epoch 19/35  
 - 2s - loss: 0.3029 - acc: 0.9184 - val\_loss: 0.4385 - val\_acc: 0.8789  
 Epoch 20/35  
 - 2s - loss: 0.2992 - acc: 0.9215 - val\_loss: 0.4209 - val\_acc: 0.8636  
 Epoch 21/35  
 - 2s - loss: 0.2943 - acc: 0.9203 - val\_loss: 0.3879 - val\_acc: 0.8758  
 Epoch 22/35  
 - 2s - loss: 0.2984 - acc: 0.9188 - val\_loss: 0.4348 - val\_acc: 0.8554  
 Epoch 23/35  
 - 2s - loss: 0.3077 - acc: 0.9202 - val\_loss: 0.4411 - val\_acc: 0.8422  
 Epoch 24/35  
 - 2s - loss: 0.2890 - acc: 0.9226 - val\_loss: 0.4017 - val\_acc: 0.8602  
 Epoch 25/35  
 - 2s - loss: 0.3037 - acc: 0.9211 - val\_loss: 0.4872 - val\_acc: 0.8354  
 Epoch 26/35  
 - 2s - loss: 0.3116 - acc: 0.9178 - val\_loss: 0.4148 - val\_acc: 0.8612  
 Epoch 27/35  
 - 2s - loss: 0.2944 - acc: 0.9252 - val\_loss: 0.4787 - val\_acc: 0.8368  
 Epoch 28/35  
 - 2s - loss: 0.2845 - acc: 0.9245 - val\_loss: 0.5676 - val\_acc: 0.8239  
 Epoch 29/35

```

- 2s - loss: 0.2987 - acc: 0.9232 - val_loss: 0.4795 - val_acc: 0.8602
Epoch 30/35
- 2s - loss: 0.2844 - acc: 0.9251 - val_loss: 0.5168 - val_acc: 0.8442
Epoch 31/35
- 2s - loss: 0.3031 - acc: 0.9249 - val_loss: 0.4025 - val_acc: 0.8809
Epoch 32/35
- 2s - loss: 0.2885 - acc: 0.9251 - val_loss: 0.3978 - val_acc: 0.8823
Epoch 33/35
- 2s - loss: 0.2911 - acc: 0.9218 - val_loss: 0.6231 - val_acc: 0.8022
Epoch 34/35
- 3s - loss: 0.2916 - acc: 0.9226 - val_loss: 1.4996 - val_acc: 0.6542
Epoch 35/35
- 2s - loss: 0.3018 - acc: 0.9268 - val_loss: 0.5221 - val_acc: 0.8578
Train accuracy 0.941240478781284 Test accuracy: 0.8578215134034611
-----

```

Layer (type)	Output Shape	Param #
conv1d_5 (Conv1D)	(None, 122, 28)	1792
conv1d_6 (Conv1D)	(None, 118, 32)	4512
dropout_3 (Dropout)	(None, 118, 32)	0
max_pooling1d_3 (MaxPooling1	(None, 39, 32)	0
flatten_3 (Flatten)	(None, 1248)	0
dense_5 (Dense)	(None, 64)	79936
dense_6 (Dense)	(None, 6)	390

```

=====
Total params: 86,630
Trainable params: 86,630
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
- 3s - loss: 21.3175 - acc: 0.7323 - val_loss: 0.8292 - val_acc: 0.8157
Epoch 2/35
- 3s - loss: 0.5440 - acc: 0.8694 - val_loss: 0.8706 - val_acc: 0.7370
Epoch 3/35
- 3s - loss: 0.4467 - acc: 0.8900 - val_loss: 0.6157 - val_acc: 0.7805
Epoch 4/35
- 3s - loss: 0.4128 - acc: 0.8957 - val_loss: 0.5928 - val_acc: 0.8124
Epoch 5/35
- 3s - loss: 0.3966 - acc: 0.9017 - val_loss: 0.5419 - val_acc: 0.8721

```

Epoch 6/35  
 - 3s - loss: 0.3660 - acc: 0.9060 - val\_loss: 0.4645 - val\_acc: 0.8717  
 Epoch 7/35  
 - 3s - loss: 0.3549 - acc: 0.9112 - val\_loss: 0.4408 - val\_acc: 0.8863  
 Epoch 8/35  
 - 3s - loss: 0.3403 - acc: 0.9138 - val\_loss: 0.4832 - val\_acc: 0.8599  
 Epoch 9/35  
 - 3s - loss: 0.3311 - acc: 0.9185 - val\_loss: 0.4378 - val\_acc: 0.8636  
 Epoch 10/35  
 - 3s - loss: 0.3359 - acc: 0.9146 - val\_loss: 0.4415 - val\_acc: 0.8931  
 Epoch 11/35  
 - 3s - loss: 0.3241 - acc: 0.9173 - val\_loss: 0.4128 - val\_acc: 0.8890  
 Epoch 12/35  
 - 3s - loss: 0.3287 - acc: 0.9142 - val\_loss: 0.4476 - val\_acc: 0.8778  
 Epoch 13/35  
 - 3s - loss: 0.3242 - acc: 0.9144 - val\_loss: 0.4104 - val\_acc: 0.8965  
 Epoch 14/35  
 - 3s - loss: 0.3155 - acc: 0.9193 - val\_loss: 0.4258 - val\_acc: 0.8846  
 Epoch 15/35  
 - 3s - loss: 0.3211 - acc: 0.9191 - val\_loss: 0.4041 - val\_acc: 0.8856  
 Epoch 16/35  
 - 3s - loss: 0.3082 - acc: 0.9170 - val\_loss: 0.5309 - val\_acc: 0.8575  
 Epoch 17/35  
 - 3s - loss: 0.3101 - acc: 0.9188 - val\_loss: 0.4276 - val\_acc: 0.8935  
 Epoch 18/35  
 - 3s - loss: 0.3127 - acc: 0.9188 - val\_loss: 0.4314 - val\_acc: 0.8968  
 Epoch 19/35  
 - 3s - loss: 0.3093 - acc: 0.9206 - val\_loss: 0.4253 - val\_acc: 0.8782  
 Epoch 20/35  
 - 3s - loss: 0.2990 - acc: 0.9212 - val\_loss: 0.5731 - val\_acc: 0.8310  
 Epoch 21/35  
 - 3s - loss: 0.3052 - acc: 0.9193 - val\_loss: 0.3815 - val\_acc: 0.8982  
 Epoch 22/35  
 - 3s - loss: 0.3042 - acc: 0.9169 - val\_loss: 0.4525 - val\_acc: 0.8558  
 Epoch 23/35  
 - 3s - loss: 0.3085 - acc: 0.9178 - val\_loss: 0.3837 - val\_acc: 0.8935  
 Epoch 24/35  
 - 3s - loss: 0.2984 - acc: 0.9210 - val\_loss: 0.4201 - val\_acc: 0.8826  
 Epoch 25/35  
 - 3s - loss: 0.2980 - acc: 0.9237 - val\_loss: 0.4196 - val\_acc: 0.8911  
 Epoch 26/35  
 - 3s - loss: 0.2898 - acc: 0.9185 - val\_loss: 0.4015 - val\_acc: 0.8782  
 Epoch 27/35  
 - 3s - loss: 0.2882 - acc: 0.9200 - val\_loss: 1.0529 - val\_acc: 0.6569  
 Epoch 28/35  
 - 3s - loss: 0.3073 - acc: 0.9211 - val\_loss: 0.5184 - val\_acc: 0.8249  
 Epoch 29/35  
 - 3s - loss: 0.2951 - acc: 0.9180 - val\_loss: 0.3777 - val\_acc: 0.8972

Epoch 30/35  
 - 3s - loss: 0.2878 - acc: 0.9236 - val\_loss: 0.4222 - val\_acc: 0.8870  
 Epoch 31/35  
 - 3s - loss: 0.2895 - acc: 0.9230 - val\_loss: 0.3646 - val\_acc: 0.8928  
 Epoch 32/35  
 - 3s - loss: 0.2946 - acc: 0.9177 - val\_loss: 0.4072 - val\_acc: 0.8700  
 Epoch 33/35  
 - 3s - loss: 0.2943 - acc: 0.9222 - val\_loss: 0.4008 - val\_acc: 0.8653  
 Epoch 34/35  
 - 3s - loss: 0.2857 - acc: 0.9232 - val\_loss: 0.4046 - val\_acc: 0.8873  
 Epoch 35/35  
 - 3s - loss: 0.2878 - acc: 0.9210 - val\_loss: 0.4164 - val\_acc: 0.8697  
 Train accuracy 0.9110446137105549 Test accuracy: 0.8696979979640312

---

Layer (type)	Output Shape	Param #
=====		
conv1d_7 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_8 (Conv1D)	(None, 120, 24)	2328
-----		
dropout_4 (Dropout)	(None, 120, 24)	0
-----		
max_pooling1d_4 (MaxPooling1	(None, 40, 24)	0
-----		
flatten_4 (Flatten)	(None, 960)	0
-----		
dense_7 (Dense)	(None, 64)	61504
-----		
dense_8 (Dense)	(None, 6)	390
=====		

Total params: 66,270  
 Trainable params: 66,270  
 Non-trainable params: 0

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None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 4s - loss: 27.7956 - acc: 0.6970 - val\_loss: 0.9407 - val\_acc: 0.8090  
 Epoch 2/30  
 - 3s - loss: 0.7369 - acc: 0.7890 - val\_loss: 0.8387 - val\_acc: 0.7486  
 Epoch 3/30  
 - 4s - loss: 0.6319 - acc: 0.8303 - val\_loss: 0.7569 - val\_acc: 0.8324  
 Epoch 4/30  
 - 3s - loss: 0.5590 - acc: 0.8555 - val\_loss: 0.6682 - val\_acc: 0.8683  
 Epoch 5/30  
 - 3s - loss: 0.5298 - acc: 0.8640 - val\_loss: 0.6922 - val\_acc: 0.8263  
 Epoch 6/30



- 4s - loss: 0.5146 - acc: 0.8678 - val\_loss: 0.7644 - val\_acc: 0.7190  
 Epoch 7/30  
 - 3s - loss: 0.4868 - acc: 0.8798 - val\_loss: 0.5707 - val\_acc: 0.8626  
 Epoch 8/30  
 - 3s - loss: 0.4804 - acc: 0.8774 - val\_loss: 0.6694 - val\_acc: 0.8256  
 Epoch 9/30  
 - 4s - loss: 0.4777 - acc: 0.8811 - val\_loss: 0.9647 - val\_acc: 0.6434  
 Epoch 10/30  
 - 4s - loss: 0.4602 - acc: 0.8878 - val\_loss: 0.9447 - val\_acc: 0.6854  
 Epoch 11/30  
 - 3s - loss: 0.4603 - acc: 0.8822 - val\_loss: 0.6184 - val\_acc: 0.8426  
 Epoch 12/30  
 - 3s - loss: 0.4482 - acc: 0.8928 - val\_loss: 0.5112 - val\_acc: 0.8792  
 Epoch 13/30  
 - 4s - loss: 0.4455 - acc: 0.8870 - val\_loss: 0.5271 - val\_acc: 0.8534  
 Epoch 14/30  
 - 4s - loss: 0.4454 - acc: 0.8897 - val\_loss: 0.4992 - val\_acc: 0.8646  
 Epoch 15/30  
 - 3s - loss: 0.4389 - acc: 0.8902 - val\_loss: 0.6000 - val\_acc: 0.8541  
 Epoch 16/30  
 - 4s - loss: 0.4299 - acc: 0.8913 - val\_loss: 0.5878 - val\_acc: 0.8534  
 Epoch 17/30  
 - 4s - loss: 0.4258 - acc: 0.8945 - val\_loss: 0.4728 - val\_acc: 0.8704  
 Epoch 18/30  
 - 3s - loss: 0.4263 - acc: 0.8921 - val\_loss: 0.6675 - val\_acc: 0.7991  
 Epoch 19/30  
 - 4s - loss: 0.4179 - acc: 0.8919 - val\_loss: 0.6103 - val\_acc: 0.7957  
 Epoch 20/30  
 - 4s - loss: 0.4225 - acc: 0.8962 - val\_loss: 0.7398 - val\_acc: 0.7591  
 Epoch 21/30  
 - 4s - loss: 0.4227 - acc: 0.8935 - val\_loss: 0.9899 - val\_acc: 0.6688  
 Epoch 22/30  
 - 3s - loss: 0.4179 - acc: 0.8953 - val\_loss: 0.8645 - val\_acc: 0.6325  
 Epoch 23/30  
 - 3s - loss: 0.4091 - acc: 0.8942 - val\_loss: 0.9141 - val\_acc: 0.7170  
 Epoch 24/30  
 - 4s - loss: 0.4173 - acc: 0.8913 - val\_loss: 0.6336 - val\_acc: 0.7781  
 Epoch 25/30  
 - 3s - loss: 0.4212 - acc: 0.8923 - val\_loss: 0.7610 - val\_acc: 0.7631  
 Epoch 26/30  
 - 4s - loss: 0.4149 - acc: 0.8947 - val\_loss: 0.5665 - val\_acc: 0.8463  
 Epoch 27/30  
 - 3s - loss: 0.4025 - acc: 0.8979 - val\_loss: 0.8253 - val\_acc: 0.7645  
 Epoch 28/30  
 - 3s - loss: 0.3960 - acc: 0.8993 - val\_loss: 1.1675 - val\_acc: 0.6909  
 Epoch 29/30  
 - 3s - loss: 0.4050 - acc: 0.8980 - val\_loss: 0.9959 - val\_acc: 0.5694  
 Epoch 30/30

- 3s - loss: 0.3913 - acc: 0.8964 - val\_loss: 0.5740 - val\_acc: 0.8079  
Train accuracy 0.9038356909035858 Test accuracy: 0.8079402782490669

Layer (type)	Output Shape	Param #
conv1d_9 (Conv1D)	(None, 126, 32)	896
conv1d_10 (Conv1D)	(None, 120, 24)	5400
dropout_5 (Dropout)	(None, 120, 24)	0
max_pooling1d_5 (MaxPooling1	(None, 40, 24)	0
flatten_5 (Flatten)	(None, 960)	0
dense_9 (Dense)	(None, 32)	30752
dense_10 (Dense)	(None, 6)	198

Total params: 37,246  
Trainable params: 37,246  
Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 3s - loss: 13.6495 - acc: 0.6700 - val\_loss: 2.2101 - val\_acc: 0.7024

Epoch 2/25

- 2s - loss: 0.9645 - acc: 0.8139 - val\_loss: 0.7633 - val\_acc: 0.8076

Epoch 3/25

- 2s - loss: 0.5302 - acc: 0.8664 - val\_loss: 0.6662 - val\_acc: 0.8015

Epoch 4/25

- 2s - loss: 0.4578 - acc: 0.8852 - val\_loss: 0.5661 - val\_acc: 0.8782

Epoch 5/25

- 2s - loss: 0.4317 - acc: 0.8848 - val\_loss: 0.5911 - val\_acc: 0.8442

Epoch 6/25

- 2s - loss: 0.4064 - acc: 0.8947 - val\_loss: 0.4967 - val\_acc: 0.8809

Epoch 7/25

- 2s - loss: 0.3851 - acc: 0.8973 - val\_loss: 0.5429 - val\_acc: 0.8578

Epoch 8/25

- 2s - loss: 0.3750 - acc: 0.8991 - val\_loss: 0.5994 - val\_acc: 0.8015

Epoch 9/25

- 2s - loss: 0.3684 - acc: 0.9007 - val\_loss: 0.4789 - val\_acc: 0.8609

Epoch 10/25

- 2s - loss: 0.3561 - acc: 0.9013 - val\_loss: 0.5707 - val\_acc: 0.8585

Epoch 11/25

- 2s - loss: 0.3543 - acc: 0.9056 - val\_loss: 0.4566 - val\_acc: 0.8836

```

Epoch 12/25
- 2s - loss: 0.3396 - acc: 0.9055 - val_loss: 0.4830 - val_acc: 0.8656
Epoch 13/25
- 2s - loss: 0.3503 - acc: 0.9074 - val_loss: 0.4316 - val_acc: 0.8795
Epoch 14/25
- 2s - loss: 0.3309 - acc: 0.9068 - val_loss: 0.4449 - val_acc: 0.8802
Epoch 15/25
- 2s - loss: 0.3322 - acc: 0.9125 - val_loss: 0.4143 - val_acc: 0.8924
Epoch 16/25
- 2s - loss: 0.3220 - acc: 0.9149 - val_loss: 0.4309 - val_acc: 0.8734
Epoch 17/25
- 2s - loss: 0.3141 - acc: 0.9187 - val_loss: 0.4351 - val_acc: 0.8724
Epoch 18/25
- 2s - loss: 0.3185 - acc: 0.9168 - val_loss: 0.4605 - val_acc: 0.8819
Epoch 19/25
- 2s - loss: 0.3022 - acc: 0.9191 - val_loss: 0.4243 - val_acc: 0.8972
Epoch 20/25
- 2s - loss: 0.3184 - acc: 0.9191 - val_loss: 0.4000 - val_acc: 0.8901
Epoch 21/25
- 2s - loss: 0.3062 - acc: 0.9192 - val_loss: 0.4130 - val_acc: 0.8972
Epoch 22/25
- 2s - loss: 0.3039 - acc: 0.9199 - val_loss: 0.4041 - val_acc: 0.8839
Epoch 23/25
- 2s - loss: 0.2902 - acc: 0.9237 - val_loss: 0.4928 - val_acc: 0.8347
Epoch 24/25
- 2s - loss: 0.3003 - acc: 0.9222 - val_loss: 0.4102 - val_acc: 0.8856
Epoch 25/25
- 2s - loss: 0.2946 - acc: 0.9195 - val_loss: 0.4074 - val_acc: 0.8680
Train accuracy 0.9387921653971708 Test accuracy: 0.8680013573125213

```

```

-----
Layer (type)                 Output Shape              Param #
=====
conv1d_11 (Conv1D)           (None, 124, 42)          1932
-----
conv1d_12 (Conv1D)           (None, 118, 16)          4720
-----
dropout_6 (Dropout)          (None, 118, 16)          0
-----
max_pooling1d_6 (MaxPooling1 (None, 59, 16)          0
-----
flatten_6 (Flatten)          (None, 944)              0
-----
dense_11 (Dense)             (None, 32)               30240
-----
dense_12 (Dense)             (None, 6)                198
=====
Total params: 37,090

```

Trainable params: 37,090

Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/35

- 2s - loss: 25.2198 - acc: 0.5997 - val\_loss: 1.3637 - val\_acc: 0.6871

Epoch 2/35

- 2s - loss: 0.9933 - acc: 0.7115 - val\_loss: 0.9844 - val\_acc: 0.7628

Epoch 3/35

- 2s - loss: 0.7523 - acc: 0.7973 - val\_loss: 0.8828 - val\_acc: 0.7163

Epoch 4/35

- 2s - loss: 0.6736 - acc: 0.8230 - val\_loss: 0.8566 - val\_acc: 0.7197

Epoch 5/35

- 2s - loss: 0.6361 - acc: 0.8368 - val\_loss: 0.7387 - val\_acc: 0.7947

Epoch 6/35

- 2s - loss: 0.5801 - acc: 0.8526 - val\_loss: 0.6935 - val\_acc: 0.8174

Epoch 7/35

- 2s - loss: 0.5439 - acc: 0.8656 - val\_loss: 0.6103 - val\_acc: 0.8524

Epoch 8/35

- 2s - loss: 0.5533 - acc: 0.8659 - val\_loss: 0.6724 - val\_acc: 0.8185

Epoch 9/35

- 2s - loss: 0.5151 - acc: 0.8731 - val\_loss: 0.7260 - val\_acc: 0.8344

Epoch 10/35

- 2s - loss: 0.4970 - acc: 0.8762 - val\_loss: 0.5632 - val\_acc: 0.8839

Epoch 11/35

- 2s - loss: 0.4946 - acc: 0.8803 - val\_loss: 0.7838 - val\_acc: 0.7431

Epoch 12/35

- 2s - loss: 0.4858 - acc: 0.8803 - val\_loss: 0.5702 - val\_acc: 0.8890

Epoch 13/35

- 2s - loss: 0.4654 - acc: 0.8853 - val\_loss: 0.5218 - val\_acc: 0.8806

Epoch 14/35

- 2s - loss: 0.4581 - acc: 0.8875 - val\_loss: 0.5284 - val\_acc: 0.8463

Epoch 15/35

- 2s - loss: 0.4683 - acc: 0.8841 - val\_loss: 0.5082 - val\_acc: 0.8823

Epoch 16/35

- 2s - loss: 0.4459 - acc: 0.8939 - val\_loss: 0.4947 - val\_acc: 0.8704

Epoch 17/35

- 2s - loss: 0.4483 - acc: 0.8871 - val\_loss: 0.6061 - val\_acc: 0.8473

Epoch 18/35

- 2s - loss: 0.4473 - acc: 0.8938 - val\_loss: 0.5074 - val\_acc: 0.8622

Epoch 19/35

- 2s - loss: 0.4354 - acc: 0.8936 - val\_loss: 0.4657 - val\_acc: 0.8836

Epoch 20/35

- 2s - loss: 0.4473 - acc: 0.8946 - val\_loss: 0.5476 - val\_acc: 0.8195

Epoch 21/35

- 2s - loss: 0.4366 - acc: 0.8938 - val\_loss: 1.3489 - val\_acc: 0.5935

Epoch 22/35

```

- 2s - loss: 0.4414 - acc: 0.8930 - val_loss: 0.5112 - val_acc: 0.8677
Epoch 23/35
- 2s - loss: 0.4413 - acc: 0.8924 - val_loss: 0.4837 - val_acc: 0.8704
Epoch 24/35
- 2s - loss: 0.4361 - acc: 0.8912 - val_loss: 0.5776 - val_acc: 0.8337
Epoch 25/35
- 2s - loss: 0.4351 - acc: 0.8919 - val_loss: 0.5578 - val_acc: 0.8517
Epoch 26/35
- 2s - loss: 0.4286 - acc: 0.8946 - val_loss: 0.4881 - val_acc: 0.8809
Epoch 27/35
- 2s - loss: 0.4097 - acc: 0.9023 - val_loss: 0.4758 - val_acc: 0.8616
Epoch 28/35
- 2s - loss: 0.4181 - acc: 0.8999 - val_loss: 0.5165 - val_acc: 0.8565
Epoch 29/35
- 2s - loss: 0.4073 - acc: 0.9023 - val_loss: 0.7345 - val_acc: 0.7662
Epoch 30/35
- 2s - loss: 0.4152 - acc: 0.8996 - val_loss: 0.4742 - val_acc: 0.8673
Epoch 31/35
- 2s - loss: 0.4051 - acc: 0.9022 - val_loss: 0.5644 - val_acc: 0.8537
Epoch 32/35
- 2s - loss: 0.4050 - acc: 0.9025 - val_loss: 0.4509 - val_acc: 0.8748
Epoch 33/35
- 2s - loss: 0.4093 - acc: 0.9032 - val_loss: 0.7338 - val_acc: 0.7822
Epoch 34/35
- 2s - loss: 0.4097 - acc: 0.8976 - val_loss: 0.8234 - val_acc: 0.7248
Epoch 35/35
- 2s - loss: 0.4103 - acc: 0.9013 - val_loss: 0.6074 - val_acc: 0.8290
Train accuracy 0.8925462459194777 Test accuracy: 0.828978622327791

```

Layer (type)	Output Shape	Param #
conv1d_13 (Conv1D)	(None, 122, 42)	2688
conv1d_14 (Conv1D)	(None, 120, 24)	3048
dropout_7 (Dropout)	(None, 120, 24)	0
max_pooling1d_7 (MaxPooling1D)	(None, 40, 24)	0
flatten_7 (Flatten)	(None, 960)	0
dense_13 (Dense)	(None, 64)	61504
dense_14 (Dense)	(None, 6)	390

```

Total params: 67,630
Trainable params: 67,630

```

Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 3s - loss: 25.9652 - acc: 0.7650 - val\_loss: 1.0548 - val\_acc: 0.6362

Epoch 2/25

- 2s - loss: 0.5701 - acc: 0.8569 - val\_loss: 0.6099 - val\_acc: 0.8700

Epoch 3/25

- 3s - loss: 0.4239 - acc: 0.8919 - val\_loss: 0.6441 - val\_acc: 0.8093

Epoch 4/25

- 2s - loss: 0.3803 - acc: 0.9021 - val\_loss: 0.4727 - val\_acc: 0.9013

Epoch 5/25

- 2s - loss: 0.3610 - acc: 0.9045 - val\_loss: 0.5091 - val\_acc: 0.8612

Epoch 6/25

- 2s - loss: 0.3496 - acc: 0.9104 - val\_loss: 0.4285 - val\_acc: 0.9006

Epoch 7/25

- 3s - loss: 0.3377 - acc: 0.9121 - val\_loss: 0.4248 - val\_acc: 0.8877

Epoch 8/25

- 2s - loss: 0.3349 - acc: 0.9142 - val\_loss: 0.4144 - val\_acc: 0.8816

Epoch 9/25

- 2s - loss: 0.3324 - acc: 0.9132 - val\_loss: 0.4128 - val\_acc: 0.8972

Epoch 10/25

- 2s - loss: 0.3209 - acc: 0.9168 - val\_loss: 0.4122 - val\_acc: 0.8975

Epoch 11/25

- 2s - loss: 0.3224 - acc: 0.9169 - val\_loss: 0.4426 - val\_acc: 0.8860

Epoch 12/25

- 2s - loss: 0.3195 - acc: 0.9154 - val\_loss: 0.4198 - val\_acc: 0.8897

Epoch 13/25

- 2s - loss: 0.3098 - acc: 0.9129 - val\_loss: 0.4413 - val\_acc: 0.8731

Epoch 14/25

- 2s - loss: 0.3108 - acc: 0.9163 - val\_loss: 0.7179 - val\_acc: 0.7078

Epoch 15/25

- 2s - loss: 0.3072 - acc: 0.9165 - val\_loss: 0.6628 - val\_acc: 0.7523

Epoch 16/25

- 3s - loss: 0.3074 - acc: 0.9188 - val\_loss: 0.4272 - val\_acc: 0.8602

Epoch 17/25

- 2s - loss: 0.3041 - acc: 0.9177 - val\_loss: 0.3638 - val\_acc: 0.8999

Epoch 18/25

- 2s - loss: 0.2989 - acc: 0.9195 - val\_loss: 0.3717 - val\_acc: 0.8951

Epoch 19/25

- 3s - loss: 0.3021 - acc: 0.9207 - val\_loss: 0.4031 - val\_acc: 0.8802

Epoch 20/25

- 2s - loss: 0.2961 - acc: 0.9223 - val\_loss: 0.4189 - val\_acc: 0.8833

Epoch 21/25

- 2s - loss: 0.2964 - acc: 0.9189 - val\_loss: 0.4126 - val\_acc: 0.8856

Epoch 22/25

- 2s - loss: 0.2916 - acc: 0.9221 - val\_loss: 0.4405 - val\_acc: 0.8616

Epoch 23/25  
 - 2s - loss: 0.2979 - acc: 0.9204 - val\_loss: 0.5049 - val\_acc: 0.8219  
 Epoch 24/25  
 - 2s - loss: 0.2910 - acc: 0.9233 - val\_loss: 0.4327 - val\_acc: 0.8622  
 Epoch 25/25  
 - 2s - loss: 0.2908 - acc: 0.9208 - val\_loss: 0.3847 - val\_acc: 0.9033  
 Train accuracy 0.9319912948208873 Test accuracy: 0.9032914828639295

Layer (type)	Output Shape	Param #
conv1d_15 (Conv1D)	(None, 124, 32)	1472
conv1d_16 (Conv1D)	(None, 122, 16)	1552
dropout_8 (Dropout)	(None, 122, 16)	0
max_pooling1d_8 (MaxPooling1D)	(None, 61, 16)	0
flatten_8 (Flatten)	(None, 976)	0
dense_15 (Dense)	(None, 32)	31264
dense_16 (Dense)	(None, 6)	198

Total params: 34,486  
 Trainable params: 34,486  
 Non-trainable params: 0

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 8s - loss: 12.3182 - acc: 0.7433 - val\_loss: 0.9290 - val\_acc: 0.7886  
 Epoch 2/30  
 - 7s - loss: 0.6339 - acc: 0.8519 - val\_loss: 0.7639 - val\_acc: 0.8473  
 Epoch 3/30  
 - 6s - loss: 0.5438 - acc: 0.8746 - val\_loss: 0.8724 - val\_acc: 0.7408  
 Epoch 4/30  
 - 7s - loss: 0.4897 - acc: 0.8864 - val\_loss: 0.6148 - val\_acc: 0.8666  
 Epoch 5/30  
 - 7s - loss: 0.4750 - acc: 0.8842 - val\_loss: 0.6477 - val\_acc: 0.8633  
 Epoch 6/30  
 - 7s - loss: 0.4304 - acc: 0.8942 - val\_loss: 0.6484 - val\_acc: 0.8246  
 Epoch 7/30  
 - 6s - loss: 0.4311 - acc: 0.8953 - val\_loss: 0.5412 - val\_acc: 0.8683  
 Epoch 8/30  
 - 7s - loss: 0.4064 - acc: 0.9008 - val\_loss: 0.6210 - val\_acc: 0.8449  
 Epoch 9/30

```

- 6s - loss: 0.3902 - acc: 0.9034 - val_loss: 0.5972 - val_acc: 0.8741
Epoch 10/30
- 7s - loss: 0.3913 - acc: 0.9042 - val_loss: 0.5147 - val_acc: 0.8772
Epoch 11/30
- 7s - loss: 0.3697 - acc: 0.9095 - val_loss: 0.5122 - val_acc: 0.8724
Epoch 12/30
- 7s - loss: 0.3836 - acc: 0.9055 - val_loss: 0.5635 - val_acc: 0.8666
Epoch 13/30
- 7s - loss: 0.3538 - acc: 0.9143 - val_loss: 0.4843 - val_acc: 0.8833
Epoch 14/30
- 6s - loss: 0.3529 - acc: 0.9140 - val_loss: 0.5295 - val_acc: 0.8690
Epoch 15/30
- 7s - loss: 0.3402 - acc: 0.9184 - val_loss: 0.5248 - val_acc: 0.8629
Epoch 16/30
- 6s - loss: 0.3382 - acc: 0.9211 - val_loss: 0.5409 - val_acc: 0.8711
Epoch 17/30
- 7s - loss: 0.3530 - acc: 0.9180 - val_loss: 0.5157 - val_acc: 0.8935
Epoch 18/30
- 6s - loss: 0.3384 - acc: 0.9184 - val_loss: 0.4540 - val_acc: 0.8918
Epoch 19/30
- 7s - loss: 0.3258 - acc: 0.9189 - val_loss: 0.4588 - val_acc: 0.8850
Epoch 20/30
- 6s - loss: 0.3192 - acc: 0.9249 - val_loss: 0.4826 - val_acc: 0.8877
Epoch 21/30
- 7s - loss: 0.3297 - acc: 0.9183 - val_loss: 0.4209 - val_acc: 0.8890
Epoch 22/30
- 7s - loss: 0.3232 - acc: 0.9204 - val_loss: 0.4155 - val_acc: 0.8833
Epoch 23/30
- 6s - loss: 0.3227 - acc: 0.9183 - val_loss: 0.4771 - val_acc: 0.8785
Epoch 24/30
- 7s - loss: 0.3509 - acc: 0.9119 - val_loss: 0.5136 - val_acc: 0.8812
Epoch 25/30
- 6s - loss: 0.3007 - acc: 0.9271 - val_loss: 0.4932 - val_acc: 0.8945
Epoch 26/30
- 7s - loss: 0.3218 - acc: 0.9207 - val_loss: 0.4610 - val_acc: 0.8951
Epoch 27/30
- 7s - loss: 0.3024 - acc: 0.9229 - val_loss: 0.3987 - val_acc: 0.9030
Epoch 28/30
- 7s - loss: 0.2932 - acc: 0.9274 - val_loss: 0.4091 - val_acc: 0.8890
Epoch 29/30
- 6s - loss: 0.3257 - acc: 0.9189 - val_loss: 0.4050 - val_acc: 0.9016
Epoch 30/30
- 7s - loss: 0.3058 - acc: 0.9195 - val_loss: 0.4308 - val_acc: 0.8890
Train accuracy 0.9315832426550599 Test accuracy: 0.8890397013912453

```

```

-----
Layer (type)                Output Shape                Param #
=====

```



conv1d_17 (Conv1D)	(None, 126, 42)	1176
-----		
conv1d_18 (Conv1D)	(None, 122, 32)	6752
-----		
dropout_9 (Dropout)	(None, 122, 32)	0
-----		
max_pooling1d_9 (MaxPooling1D)	(None, 61, 32)	0
-----		
flatten_9 (Flatten)	(None, 1952)	0
-----		
dense_17 (Dense)	(None, 32)	62496
-----		
dense_18 (Dense)	(None, 6)	198
=====		
Total params: 70,622		
Trainable params: 70,622		
Non-trainable params: 0		
-----		
None		
Train on 7352 samples, validate on 2947 samples		
Epoch 1/35		
- 5s - loss: 15.4657 - acc: 0.6742 - val_loss: 0.8693 - val_acc: 0.7472		
Epoch 2/35		
- 4s - loss: 0.7068 - acc: 0.7807 - val_loss: 0.8246 - val_acc: 0.7214		
Epoch 3/35		
- 4s - loss: 0.6686 - acc: 0.7942 - val_loss: 0.7972 - val_acc: 0.7917		
Epoch 4/35		
- 4s - loss: 0.6442 - acc: 0.8092 - val_loss: 0.7068 - val_acc: 0.8307		
Epoch 5/35		
- 4s - loss: 0.6183 - acc: 0.8218 - val_loss: 0.8885 - val_acc: 0.6980		
Epoch 6/35		
- 4s - loss: 0.5963 - acc: 0.8324 - val_loss: 0.7499 - val_acc: 0.8056		
Epoch 7/35		
- 4s - loss: 0.5940 - acc: 0.8364 - val_loss: 0.6955 - val_acc: 0.8395		
Epoch 8/35		
- 4s - loss: 0.5829 - acc: 0.8409 - val_loss: 0.6824 - val_acc: 0.8276		
Epoch 9/35		
- 4s - loss: 0.5757 - acc: 0.8448 - val_loss: 0.7829 - val_acc: 0.8107		
Epoch 10/35		
- 4s - loss: 0.5558 - acc: 0.8481 - val_loss: 0.7201 - val_acc: 0.8144		
Epoch 11/35		
- 4s - loss: 0.5525 - acc: 0.8554 - val_loss: 0.7835 - val_acc: 0.8025		
Epoch 12/35		
- 4s - loss: 0.5384 - acc: 0.8592 - val_loss: 0.9675 - val_acc: 0.6807		
Epoch 13/35		
- 4s - loss: 0.5349 - acc: 0.8625 - val_loss: 0.6919 - val_acc: 0.8432		
Epoch 14/35		
- 4s - loss: 0.5206 - acc: 0.8689 - val_loss: 0.7597 - val_acc: 0.7995		

```

Epoch 15/35
- 4s - loss: 0.5238 - acc: 0.8677 - val_loss: 0.7964 - val_acc: 0.8015
Epoch 16/35
- 4s - loss: 0.5120 - acc: 0.8655 - val_loss: 0.8578 - val_acc: 0.7106
Epoch 17/35
- 4s - loss: 0.5068 - acc: 0.8723 - val_loss: 0.7589 - val_acc: 0.8100
Epoch 18/35
- 4s - loss: 0.5082 - acc: 0.8720 - val_loss: 0.8592 - val_acc: 0.7625
Epoch 19/35
- 4s - loss: 0.4990 - acc: 0.8721 - val_loss: 0.7058 - val_acc: 0.7465
Epoch 20/35
- 4s - loss: 0.4949 - acc: 0.8742 - val_loss: 0.7608 - val_acc: 0.7638
Epoch 21/35
- 4s - loss: 0.4969 - acc: 0.8753 - val_loss: 0.9662 - val_acc: 0.5714
Epoch 22/35
- 4s - loss: 0.4729 - acc: 0.8853 - val_loss: 1.0824 - val_acc: 0.6997
Epoch 23/35
- 4s - loss: 0.4722 - acc: 0.8784 - val_loss: 0.6847 - val_acc: 0.8090
Epoch 24/35
- 4s - loss: 0.4729 - acc: 0.8808 - val_loss: 0.6892 - val_acc: 0.8154
Epoch 25/35
- 4s - loss: 0.4691 - acc: 0.8837 - val_loss: 0.6156 - val_acc: 0.8001
Epoch 26/35
- 4s - loss: 0.4665 - acc: 0.8818 - val_loss: 0.8563 - val_acc: 0.7207
Epoch 27/35
- 4s - loss: 0.4594 - acc: 0.8817 - val_loss: 0.7700 - val_acc: 0.7574
Epoch 28/35
- 4s - loss: 0.4559 - acc: 0.8819 - val_loss: 0.6305 - val_acc: 0.8680
Epoch 29/35
- 4s - loss: 0.4624 - acc: 0.8860 - val_loss: 0.8539 - val_acc: 0.7024
Epoch 30/35
- 4s - loss: 0.4462 - acc: 0.8894 - val_loss: 0.6595 - val_acc: 0.8320
Epoch 31/35
- 4s - loss: 0.4444 - acc: 0.8901 - val_loss: 0.6202 - val_acc: 0.8154
Epoch 32/35
- 4s - loss: 0.4506 - acc: 0.8867 - val_loss: 0.6456 - val_acc: 0.7842
Epoch 33/35
- 4s - loss: 0.4506 - acc: 0.8848 - val_loss: 0.7049 - val_acc: 0.8402
Epoch 34/35
- 4s - loss: 0.4471 - acc: 0.8866 - val_loss: 0.5752 - val_acc: 0.8666
Epoch 35/35
- 4s - loss: 0.4595 - acc: 0.8826 - val_loss: 0.8860 - val_acc: 0.7041
Train accuracy 0.7135473340628131 Test accuracy: 0.7041058703766542

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_19 (Conv1D)          (None, 124, 32)            1472

```

```

-----
conv1d_20 (Conv1D)                (None, 118, 16)                3600
-----
dropout_10 (Dropout)              (None, 118, 16)                0
-----
max_pooling1d_10 (MaxPooling)     (None, 39, 16)                0
-----
flatten_10 (Flatten)              (None, 624)                    0
-----
dense_19 (Dense)                  (None, 32)                     20000
-----
dense_20 (Dense)                  (None, 6)                      198
=====
Total params: 25,270
Trainable params: 25,270
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 5s - loss: 33.1583 - acc: 0.7077 - val_loss: 9.1590 - val_acc: 0.8463
Epoch 2/25
  - 4s - loss: 3.7155 - acc: 0.8868 - val_loss: 1.5044 - val_acc: 0.8436
Epoch 3/25
  - 4s - loss: 0.7515 - acc: 0.9047 - val_loss: 0.8519 - val_acc: 0.7855
Epoch 4/25
  - 4s - loss: 0.4972 - acc: 0.9057 - val_loss: 0.7259 - val_acc: 0.8103
Epoch 5/25
  - 5s - loss: 0.4501 - acc: 0.9052 - val_loss: 0.6605 - val_acc: 0.8653
Epoch 6/25
  - 4s - loss: 0.4197 - acc: 0.9106 - val_loss: 0.6046 - val_acc: 0.8782
Epoch 7/25
  - 4s - loss: 0.3938 - acc: 0.9128 - val_loss: 0.5528 - val_acc: 0.8877
Epoch 8/25
  - 4s - loss: 0.3883 - acc: 0.9115 - val_loss: 0.6221 - val_acc: 0.8551
Epoch 9/25
  - 4s - loss: 0.3514 - acc: 0.9196 - val_loss: 0.5976 - val_acc: 0.8079
Epoch 10/25
  - 4s - loss: 0.3569 - acc: 0.9165 - val_loss: 0.5430 - val_acc: 0.8778
Epoch 11/25
  - 5s - loss: 0.3253 - acc: 0.9245 - val_loss: 0.5598 - val_acc: 0.8677
Epoch 12/25
  - 4s - loss: 0.3208 - acc: 0.9252 - val_loss: 0.4985 - val_acc: 0.8785
Epoch 13/25
  - 4s - loss: 0.3355 - acc: 0.9200 - val_loss: 0.5307 - val_acc: 0.8734
Epoch 14/25
  - 5s - loss: 0.3039 - acc: 0.9287 - val_loss: 0.4901 - val_acc: 0.8938
Epoch 15/25

```

```

- 4s - loss: 0.2934 - acc: 0.9300 - val_loss: 0.5767 - val_acc: 0.8392
Epoch 16/25
- 4s - loss: 0.3100 - acc: 0.9211 - val_loss: 0.5113 - val_acc: 0.8459
Epoch 17/25
- 5s - loss: 0.2956 - acc: 0.9282 - val_loss: 0.4581 - val_acc: 0.8744
Epoch 18/25
- 4s - loss: 0.2838 - acc: 0.9312 - val_loss: 0.5231 - val_acc: 0.8761
Epoch 19/25
- 4s - loss: 0.2789 - acc: 0.9316 - val_loss: 0.4493 - val_acc: 0.8765
Epoch 20/25
- 4s - loss: 0.2712 - acc: 0.9350 - val_loss: 0.4607 - val_acc: 0.8592
Epoch 21/25
- 4s - loss: 0.2739 - acc: 0.9312 - val_loss: 0.4213 - val_acc: 0.8951
Epoch 22/25
- 5s - loss: 0.2609 - acc: 0.9338 - val_loss: 0.4548 - val_acc: 0.8758
Epoch 23/25
- 4s - loss: 0.2554 - acc: 0.9350 - val_loss: 0.5415 - val_acc: 0.8076
Epoch 24/25
- 4s - loss: 0.2650 - acc: 0.9327 - val_loss: 0.4351 - val_acc: 0.8897
Epoch 25/25
- 4s - loss: 0.2926 - acc: 0.9290 - val_loss: 0.4154 - val_acc: 0.8924
Train accuracy 0.9402883569096845 Test accuracy: 0.8924329826942654
-----

```

Layer (type)	Output Shape	Param #
conv1d_21 (Conv1D)	(None, 124, 28)	1288
conv1d_22 (Conv1D)	(None, 118, 24)	4728
dropout_11 (Dropout)	(None, 118, 24)	0
max_pooling1d_11 (MaxPooling)	(None, 39, 24)	0
flatten_11 (Flatten)	(None, 936)	0
dense_21 (Dense)	(None, 32)	29984
dense_22 (Dense)	(None, 6)	198

```

=====
Total params: 36,198
Trainable params: 36,198
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 3s - loss: 22.0003 - acc: 0.7575 - val_loss: 0.9952 - val_acc: 0.7954

```

Epoch 2/30  
- 2s - loss: 0.5749 - acc: 0.8625 - val\_loss: 1.0222 - val\_acc: 0.6698  
Epoch 3/30  
- 2s - loss: 0.4590 - acc: 0.8875 - val\_loss: 0.5730 - val\_acc: 0.8870  
Epoch 4/30  
- 2s - loss: 0.4050 - acc: 0.8964 - val\_loss: 0.5849 - val\_acc: 0.8666  
Epoch 5/30  
- 2s - loss: 0.3764 - acc: 0.9083 - val\_loss: 0.5224 - val\_acc: 0.8582  
Epoch 6/30  
- 2s - loss: 0.3698 - acc: 0.9109 - val\_loss: 0.5335 - val\_acc: 0.8534  
Epoch 7/30  
- 2s - loss: 0.3426 - acc: 0.9131 - val\_loss: 0.4697 - val\_acc: 0.8795  
Epoch 8/30  
- 2s - loss: 0.3304 - acc: 0.9169 - val\_loss: 0.4343 - val\_acc: 0.8982  
Epoch 9/30  
- 2s - loss: 0.3292 - acc: 0.9134 - val\_loss: 0.4552 - val\_acc: 0.8704  
Epoch 10/30  
- 2s - loss: 0.3313 - acc: 0.9146 - val\_loss: 0.4631 - val\_acc: 0.8799  
Epoch 11/30  
- 2s - loss: 0.3203 - acc: 0.9177 - val\_loss: 0.5109 - val\_acc: 0.8364  
Epoch 12/30  
- 2s - loss: 0.3042 - acc: 0.9221 - val\_loss: 0.4424 - val\_acc: 0.8748  
Epoch 13/30  
- 2s - loss: 0.3095 - acc: 0.9204 - val\_loss: 0.4410 - val\_acc: 0.8792  
Epoch 14/30  
- 2s - loss: 0.3130 - acc: 0.9173 - val\_loss: 0.4639 - val\_acc: 0.8599  
Epoch 15/30  
- 2s - loss: 0.3084 - acc: 0.9207 - val\_loss: 0.5122 - val\_acc: 0.8297  
Epoch 16/30  
- 2s - loss: 0.2898 - acc: 0.9229 - val\_loss: 0.3869 - val\_acc: 0.8897  
Epoch 17/30  
- 2s - loss: 0.2976 - acc: 0.9180 - val\_loss: 0.4307 - val\_acc: 0.8744  
Epoch 18/30  
- 2s - loss: 0.2923 - acc: 0.9217 - val\_loss: 0.4364 - val\_acc: 0.8571  
Epoch 19/30  
- 2s - loss: 0.2950 - acc: 0.9251 - val\_loss: 0.4431 - val\_acc: 0.8785  
Epoch 20/30  
- 2s - loss: 0.2935 - acc: 0.9245 - val\_loss: 0.6502 - val\_acc: 0.7852  
Epoch 21/30  
- 2s - loss: 0.2951 - acc: 0.9236 - val\_loss: 0.4068 - val\_acc: 0.8738  
Epoch 22/30  
- 2s - loss: 0.2870 - acc: 0.9257 - val\_loss: 0.4662 - val\_acc: 0.8510  
Epoch 23/30  
- 2s - loss: 0.2911 - acc: 0.9215 - val\_loss: 0.4477 - val\_acc: 0.8388  
Epoch 24/30  
- 2s - loss: 0.2883 - acc: 0.9244 - val\_loss: 0.5285 - val\_acc: 0.7991  
Epoch 25/30  
- 2s - loss: 0.2867 - acc: 0.9257 - val\_loss: 0.3972 - val\_acc: 0.8911

Epoch 26/30  
 - 2s - loss: 0.2849 - acc: 0.9242 - val\_loss: 0.4130 - val\_acc: 0.8741  
 Epoch 27/30  
 - 2s - loss: 0.2880 - acc: 0.9218 - val\_loss: 0.5486 - val\_acc: 0.8137  
 Epoch 28/30  
 - 2s - loss: 0.2804 - acc: 0.9287 - val\_loss: 0.4059 - val\_acc: 0.8656  
 Epoch 29/30  
 - 2s - loss: 0.2889 - acc: 0.9226 - val\_loss: 0.7382 - val\_acc: 0.7747  
 Epoch 30/30  
 - 2s - loss: 0.2833 - acc: 0.9291 - val\_loss: 0.4879 - val\_acc: 0.8219  
 Train accuracy 0.8803046789989118 Test accuracy: 0.8218527315914489

Layer (type)	Output Shape	Param #
conv1d_23 (Conv1D)	(None, 122, 42)	2688
conv1d_24 (Conv1D)	(None, 116, 32)	9440
dropout_12 (Dropout)	(None, 116, 32)	0
max_pooling1d_12 (MaxPooling)	(None, 38, 32)	0
flatten_12 (Flatten)	(None, 1216)	0
dense_23 (Dense)	(None, 64)	77888
dense_24 (Dense)	(None, 6)	390

Total params: 90,406  
 Trainable params: 90,406  
 Non-trainable params: 0

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 5s - loss: 4.2436 - acc: 0.8079 - val\_loss: 0.5711 - val\_acc: 0.8636  
 Epoch 2/25  
 - 4s - loss: 0.4683 - acc: 0.8844 - val\_loss: 0.6810 - val\_acc: 0.8093  
 Epoch 3/25  
 - 4s - loss: 0.4119 - acc: 0.8973 - val\_loss: 0.6572 - val\_acc: 0.8412  
 Epoch 4/25  
 - 4s - loss: 0.3911 - acc: 0.9026 - val\_loss: 0.4871 - val\_acc: 0.8588  
 Epoch 5/25  
 - 4s - loss: 0.3806 - acc: 0.9027 - val\_loss: 0.4511 - val\_acc: 0.8721  
 Epoch 6/25  
 - 4s - loss: 0.3686 - acc: 0.9045 - val\_loss: 0.5533 - val\_acc: 0.8232  
 Epoch 7/25

```

- 4s - loss: 0.3675 - acc: 0.9057 - val_loss: 0.6532 - val_acc: 0.7703
Epoch 8/25
- 4s - loss: 0.3647 - acc: 0.9097 - val_loss: 0.4831 - val_acc: 0.8599
Epoch 9/25
- 4s - loss: 0.3650 - acc: 0.9106 - val_loss: 0.7605 - val_acc: 0.7469
Epoch 10/25
- 4s - loss: 0.3588 - acc: 0.9082 - val_loss: 0.7704 - val_acc: 0.7089
Epoch 11/25
- 4s - loss: 0.3535 - acc: 0.9095 - val_loss: 0.4914 - val_acc: 0.8680
Epoch 12/25
- 4s - loss: 0.3511 - acc: 0.9101 - val_loss: 0.5851 - val_acc: 0.7852
Epoch 13/25
- 4s - loss: 0.3507 - acc: 0.9091 - val_loss: 0.3763 - val_acc: 0.8904
Epoch 14/25
- 4s - loss: 0.3444 - acc: 0.9128 - val_loss: 0.4630 - val_acc: 0.8663
Epoch 15/25
- 4s - loss: 0.3669 - acc: 0.9081 - val_loss: 0.4374 - val_acc: 0.8521
Epoch 16/25
- 4s - loss: 0.3502 - acc: 0.9117 - val_loss: 0.4200 - val_acc: 0.8700
Epoch 17/25
- 4s - loss: 0.3462 - acc: 0.9149 - val_loss: 0.5515 - val_acc: 0.8039
Epoch 18/25
- 4s - loss: 0.3321 - acc: 0.9153 - val_loss: 0.5360 - val_acc: 0.8195
Epoch 19/25
- 4s - loss: 0.3365 - acc: 0.9154 - val_loss: 0.4456 - val_acc: 0.8459
Epoch 20/25
- 4s - loss: 0.3266 - acc: 0.9161 - val_loss: 0.3982 - val_acc: 0.8816
Epoch 21/25
- 4s - loss: 0.3478 - acc: 0.9128 - val_loss: 0.5870 - val_acc: 0.8032
Epoch 22/25
- 4s - loss: 0.3437 - acc: 0.9142 - val_loss: 0.4387 - val_acc: 0.8748
Epoch 23/25
- 4s - loss: 0.3247 - acc: 0.9144 - val_loss: 0.4087 - val_acc: 0.8856
Epoch 24/25
- 4s - loss: 0.3268 - acc: 0.9115 - val_loss: 0.3774 - val_acc: 0.8867
Epoch 25/25
- 4s - loss: 0.3255 - acc: 0.9176 - val_loss: 0.4234 - val_acc: 0.8622
Train accuracy 0.9236942327969482 Test accuracy: 0.8622327790973872

```

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_25 (Conv1D)	(None, 124, 32)	1472
<hr/>		
conv1d_26 (Conv1D)	(None, 120, 32)	5152
<hr/>		
dropout_13 (Dropout)	(None, 120, 32)	0

---

```

max_pooling1d_13 (MaxPooling (None, 40, 32))          0
-----
flatten_13 (Flatten)          (None, 1280)          0
-----
dense_25 (Dense)              (None, 64)          81984
-----
dense_26 (Dense)              (None, 6)          390
=====
Total params: 88,998
Trainable params: 88,998
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 4s - loss: 91.6109 - acc: 0.7274 - val_loss: 20.5480 - val_acc: 0.7713
Epoch 2/30
  - 2s - loss: 7.8445 - acc: 0.8384 - val_loss: 2.3996 - val_acc: 0.7431
Epoch 3/30
  - 2s - loss: 1.1033 - acc: 0.8599 - val_loss: 0.9668 - val_acc: 0.8415
Epoch 4/30
  - 2s - loss: 0.6050 - acc: 0.8774 - val_loss: 0.8111 - val_acc: 0.8527
Epoch 5/30
  - 2s - loss: 0.5668 - acc: 0.8747 - val_loss: 0.7943 - val_acc: 0.8442
Epoch 6/30
  - 2s - loss: 0.5385 - acc: 0.8828 - val_loss: 0.7514 - val_acc: 0.8429
Epoch 7/30
  - 3s - loss: 0.4746 - acc: 0.8919 - val_loss: 0.7028 - val_acc: 0.8225
Epoch 8/30
  - 2s - loss: 0.4651 - acc: 0.8912 - val_loss: 0.7666 - val_acc: 0.8151
Epoch 9/30
  - 2s - loss: 0.4642 - acc: 0.8900 - val_loss: 0.6762 - val_acc: 0.8588
Epoch 10/30
  - 2s - loss: 0.4537 - acc: 0.8893 - val_loss: 0.6286 - val_acc: 0.8666
Epoch 11/30
  - 2s - loss: 0.4080 - acc: 0.9045 - val_loss: 0.6110 - val_acc: 0.8633
Epoch 12/30
  - 3s - loss: 0.4068 - acc: 0.8998 - val_loss: 0.6332 - val_acc: 0.8463
Epoch 13/30
  - 2s - loss: 0.4012 - acc: 0.9017 - val_loss: 0.6238 - val_acc: 0.8364
Epoch 14/30
  - 2s - loss: 0.3900 - acc: 0.9033 - val_loss: 0.5950 - val_acc: 0.8521
Epoch 15/30
  - 2s - loss: 0.3884 - acc: 0.9015 - val_loss: 0.6049 - val_acc: 0.8568
Epoch 16/30
  - 2s - loss: 0.3807 - acc: 0.9036 - val_loss: 0.6256 - val_acc: 0.8531
Epoch 17/30
  - 3s - loss: 0.4079 - acc: 0.9015 - val_loss: 0.5884 - val_acc: 0.8636

```



```

Epoch 18/30
  - 2s - loss: 0.3759 - acc: 0.9076 - val_loss: 0.6103 - val_acc: 0.8616
Epoch 19/30
  - 2s - loss: 0.4024 - acc: 0.8961 - val_loss: 0.5990 - val_acc: 0.8144
Epoch 20/30
  - 2s - loss: 0.3695 - acc: 0.9075 - val_loss: 0.5853 - val_acc: 0.8571
Epoch 21/30
  - 2s - loss: 0.3759 - acc: 0.9060 - val_loss: 0.5910 - val_acc: 0.8419
Epoch 22/30
  - 3s - loss: 0.3784 - acc: 0.9030 - val_loss: 0.5485 - val_acc: 0.8823
Epoch 23/30
  - 2s - loss: 0.3656 - acc: 0.9081 - val_loss: 0.5569 - val_acc: 0.8901
Epoch 24/30
  - 2s - loss: 0.3383 - acc: 0.9199 - val_loss: 0.5249 - val_acc: 0.8585
Epoch 25/30
  - 2s - loss: 0.4042 - acc: 0.8985 - val_loss: 0.5675 - val_acc: 0.8599
Epoch 26/30
  - 2s - loss: 0.3456 - acc: 0.9188 - val_loss: 0.5822 - val_acc: 0.8626
Epoch 27/30
  - 2s - loss: 0.3543 - acc: 0.9161 - val_loss: 0.5797 - val_acc: 0.8364
Epoch 28/30
  - 3s - loss: 0.3425 - acc: 0.9154 - val_loss: 0.5437 - val_acc: 0.8622
Epoch 29/30
  - 2s - loss: 0.3220 - acc: 0.9246 - val_loss: 0.5397 - val_acc: 0.8694
Epoch 30/30
  - 2s - loss: 0.3443 - acc: 0.9161 - val_loss: 0.4974 - val_acc: 0.8639
Train accuracy 0.9197497279651795 Test accuracy: 0.8639294197488971

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_27 (Conv1D)	(None, 126, 42)	1176
-----		
conv1d_28 (Conv1D)	(None, 124, 24)	3048
-----		
dropout_14 (Dropout)	(None, 124, 24)	0
-----		
max_pooling1d_14 (MaxPooling)	(None, 62, 24)	0
-----		
flatten_14 (Flatten)	(None, 1488)	0
-----		
dense_27 (Dense)	(None, 64)	95296
-----		
dense_28 (Dense)	(None, 6)	390
=====		

```

Total params: 99,910
Trainable params: 99,910
Non-trainable params: 0

```

```

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 4s - loss: 35.4818 - acc: 0.7365 - val_loss: 1.2519 - val_acc: 0.7645
Epoch 2/30
  - 3s - loss: 0.7410 - acc: 0.8230 - val_loss: 0.7950 - val_acc: 0.7811
Epoch 3/30
  - 3s - loss: 0.6246 - acc: 0.8414 - val_loss: 0.7543 - val_acc: 0.8069
Epoch 4/30
  - 3s - loss: 0.5642 - acc: 0.8576 - val_loss: 0.7985 - val_acc: 0.7557
Epoch 5/30
  - 3s - loss: 0.5363 - acc: 0.8637 - val_loss: 0.6684 - val_acc: 0.8195
Epoch 6/30
  - 3s - loss: 0.4955 - acc: 0.8762 - val_loss: 0.7244 - val_acc: 0.7771
Epoch 7/30
  - 3s - loss: 0.5006 - acc: 0.8686 - val_loss: 0.7676 - val_acc: 0.8042
Epoch 8/30
  - 3s - loss: 0.4527 - acc: 0.8879 - val_loss: 0.5642 - val_acc: 0.8493
Epoch 9/30
  - 3s - loss: 0.4582 - acc: 0.8853 - val_loss: 0.6889 - val_acc: 0.8314
Epoch 10/30
  - 3s - loss: 0.4547 - acc: 0.8864 - val_loss: 0.6378 - val_acc: 0.8517
Epoch 11/30
  - 3s - loss: 0.4442 - acc: 0.8886 - val_loss: 0.5697 - val_acc: 0.8599
Epoch 12/30
  - 3s - loss: 0.4211 - acc: 0.8930 - val_loss: 0.5194 - val_acc: 0.8785
Epoch 13/30
  - 3s - loss: 0.4081 - acc: 0.9002 - val_loss: 0.6659 - val_acc: 0.7727
Epoch 14/30
  - 3s - loss: 0.4002 - acc: 0.8995 - val_loss: 0.6751 - val_acc: 0.7615
Epoch 15/30
  - 3s - loss: 0.3853 - acc: 0.9071 - val_loss: 0.5253 - val_acc: 0.8734
Epoch 16/30
  - 3s - loss: 0.3952 - acc: 0.9003 - val_loss: 0.5621 - val_acc: 0.8677
Epoch 17/30
  - 3s - loss: 0.4270 - acc: 0.8984 - val_loss: 0.4994 - val_acc: 0.8921
Epoch 18/30
  - 3s - loss: 0.3933 - acc: 0.9007 - val_loss: 0.6029 - val_acc: 0.8490
Epoch 19/30
  - 3s - loss: 0.3689 - acc: 0.9090 - val_loss: 0.5713 - val_acc: 0.8300
Epoch 20/30
  - 3s - loss: 0.3653 - acc: 0.9110 - val_loss: 0.4760 - val_acc: 0.8833
Epoch 21/30
  - 3s - loss: 0.3713 - acc: 0.9056 - val_loss: 0.4707 - val_acc: 0.8683
Epoch 22/30
  - 3s - loss: 0.3936 - acc: 0.9068 - val_loss: 0.5288 - val_acc: 0.8846
Epoch 23/30

```

```

- 3s - loss: 0.3470 - acc: 0.9162 - val_loss: 0.4120 - val_acc: 0.8816
Epoch 24/30
- 3s - loss: 0.3585 - acc: 0.9087 - val_loss: 0.4459 - val_acc: 0.8833
Epoch 25/30
- 3s - loss: 0.3368 - acc: 0.9185 - val_loss: 0.4237 - val_acc: 0.8792
Epoch 26/30
- 3s - loss: 0.3483 - acc: 0.9128 - val_loss: 0.4607 - val_acc: 0.8755
Epoch 27/30
- 3s - loss: 0.3311 - acc: 0.9189 - val_loss: 0.4189 - val_acc: 0.8921
Epoch 28/30
- 3s - loss: 0.3116 - acc: 0.9232 - val_loss: 0.4055 - val_acc: 0.8938
Epoch 29/30
- 3s - loss: 0.3375 - acc: 0.9154 - val_loss: 0.5142 - val_acc: 0.8419
Epoch 30/30
- 3s - loss: 0.3531 - acc: 0.9113 - val_loss: 0.4770 - val_acc: 0.8514
Train accuracy 0.9139009793253536 Test accuracy: 0.8513742789277231
-----

```

Layer (type)	Output Shape	Param #
conv1d_29 (Conv1D)	(None, 124, 32)	1472
conv1d_30 (Conv1D)	(None, 118, 24)	5400
dropout_15 (Dropout)	(None, 118, 24)	0
max_pooling1d_15 (MaxPooling)	(None, 39, 24)	0
flatten_15 (Flatten)	(None, 936)	0
dense_29 (Dense)	(None, 32)	29984
dense_30 (Dense)	(None, 6)	198

```

=====
Total params: 37,054
Trainable params: 37,054
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 4s - loss: 20.3809 - acc: 0.7291 - val_loss: 2.9204 - val_acc: 0.8090
Epoch 2/25
- 4s - loss: 1.0833 - acc: 0.8726 - val_loss: 0.8612 - val_acc: 0.8426
Epoch 3/25
- 4s - loss: 0.5268 - acc: 0.8875 - val_loss: 0.7121 - val_acc: 0.8548
Epoch 4/25
- 3s - loss: 0.4572 - acc: 0.8966 - val_loss: 0.7138 - val_acc: 0.8738

```

```

Epoch 5/25
- 4s - loss: 0.4335 - acc: 0.8970 - val_loss: 0.6639 - val_acc: 0.8364
Epoch 6/25
- 4s - loss: 0.4060 - acc: 0.9007 - val_loss: 0.6129 - val_acc: 0.8873
Epoch 7/25
- 4s - loss: 0.4219 - acc: 0.8995 - val_loss: 0.5754 - val_acc: 0.9002
Epoch 8/25
- 4s - loss: 0.3727 - acc: 0.9115 - val_loss: 0.5795 - val_acc: 0.8568
Epoch 9/25
- 4s - loss: 0.3573 - acc: 0.9104 - val_loss: 0.6117 - val_acc: 0.8351
Epoch 10/25
- 3s - loss: 0.3441 - acc: 0.9162 - val_loss: 0.5354 - val_acc: 0.8948
Epoch 11/25
- 4s - loss: 0.3478 - acc: 0.9116 - val_loss: 0.5007 - val_acc: 0.9019
Epoch 12/25
- 4s - loss: 0.3180 - acc: 0.9197 - val_loss: 0.5056 - val_acc: 0.8989
Epoch 13/25
- 4s - loss: 0.3130 - acc: 0.9236 - val_loss: 0.4728 - val_acc: 0.8955
Epoch 14/25
- 4s - loss: 0.3097 - acc: 0.9211 - val_loss: 0.4581 - val_acc: 0.9104
Epoch 15/25
- 4s - loss: 0.2956 - acc: 0.9234 - val_loss: 0.4555 - val_acc: 0.9053
Epoch 16/25
- 4s - loss: 0.3036 - acc: 0.9214 - val_loss: 0.4797 - val_acc: 0.8938
Epoch 17/25
- 4s - loss: 0.3032 - acc: 0.9230 - val_loss: 0.4508 - val_acc: 0.8819
Epoch 18/25
- 4s - loss: 0.2848 - acc: 0.9279 - val_loss: 0.4111 - val_acc: 0.9192
Epoch 19/25
- 4s - loss: 0.2817 - acc: 0.9275 - val_loss: 0.4110 - val_acc: 0.9128
Epoch 20/25
- 4s - loss: 0.2917 - acc: 0.9226 - val_loss: 0.4152 - val_acc: 0.9050
Epoch 21/25
- 4s - loss: 0.2715 - acc: 0.9314 - val_loss: 0.4112 - val_acc: 0.8938
Epoch 22/25
- 4s - loss: 0.2868 - acc: 0.9193 - val_loss: 0.4240 - val_acc: 0.9002
Epoch 23/25
- 4s - loss: 0.2637 - acc: 0.9329 - val_loss: 0.4017 - val_acc: 0.9002
Epoch 24/25
- 4s - loss: 0.2576 - acc: 0.9313 - val_loss: 0.4015 - val_acc: 0.9084
Epoch 25/25
- 4s - loss: 0.2557 - acc: 0.9331 - val_loss: 0.3854 - val_acc: 0.9080
Train accuracy 0.948721436343852 Test accuracy: 0.9080420766881574

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_31 (Conv1D)          (None, 124, 28)            1288

```

```

-----
conv1d_32 (Conv1D)                (None, 118, 16)                3152
-----
dropout_16 (Dropout)              (None, 118, 16)                0
-----
max_pooling1d_16 (MaxPooling)     (None, 39, 16)                0
-----
flatten_16 (Flatten)              (None, 624)                    0
-----
dense_31 (Dense)                  (None, 32)                     20000
-----
dense_32 (Dense)                  (None, 6)                      198
=====
Total params: 24,638
Trainable params: 24,638
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 3s - loss: 15.3245 - acc: 0.7458 - val_loss: 1.2714 - val_acc: 0.7805
Epoch 2/30
  - 1s - loss: 0.6392 - acc: 0.8550 - val_loss: 0.7413 - val_acc: 0.8409
Epoch 3/30
  - 1s - loss: 0.4923 - acc: 0.8857 - val_loss: 0.6626 - val_acc: 0.8622
Epoch 4/30
  - 1s - loss: 0.4680 - acc: 0.8860 - val_loss: 0.6297 - val_acc: 0.8473
Epoch 5/30
  - 1s - loss: 0.4677 - acc: 0.8882 - val_loss: 0.6407 - val_acc: 0.8656
Epoch 6/30
  - 1s - loss: 0.4308 - acc: 0.8950 - val_loss: 0.7057 - val_acc: 0.7842
Epoch 7/30
  - 1s - loss: 0.4097 - acc: 0.9008 - val_loss: 0.6249 - val_acc: 0.8344
Epoch 8/30
  - 1s - loss: 0.4138 - acc: 0.8966 - val_loss: 0.5428 - val_acc: 0.8595
Epoch 9/30
  - 1s - loss: 0.3861 - acc: 0.9086 - val_loss: 0.6079 - val_acc: 0.8398
Epoch 10/30
  - 1s - loss: 0.3920 - acc: 0.9053 - val_loss: 0.5732 - val_acc: 0.8476
Epoch 11/30
  - 1s - loss: 0.3687 - acc: 0.9100 - val_loss: 0.5987 - val_acc: 0.8398
Epoch 12/30
  - 1s - loss: 0.3888 - acc: 0.8998 - val_loss: 0.5543 - val_acc: 0.8738
Epoch 13/30
  - 1s - loss: 0.3739 - acc: 0.9051 - val_loss: 0.5441 - val_acc: 0.8609
Epoch 14/30
  - 2s - loss: 0.3720 - acc: 0.9051 - val_loss: 0.5179 - val_acc: 0.8609
Epoch 15/30

```

```

- 1s - loss: 0.3505 - acc: 0.9115 - val_loss: 0.5880 - val_acc: 0.8229
Epoch 16/30
- 1s - loss: 0.3415 - acc: 0.9138 - val_loss: 0.4769 - val_acc: 0.8884
Epoch 17/30
- 1s - loss: 0.3342 - acc: 0.9123 - val_loss: 0.4564 - val_acc: 0.8951
Epoch 18/30
- 1s - loss: 0.3228 - acc: 0.9214 - val_loss: 0.4618 - val_acc: 0.8985
Epoch 19/30
- 1s - loss: 0.3444 - acc: 0.9149 - val_loss: 0.4618 - val_acc: 0.9019
Epoch 20/30
- 1s - loss: 0.3535 - acc: 0.9087 - val_loss: 0.4896 - val_acc: 0.8931
Epoch 21/30
- 1s - loss: 0.3269 - acc: 0.9174 - val_loss: 0.4670 - val_acc: 0.8799
Epoch 22/30
- 2s - loss: 0.3380 - acc: 0.9136 - val_loss: 0.5943 - val_acc: 0.8476
Epoch 23/30
- 1s - loss: 0.3278 - acc: 0.9157 - val_loss: 0.5482 - val_acc: 0.8673
Epoch 24/30
- 1s - loss: 0.3038 - acc: 0.9259 - val_loss: 0.4524 - val_acc: 0.8816
Epoch 25/30
- 1s - loss: 0.2950 - acc: 0.9256 - val_loss: 0.4678 - val_acc: 0.8673
Epoch 26/30
- 1s - loss: 0.2893 - acc: 0.9271 - val_loss: 0.4022 - val_acc: 0.8921
Epoch 27/30
- 1s - loss: 0.3299 - acc: 0.9168 - val_loss: 0.6079 - val_acc: 0.8663
Epoch 28/30
- 1s - loss: 0.3191 - acc: 0.9233 - val_loss: 0.3898 - val_acc: 0.8921
Epoch 29/30
- 1s - loss: 0.3074 - acc: 0.9208 - val_loss: 0.6789 - val_acc: 0.7703
Epoch 30/30
- 1s - loss: 0.3375 - acc: 0.9166 - val_loss: 0.4229 - val_acc: 0.9077
Train accuracy 0.9439608269858542 Test accuracy: 0.9077027485578555

```

Layer (type)	Output Shape	Param #
conv1d_33 (Conv1D)	(None, 126, 28)	784
conv1d_34 (Conv1D)	(None, 124, 16)	1360
dropout_17 (Dropout)	(None, 124, 16)	0
max_pooling1d_17 (MaxPooling)	(None, 41, 16)	0
flatten_17 (Flatten)	(None, 656)	0
dense_33 (Dense)	(None, 64)	42048

dense\_34 (Dense) (None, 6) 390  
=====

Total params: 44,582  
Trainable params: 44,582  
Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 3s - loss: 67.7185 - acc: 0.6288 - val\_loss: 49.4894 - val\_acc: 0.7367

Epoch 2/30

- 1s - loss: 37.1992 - acc: 0.8252 - val\_loss: 27.4454 - val\_acc: 0.7659

Epoch 3/30

- 1s - loss: 20.4884 - acc: 0.8706 - val\_loss: 15.2680 - val\_acc: 0.7689

Epoch 4/30

- 1s - loss: 11.2570 - acc: 0.8902 - val\_loss: 8.5185 - val\_acc: 0.8174

Epoch 5/30

- 1s - loss: 6.1733 - acc: 0.8919 - val\_loss: 4.8209 - val\_acc: 0.8181

Epoch 6/30

- 1s - loss: 3.4088 - acc: 0.8977 - val\_loss: 2.8336 - val\_acc: 0.8266

Epoch 7/30

- 1s - loss: 1.9367 - acc: 0.9032 - val\_loss: 1.8325 - val\_acc: 0.7869

Epoch 8/30

- 2s - loss: 1.1843 - acc: 0.9022 - val\_loss: 1.3294 - val\_acc: 0.7933

Epoch 9/30

- 1s - loss: 0.8109 - acc: 0.9091 - val\_loss: 1.0191 - val\_acc: 0.8497

Epoch 10/30

- 1s - loss: 0.6267 - acc: 0.9106 - val\_loss: 0.8913 - val\_acc: 0.8347

Epoch 11/30

- 1s - loss: 0.5430 - acc: 0.9087 - val\_loss: 0.7963 - val\_acc: 0.8646

Epoch 12/30

- 1s - loss: 0.4968 - acc: 0.9079 - val\_loss: 0.7564 - val\_acc: 0.8609

Epoch 13/30

- 1s - loss: 0.4760 - acc: 0.9081 - val\_loss: 0.7551 - val\_acc: 0.8588

Epoch 14/30

- 1s - loss: 0.4512 - acc: 0.9115 - val\_loss: 0.7723 - val\_acc: 0.8164

Epoch 15/30

- 1s - loss: 0.4325 - acc: 0.9132 - val\_loss: 0.7058 - val\_acc: 0.8612

Epoch 16/30

- 2s - loss: 0.4363 - acc: 0.9041 - val\_loss: 0.6773 - val\_acc: 0.8677

Epoch 17/30

- 1s - loss: 0.4068 - acc: 0.9149 - val\_loss: 0.6637 - val\_acc: 0.8687

Epoch 18/30

- 1s - loss: 0.4053 - acc: 0.9138 - val\_loss: 0.6468 - val\_acc: 0.8673

Epoch 19/30

- 1s - loss: 0.3873 - acc: 0.9180 - val\_loss: 0.6441 - val\_acc: 0.8653

Epoch 20/30

- 1s - loss: 0.3779 - acc: 0.9237 - val\_loss: 0.6258 - val\_acc: 0.8748

Epoch 21/30  
 - 1s - loss: 0.3672 - acc: 0.9204 - val\_loss: 0.6213 - val\_acc: 0.8744  
 Epoch 22/30  
 - 1s - loss: 0.3643 - acc: 0.9226 - val\_loss: 0.6147 - val\_acc: 0.8748  
 Epoch 23/30  
 - 1s - loss: 0.3581 - acc: 0.9249 - val\_loss: 0.5916 - val\_acc: 0.8680  
 Epoch 24/30  
 - 1s - loss: 0.3521 - acc: 0.9253 - val\_loss: 0.5863 - val\_acc: 0.8690  
 Epoch 25/30  
 - 1s - loss: 0.3434 - acc: 0.9270 - val\_loss: 0.6174 - val\_acc: 0.8398  
 Epoch 26/30  
 - 1s - loss: 0.3382 - acc: 0.9283 - val\_loss: 0.5705 - val\_acc: 0.8694  
 Epoch 27/30  
 - 1s - loss: 0.3360 - acc: 0.9260 - val\_loss: 0.5708 - val\_acc: 0.8683  
 Epoch 28/30  
 - 1s - loss: 0.3264 - acc: 0.9270 - val\_loss: 0.5596 - val\_acc: 0.8744  
 Epoch 29/30  
 - 1s - loss: 0.3165 - acc: 0.9294 - val\_loss: 0.5545 - val\_acc: 0.8809  
 Epoch 30/30  
 - 1s - loss: 0.3167 - acc: 0.9276 - val\_loss: 0.5340 - val\_acc: 0.8744  
 Train accuracy 0.933215451577802 Test accuracy: 0.8744485917882593

---

Layer (type)	Output Shape	Param #
=====		
conv1d_35 (Conv1D)	(None, 122, 42)	2688
-----		
conv1d_36 (Conv1D)	(None, 120, 16)	2032
-----		
dropout_18 (Dropout)	(None, 120, 16)	0
-----		
max_pooling1d_18 (MaxPooling)	(None, 40, 16)	0
-----		
flatten_18 (Flatten)	(None, 640)	0
-----		
dense_35 (Dense)	(None, 32)	20512
-----		
dense_36 (Dense)	(None, 6)	198
=====		

Total params: 25,430  
 Trainable params: 25,430  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 5s - loss: 11.7904 - acc: 0.7391 - val\_loss: 0.8701 - val\_acc: 0.7788  
 Epoch 2/25



```

- 4s - loss: 0.6442 - acc: 0.8328 - val_loss: 0.7829 - val_acc: 0.8164
Epoch 3/25
- 4s - loss: 0.5658 - acc: 0.8569 - val_loss: 0.6739 - val_acc: 0.8453
Epoch 4/25
- 3s - loss: 0.5517 - acc: 0.8618 - val_loss: 0.8972 - val_acc: 0.7027
Epoch 5/25
- 3s - loss: 0.5117 - acc: 0.8708 - val_loss: 0.6253 - val_acc: 0.8412
Epoch 6/25
- 4s - loss: 0.4780 - acc: 0.8788 - val_loss: 0.6040 - val_acc: 0.8280
Epoch 7/25
- 3s - loss: 0.4720 - acc: 0.8844 - val_loss: 0.6061 - val_acc: 0.8466
Epoch 8/25
- 3s - loss: 0.4509 - acc: 0.8906 - val_loss: 0.5511 - val_acc: 0.8514
Epoch 9/25
- 4s - loss: 0.4468 - acc: 0.8901 - val_loss: 0.5676 - val_acc: 0.8466
Epoch 10/25
- 3s - loss: 0.4462 - acc: 0.8881 - val_loss: 0.6952 - val_acc: 0.8144
Epoch 11/25
- 4s - loss: 0.4389 - acc: 0.8939 - val_loss: 0.5627 - val_acc: 0.8694
Epoch 12/25
- 3s - loss: 0.4341 - acc: 0.8906 - val_loss: 0.5739 - val_acc: 0.8575
Epoch 13/25
- 3s - loss: 0.4189 - acc: 0.8980 - val_loss: 0.6106 - val_acc: 0.8171
Epoch 14/25
- 3s - loss: 0.4243 - acc: 0.9018 - val_loss: 0.6372 - val_acc: 0.8341
Epoch 15/25
- 4s - loss: 0.4123 - acc: 0.8976 - val_loss: 0.6017 - val_acc: 0.8463
Epoch 16/25
- 4s - loss: 0.3796 - acc: 0.9070 - val_loss: 0.4965 - val_acc: 0.8626
Epoch 17/25
- 3s - loss: 0.3946 - acc: 0.9004 - val_loss: 0.4797 - val_acc: 0.8609
Epoch 18/25
- 3s - loss: 0.3904 - acc: 0.9048 - val_loss: 0.6900 - val_acc: 0.7967
Epoch 19/25
- 3s - loss: 0.3939 - acc: 0.9052 - val_loss: 0.5635 - val_acc: 0.8215
Epoch 20/25
- 3s - loss: 0.3781 - acc: 0.9057 - val_loss: 0.6522 - val_acc: 0.8134
Epoch 21/25
- 3s - loss: 0.3945 - acc: 0.9061 - val_loss: 0.4607 - val_acc: 0.8748
Epoch 22/25
- 4s - loss: 0.3641 - acc: 0.9128 - val_loss: 0.4994 - val_acc: 0.8466
Epoch 23/25
- 4s - loss: 0.4095 - acc: 0.9017 - val_loss: 0.6645 - val_acc: 0.7855
Epoch 24/25
- 3s - loss: 0.3662 - acc: 0.9106 - val_loss: 0.4692 - val_acc: 0.8911
Epoch 25/25
- 4s - loss: 0.3860 - acc: 0.9087 - val_loss: 0.5268 - val_acc: 0.8320
Train accuracy 0.8769042437431991 Test accuracy: 0.832032575500509

```

---

Layer (type)	Output Shape	Param #
conv1d_37 (Conv1D)	(None, 122, 28)	1792
conv1d_38 (Conv1D)	(None, 116, 24)	4728
dropout_19 (Dropout)	(None, 116, 24)	0
max_pooling1d_19 (MaxPooling)	(None, 58, 24)	0
flatten_19 (Flatten)	(None, 1392)	0
dense_37 (Dense)	(None, 32)	44576
dense_38 (Dense)	(None, 6)	198

---

Total params: 51,294  
Trainable params: 51,294  
Non-trainable params: 0

---

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 3s - loss: 4.6101 - acc: 0.7229 - val\_loss: 0.8567 - val\_acc: 0.8575

Epoch 2/25

- 2s - loss: 0.5960 - acc: 0.8694 - val\_loss: 0.5388 - val\_acc: 0.8999

Epoch 3/25

- 2s - loss: 0.4529 - acc: 0.8985 - val\_loss: 0.4633 - val\_acc: 0.8873

Epoch 4/25

- 2s - loss: 0.3815 - acc: 0.9074 - val\_loss: 0.4082 - val\_acc: 0.8931

Epoch 5/25

- 2s - loss: 0.3394 - acc: 0.9135 - val\_loss: 0.3843 - val\_acc: 0.9013

Epoch 6/25

- 2s - loss: 0.3315 - acc: 0.9181 - val\_loss: 0.4065 - val\_acc: 0.8911

Epoch 7/25

- 2s - loss: 0.3237 - acc: 0.9184 - val\_loss: 0.3902 - val\_acc: 0.8870

Epoch 8/25

- 2s - loss: 0.2985 - acc: 0.9226 - val\_loss: 0.3657 - val\_acc: 0.8968

Epoch 9/25

- 2s - loss: 0.3158 - acc: 0.9248 - val\_loss: 0.3911 - val\_acc: 0.9006

Epoch 10/25

- 2s - loss: 0.3041 - acc: 0.9225 - val\_loss: 0.4590 - val\_acc: 0.8782

Epoch 11/25

- 2s - loss: 0.2902 - acc: 0.9240 - val\_loss: 0.3727 - val\_acc: 0.8951

Epoch 12/25

- 2s - loss: 0.2983 - acc: 0.9246 - val\_loss: 0.6372 - val\_acc: 0.7903

```

Epoch 13/25
- 2s - loss: 0.3210 - acc: 0.9218 - val_loss: 0.3795 - val_acc: 0.8924
Epoch 14/25
- 2s - loss: 0.2750 - acc: 0.9285 - val_loss: 0.3721 - val_acc: 0.8928
Epoch 15/25
- 2s - loss: 0.3241 - acc: 0.9199 - val_loss: 0.4096 - val_acc: 0.8806
Epoch 16/25
- 2s - loss: 0.2881 - acc: 0.9283 - val_loss: 0.3993 - val_acc: 0.8829
Epoch 17/25
- 2s - loss: 0.2935 - acc: 0.9283 - val_loss: 0.4347 - val_acc: 0.8768
Epoch 18/25
- 2s - loss: 0.2857 - acc: 0.9274 - val_loss: 0.4402 - val_acc: 0.8768
Epoch 19/25
- 2s - loss: 0.3183 - acc: 0.9218 - val_loss: 0.3732 - val_acc: 0.8863
Epoch 20/25
- 2s - loss: 0.2959 - acc: 0.9278 - val_loss: 0.3438 - val_acc: 0.9002
Epoch 21/25
- 2s - loss: 0.3066 - acc: 0.9229 - val_loss: 0.3859 - val_acc: 0.8853
Epoch 22/25
- 2s - loss: 0.2850 - acc: 0.9272 - val_loss: 0.3951 - val_acc: 0.8795
Epoch 23/25
- 2s - loss: 0.2920 - acc: 0.9259 - val_loss: 0.3742 - val_acc: 0.8809
Epoch 24/25
- 2s - loss: 0.2962 - acc: 0.9242 - val_loss: 0.4072 - val_acc: 0.8738
Epoch 25/25
- 2s - loss: 0.2963 - acc: 0.9249 - val_loss: 0.4095 - val_acc: 0.8761
Train accuracy 0.9345756256152289 Test accuracy: 0.8761452324397693

```

Layer (type)	Output Shape	Param #
conv1d_39 (Conv1D)	(None, 124, 28)	1288
conv1d_40 (Conv1D)	(None, 122, 32)	2720
dropout_20 (Dropout)	(None, 122, 32)	0
max_pooling1d_20 (MaxPooling)	(None, 40, 32)	0
flatten_20 (Flatten)	(None, 1280)	0
dense_39 (Dense)	(None, 64)	81984
dense_40 (Dense)	(None, 6)	390

```

Total params: 86,382
Trainable params: 86,382
Non-trainable params: 0

```

```

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
  - 3s - loss: 22.7968 - acc: 0.7855 - val_loss: 4.4245 - val_acc: 0.8269
Epoch 2/35
  - 2s - loss: 1.5498 - acc: 0.9135 - val_loss: 0.7672 - val_acc: 0.8829
Epoch 3/35
  - 2s - loss: 0.4640 - acc: 0.9123 - val_loss: 0.6182 - val_acc: 0.8836
Epoch 4/35
  - 2s - loss: 0.3827 - acc: 0.9218 - val_loss: 0.5272 - val_acc: 0.8734
Epoch 5/35
  - 2s - loss: 0.3322 - acc: 0.9304 - val_loss: 0.4792 - val_acc: 0.8982
Epoch 6/35
  - 2s - loss: 0.3333 - acc: 0.9245 - val_loss: 0.4604 - val_acc: 0.8867
Epoch 7/35
  - 2s - loss: 0.2905 - acc: 0.9358 - val_loss: 0.4597 - val_acc: 0.8795
Epoch 8/35
  - 2s - loss: 0.3223 - acc: 0.9245 - val_loss: 0.4677 - val_acc: 0.8958
Epoch 9/35
  - 2s - loss: 0.3260 - acc: 0.9217 - val_loss: 0.4409 - val_acc: 0.8928
Epoch 10/35
  - 2s - loss: 0.2870 - acc: 0.9350 - val_loss: 0.4316 - val_acc: 0.8775
Epoch 11/35
  - 2s - loss: 0.2716 - acc: 0.9347 - val_loss: 0.3952 - val_acc: 0.9040
Epoch 12/35
  - 2s - loss: 0.2982 - acc: 0.9274 - val_loss: 0.4363 - val_acc: 0.8904
Epoch 13/35
  - 2s - loss: 0.2594 - acc: 0.9362 - val_loss: 0.3815 - val_acc: 0.9006
Epoch 14/35
  - 2s - loss: 0.2630 - acc: 0.9369 - val_loss: 0.4391 - val_acc: 0.8802
Epoch 15/35
  - 2s - loss: 0.2667 - acc: 0.9340 - val_loss: 0.4025 - val_acc: 0.8968
Epoch 16/35
  - 2s - loss: 0.2682 - acc: 0.9312 - val_loss: 0.3907 - val_acc: 0.8884
Epoch 17/35
  - 2s - loss: 0.2627 - acc: 0.9323 - val_loss: 0.4910 - val_acc: 0.8660
Epoch 18/35
  - 2s - loss: 0.2572 - acc: 0.9363 - val_loss: 0.4170 - val_acc: 0.8921
Epoch 19/35
  - 2s - loss: 0.2512 - acc: 0.9350 - val_loss: 0.4513 - val_acc: 0.8819
Epoch 20/35
  - 2s - loss: 0.2498 - acc: 0.9372 - val_loss: 0.3645 - val_acc: 0.8877
Epoch 21/35
  - 2s - loss: 0.2725 - acc: 0.9328 - val_loss: 0.4023 - val_acc: 0.8694
Epoch 22/35
  - 2s - loss: 0.2370 - acc: 0.9418 - val_loss: 0.3780 - val_acc: 0.8907
Epoch 23/35

```

```

- 2s - loss: 0.2295 - acc: 0.9403 - val_loss: 0.3392 - val_acc: 0.8914
Epoch 24/35
- 2s - loss: 0.2422 - acc: 0.9369 - val_loss: 0.3856 - val_acc: 0.8985
Epoch 25/35
- 2s - loss: 0.2517 - acc: 0.9368 - val_loss: 0.3717 - val_acc: 0.8938
Epoch 26/35
- 2s - loss: 0.2607 - acc: 0.9343 - val_loss: 0.3326 - val_acc: 0.9050
Epoch 27/35
- 2s - loss: 0.2248 - acc: 0.9430 - val_loss: 0.3536 - val_acc: 0.9006
Epoch 28/35
- 2s - loss: 0.2193 - acc: 0.9433 - val_loss: 0.3477 - val_acc: 0.8914
Epoch 29/35
- 2s - loss: 0.2229 - acc: 0.9396 - val_loss: 0.3520 - val_acc: 0.8965
Epoch 30/35
- 2s - loss: 0.2261 - acc: 0.9402 - val_loss: 0.3448 - val_acc: 0.9030
Epoch 31/35
- 2s - loss: 0.2981 - acc: 0.9268 - val_loss: 0.3279 - val_acc: 0.9067
Epoch 32/35
- 2s - loss: 0.2337 - acc: 0.9366 - val_loss: 0.4004 - val_acc: 0.8853
Epoch 33/35
- 2s - loss: 0.2216 - acc: 0.9389 - val_loss: 0.3564 - val_acc: 0.8921
Epoch 34/35
- 2s - loss: 0.2160 - acc: 0.9404 - val_loss: 0.3425 - val_acc: 0.9002
Epoch 35/35
- 2s - loss: 0.2206 - acc: 0.9388 - val_loss: 0.4076 - val_acc: 0.8714
Train accuracy 0.9360718171926007 Test accuracy: 0.8713946386155412

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_41 (Conv1D)           (None, 124, 28)          1288
-----
conv1d_42 (Conv1D)           (None, 118, 16)          3152
-----
dropout_21 (Dropout)         (None, 118, 16)          0
-----
max_pooling1d_21 (MaxPooling (None, 39, 16)          0
-----
flatten_21 (Flatten)         (None, 624)              0
-----
dense_41 (Dense)             (None, 32)               20000
-----
dense_42 (Dense)             (None, 6)                198
=====
Total params: 24,638
Trainable params: 24,638
Non-trainable params: 0
-----

```

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 3s - loss: 24.7607 - acc: 0.6374 - val\_loss: 12.1744 - val\_acc: 0.6956

Epoch 2/25

- 1s - loss: 6.9210 - acc: 0.8572 - val\_loss: 3.8338 - val\_acc: 0.8571

Epoch 3/25

- 1s - loss: 2.1890 - acc: 0.8977 - val\_loss: 1.5053 - val\_acc: 0.8541

Epoch 4/25

- 1s - loss: 0.8775 - acc: 0.9068 - val\_loss: 0.8604 - val\_acc: 0.8721

Epoch 5/25

- 2s - loss: 0.5256 - acc: 0.9143 - val\_loss: 0.7066 - val\_acc: 0.8751

Epoch 6/25

- 1s - loss: 0.4235 - acc: 0.9238 - val\_loss: 0.6280 - val\_acc: 0.8809

Epoch 7/25

- 1s - loss: 0.3802 - acc: 0.9272 - val\_loss: 0.5760 - val\_acc: 0.8931

Epoch 8/25

- 1s - loss: 0.3511 - acc: 0.9297 - val\_loss: 0.5842 - val\_acc: 0.8843

Epoch 9/25

- 1s - loss: 0.3254 - acc: 0.9347 - val\_loss: 0.5243 - val\_acc: 0.8999

Epoch 10/25

- 1s - loss: 0.3131 - acc: 0.9347 - val\_loss: 0.5206 - val\_acc: 0.8996

Epoch 11/25

- 1s - loss: 0.3041 - acc: 0.9372 - val\_loss: 0.5029 - val\_acc: 0.8748

Epoch 12/25

- 1s - loss: 0.2853 - acc: 0.9365 - val\_loss: 0.4875 - val\_acc: 0.9002

Epoch 13/25

- 1s - loss: 0.2826 - acc: 0.9391 - val\_loss: 0.4586 - val\_acc: 0.8951

Epoch 14/25

- 2s - loss: 0.2819 - acc: 0.9388 - val\_loss: 0.4434 - val\_acc: 0.9074

Epoch 15/25

- 1s - loss: 0.2633 - acc: 0.9414 - val\_loss: 0.4804 - val\_acc: 0.8646

Epoch 16/25

- 1s - loss: 0.2555 - acc: 0.9411 - val\_loss: 0.4194 - val\_acc: 0.9121

Epoch 17/25

- 1s - loss: 0.2678 - acc: 0.9351 - val\_loss: 0.4557 - val\_acc: 0.9002

Epoch 18/25

- 1s - loss: 0.2576 - acc: 0.9407 - val\_loss: 0.4430 - val\_acc: 0.8955

Epoch 19/25

- 1s - loss: 0.2494 - acc: 0.9395 - val\_loss: 0.4019 - val\_acc: 0.8907

Epoch 20/25

- 1s - loss: 0.2348 - acc: 0.9437 - val\_loss: 0.4034 - val\_acc: 0.8968

Epoch 21/25

- 1s - loss: 0.2536 - acc: 0.9339 - val\_loss: 0.4443 - val\_acc: 0.8907

Epoch 22/25

- 1s - loss: 0.2338 - acc: 0.9441 - val\_loss: 0.3991 - val\_acc: 0.8863

Epoch 23/25

- 1s - loss: 0.2265 - acc: 0.9453 - val\_loss: 0.3730 - val\_acc: 0.9050

Epoch 24/25  
 - 1s - loss: 0.2398 - acc: 0.9402 - val\_loss: 0.3804 - val\_acc: 0.9006  
 Epoch 25/25  
 - 1s - loss: 0.2188 - acc: 0.9445 - val\_loss: 0.3689 - val\_acc: 0.8955  
 Train accuracy 0.9522578890097932 Test accuracy: 0.8954869358669834

---

Layer (type)	Output Shape	Param #
=====		
conv1d_43 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_44 (Conv1D)	(None, 118, 16)	3600
-----		
dropout_22 (Dropout)	(None, 118, 16)	0
-----		
max_pooling1d_22 (MaxPooling)	(None, 39, 16)	0
-----		
flatten_22 (Flatten)	(None, 624)	0
-----		
dense_43 (Dense)	(None, 32)	20000
-----		
dense_44 (Dense)	(None, 6)	198
=====		

Total params: 25,270  
 Trainable params: 25,270  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 4s - loss: 15.8332 - acc: 0.6967 - val\_loss: 3.0233 - val\_acc: 0.7564  
 Epoch 2/30  
 - 3s - loss: 1.1858 - acc: 0.8777 - val\_loss: 0.8561 - val\_acc: 0.8463  
 Epoch 3/30  
 - 3s - loss: 0.5198 - acc: 0.8874 - val\_loss: 0.7322 - val\_acc: 0.8436  
 Epoch 4/30  
 - 3s - loss: 0.4474 - acc: 0.8984 - val\_loss: 0.6273 - val\_acc: 0.8734  
 Epoch 5/30  
 - 3s - loss: 0.4041 - acc: 0.9036 - val\_loss: 0.6474 - val\_acc: 0.8395  
 Epoch 6/30  
 - 3s - loss: 0.3901 - acc: 0.9081 - val\_loss: 0.7020 - val\_acc: 0.8012  
 Epoch 7/30  
 - 3s - loss: 0.3900 - acc: 0.9000 - val\_loss: 0.5868 - val\_acc: 0.8734  
 Epoch 8/30  
 - 3s - loss: 0.3681 - acc: 0.9085 - val\_loss: 0.5896 - val\_acc: 0.8504  
 Epoch 9/30  
 - 3s - loss: 0.3471 - acc: 0.9119 - val\_loss: 0.5298 - val\_acc: 0.8744  
 Epoch 10/30

```

- 3s - loss: 0.3462 - acc: 0.9129 - val_loss: 0.5315 - val_acc: 0.8809
Epoch 11/30
- 3s - loss: 0.3257 - acc: 0.9173 - val_loss: 0.5010 - val_acc: 0.8748
Epoch 12/30
- 3s - loss: 0.3464 - acc: 0.9076 - val_loss: 0.5478 - val_acc: 0.8772
Epoch 13/30
- 3s - loss: 0.3178 - acc: 0.9162 - val_loss: 0.5697 - val_acc: 0.8666
Epoch 14/30
- 3s - loss: 0.3070 - acc: 0.9207 - val_loss: 0.4851 - val_acc: 0.8880
Epoch 15/30
- 3s - loss: 0.3045 - acc: 0.9226 - val_loss: 0.5191 - val_acc: 0.8812
Epoch 16/30
- 3s - loss: 0.3009 - acc: 0.9199 - val_loss: 0.4661 - val_acc: 0.8958
Epoch 17/30
- 2s - loss: 0.2988 - acc: 0.9217 - val_loss: 0.5313 - val_acc: 0.8317
Epoch 18/30
- 3s - loss: 0.3013 - acc: 0.9206 - val_loss: 0.4925 - val_acc: 0.8853
Epoch 19/30
- 3s - loss: 0.2734 - acc: 0.9314 - val_loss: 0.4544 - val_acc: 0.8738
Epoch 20/30
- 3s - loss: 0.2791 - acc: 0.9259 - val_loss: 0.4652 - val_acc: 0.8755
Epoch 21/30
- 3s - loss: 0.2842 - acc: 0.9237 - val_loss: 0.4821 - val_acc: 0.8823
Epoch 22/30
- 3s - loss: 0.2662 - acc: 0.9272 - val_loss: 0.4415 - val_acc: 0.8924
Epoch 23/30
- 2s - loss: 0.2693 - acc: 0.9289 - val_loss: 0.4626 - val_acc: 0.8758
Epoch 24/30
- 2s - loss: 0.2812 - acc: 0.9255 - val_loss: 0.4210 - val_acc: 0.8904
Epoch 25/30
- 3s - loss: 0.2672 - acc: 0.9276 - val_loss: 0.4201 - val_acc: 0.8816
Epoch 26/30
- 3s - loss: 0.2574 - acc: 0.9291 - val_loss: 0.4177 - val_acc: 0.8962
Epoch 27/30
- 2s - loss: 0.2570 - acc: 0.9323 - val_loss: 0.4297 - val_acc: 0.8918
Epoch 28/30
- 2s - loss: 0.2668 - acc: 0.9293 - val_loss: 0.4282 - val_acc: 0.8839
Epoch 29/30
- 2s - loss: 0.2485 - acc: 0.9365 - val_loss: 0.4765 - val_acc: 0.8480
Epoch 30/30
- 3s - loss: 0.2482 - acc: 0.9366 - val_loss: 0.4277 - val_acc: 0.8945
Train accuracy 0.9328073993471164 Test accuracy: 0.8944689514760774

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_45 (Conv1D)          (None, 124, 28)            1288
-----

```



conv1d_46 (Conv1D)	(None, 118, 16)	3152
-----		
dropout_23 (Dropout)	(None, 118, 16)	0
-----		
max_pooling1d_23 (MaxPooling)	(None, 39, 16)	0
-----		
flatten_23 (Flatten)	(None, 624)	0
-----		
dense_45 (Dense)	(None, 32)	20000
-----		
dense_46 (Dense)	(None, 6)	198
=====		
Total params: 24,638		
Trainable params: 24,638		
Non-trainable params: 0		
-----		
None		
Train on 7352 samples, validate on 2947 samples		
Epoch 1/25		
- 4s - loss: 24.4915 - acc: 0.7338 - val_loss: 9.6958 - val_acc: 0.8449		
Epoch 2/25		
- 2s - loss: 4.6933 - acc: 0.9143 - val_loss: 2.2316 - val_acc: 0.8833		
Epoch 3/25		
- 2s - loss: 1.1098 - acc: 0.9204 - val_loss: 0.8986 - val_acc: 0.8836		
Epoch 4/25		
- 2s - loss: 0.5101 - acc: 0.9234 - val_loss: 0.6771 - val_acc: 0.8561		
Epoch 5/25		
- 2s - loss: 0.4005 - acc: 0.9267 - val_loss: 0.6104 - val_acc: 0.8819		
Epoch 6/25		
- 2s - loss: 0.3578 - acc: 0.9308 - val_loss: 0.5528 - val_acc: 0.8856		
Epoch 7/25		
- 2s - loss: 0.3387 - acc: 0.9286 - val_loss: 0.5336 - val_acc: 0.8945		
Epoch 8/25		
- 2s - loss: 0.3173 - acc: 0.9353 - val_loss: 0.5215 - val_acc: 0.8894		
Epoch 9/25		
- 2s - loss: 0.3061 - acc: 0.9324 - val_loss: 0.4767 - val_acc: 0.8904		
Epoch 10/25		
- 2s - loss: 0.2883 - acc: 0.9358 - val_loss: 0.5144 - val_acc: 0.8636		
Epoch 11/25		
- 2s - loss: 0.2748 - acc: 0.9380 - val_loss: 0.4526 - val_acc: 0.8894		
Epoch 12/25		
- 2s - loss: 0.2865 - acc: 0.9339 - val_loss: 0.4260 - val_acc: 0.9063		
Epoch 13/25		
- 2s - loss: 0.2607 - acc: 0.9392 - val_loss: 0.4267 - val_acc: 0.8924		
Epoch 14/25		
- 2s - loss: 0.2623 - acc: 0.9382 - val_loss: 0.4755 - val_acc: 0.8636		
Epoch 15/25		
- 2s - loss: 0.2596 - acc: 0.9357 - val_loss: 0.4522 - val_acc: 0.8938		

```

Epoch 16/25
  - 2s - loss: 0.2403 - acc: 0.9438 - val_loss: 0.3898 - val_acc: 0.9026
Epoch 17/25
  - 2s - loss: 0.2386 - acc: 0.9421 - val_loss: 0.3915 - val_acc: 0.8982
Epoch 18/25
  - 2s - loss: 0.2358 - acc: 0.9399 - val_loss: 0.4083 - val_acc: 0.8863
Epoch 19/25
  - 2s - loss: 0.2376 - acc: 0.9389 - val_loss: 0.4044 - val_acc: 0.8867
Epoch 20/25
  - 2s - loss: 0.2339 - acc: 0.9388 - val_loss: 0.3960 - val_acc: 0.8962
Epoch 21/25
  - 2s - loss: 0.2294 - acc: 0.9403 - val_loss: 0.3983 - val_acc: 0.8907
Epoch 22/25
  - 2s - loss: 0.2353 - acc: 0.9402 - val_loss: 0.3883 - val_acc: 0.8965
Epoch 23/25
  - 2s - loss: 0.2266 - acc: 0.9412 - val_loss: 0.3833 - val_acc: 0.9002
Epoch 24/25
  - 2s - loss: 0.2281 - acc: 0.9362 - val_loss: 0.3575 - val_acc: 0.9060
Epoch 25/25
  - 2s - loss: 0.2098 - acc: 0.9444 - val_loss: 0.3773 - val_acc: 0.9087
Train accuracy 0.9468171926006529 Test accuracy: 0.9087207329487614
-----

```

Layer (type)	Output Shape	Param #
conv1d_47 (Conv1D)	(None, 124, 32)	1472
conv1d_48 (Conv1D)	(None, 118, 24)	5400
dropout_24 (Dropout)	(None, 118, 24)	0
max_pooling1d_24 (MaxPooling)	(None, 39, 24)	0
flatten_24 (Flatten)	(None, 936)	0
dense_47 (Dense)	(None, 32)	29984
dense_48 (Dense)	(None, 6)	198

```

=====
Total params: 37,054
Trainable params: 37,054
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 6s - loss: 30.7482 - acc: 0.6945 - val_loss: 12.6757 - val_acc: 0.7723
Epoch 2/25

```

```

- 4s - loss: 6.4228 - acc: 0.8815 - val_loss: 3.1017 - val_acc: 0.8789
Epoch 3/25
- 4s - loss: 1.5814 - acc: 0.9102 - val_loss: 1.1832 - val_acc: 0.8415
Epoch 4/25
- 4s - loss: 0.6271 - acc: 0.9207 - val_loss: 0.7677 - val_acc: 0.8867
Epoch 5/25
- 4s - loss: 0.4378 - acc: 0.9266 - val_loss: 0.6758 - val_acc: 0.8921
Epoch 6/25
- 4s - loss: 0.3849 - acc: 0.9309 - val_loss: 0.6361 - val_acc: 0.8884
Epoch 7/25
- 4s - loss: 0.3529 - acc: 0.9342 - val_loss: 0.6003 - val_acc: 0.8951
Epoch 8/25
- 4s - loss: 0.3389 - acc: 0.9325 - val_loss: 0.5626 - val_acc: 0.8962
Epoch 9/25
- 4s - loss: 0.3227 - acc: 0.9331 - val_loss: 0.5471 - val_acc: 0.8894
Epoch 10/25
- 4s - loss: 0.3194 - acc: 0.9285 - val_loss: 0.5725 - val_acc: 0.8802
Epoch 11/25
- 4s - loss: 0.2970 - acc: 0.9412 - val_loss: 0.5044 - val_acc: 0.8877
Epoch 12/25
- 4s - loss: 0.2911 - acc: 0.9347 - val_loss: 0.4854 - val_acc: 0.9084
Epoch 13/25
- 4s - loss: 0.2934 - acc: 0.9339 - val_loss: 0.5101 - val_acc: 0.8870
Epoch 14/25
- 4s - loss: 0.2692 - acc: 0.9387 - val_loss: 0.4758 - val_acc: 0.8979
Epoch 15/25
- 4s - loss: 0.2700 - acc: 0.9382 - val_loss: 0.4790 - val_acc: 0.8826
Epoch 16/25
- 4s - loss: 0.2651 - acc: 0.9372 - val_loss: 0.4938 - val_acc: 0.8812
Epoch 17/25
- 4s - loss: 0.2556 - acc: 0.9411 - val_loss: 0.4576 - val_acc: 0.8948
Epoch 18/25
- 4s - loss: 0.2394 - acc: 0.9453 - val_loss: 0.4682 - val_acc: 0.8795
Epoch 19/25
- 4s - loss: 0.2452 - acc: 0.9403 - val_loss: 0.4418 - val_acc: 0.8999
Epoch 20/25
- 4s - loss: 0.2370 - acc: 0.9433 - val_loss: 0.4561 - val_acc: 0.8751
Epoch 21/25
- 4s - loss: 0.2469 - acc: 0.9373 - val_loss: 0.4023 - val_acc: 0.9002
Epoch 22/25
- 4s - loss: 0.2356 - acc: 0.9395 - val_loss: 0.4127 - val_acc: 0.9053
Epoch 23/25
- 4s - loss: 0.2262 - acc: 0.9427 - val_loss: 0.3983 - val_acc: 0.8999
Epoch 24/25
- 4s - loss: 0.2254 - acc: 0.9403 - val_loss: 0.4087 - val_acc: 0.9026
Epoch 25/25
- 4s - loss: 0.2124 - acc: 0.9476 - val_loss: 0.4039 - val_acc: 0.9019
Train accuracy 0.9514417845484222 Test accuracy: 0.9019341703427214

```

---

Layer (type)	Output Shape	Param #
conv1d_49 (Conv1D)	(None, 124, 28)	1288
conv1d_50 (Conv1D)	(None, 118, 16)	3152
dropout_25 (Dropout)	(None, 118, 16)	0
max_pooling1d_25 (MaxPooling)	(None, 39, 16)	0
flatten_25 (Flatten)	(None, 624)	0
dense_49 (Dense)	(None, 32)	20000
dense_50 (Dense)	(None, 6)	198

---

Total params: 24,638  
Trainable params: 24,638  
Non-trainable params: 0

---

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 4s - loss: 8.6196 - acc: 0.7390 - val\_loss: 3.7160 - val\_acc: 0.8921

Epoch 2/25

- 2s - loss: 1.9125 - acc: 0.9249 - val\_loss: 1.1556 - val\_acc: 0.8958

Epoch 3/25

- 2s - loss: 0.6494 - acc: 0.9402 - val\_loss: 0.6623 - val\_acc: 0.9023

Epoch 4/25

- 2s - loss: 0.3987 - acc: 0.9402 - val\_loss: 0.5116 - val\_acc: 0.8975

Epoch 5/25

- 2s - loss: 0.3087 - acc: 0.9438 - val\_loss: 0.4542 - val\_acc: 0.8938

Epoch 6/25

- 2s - loss: 0.2733 - acc: 0.9429 - val\_loss: 0.4127 - val\_acc: 0.9040

Epoch 7/25

- 2s - loss: 0.2379 - acc: 0.9464 - val\_loss: 0.4030 - val\_acc: 0.9091

Epoch 8/25

- 2s - loss: 0.2217 - acc: 0.9467 - val\_loss: 0.3690 - val\_acc: 0.9074

Epoch 9/25

- 2s - loss: 0.2187 - acc: 0.9442 - val\_loss: 0.3577 - val\_acc: 0.9148

Epoch 10/25

- 2s - loss: 0.2041 - acc: 0.9489 - val\_loss: 0.3870 - val\_acc: 0.8941

Epoch 11/25

- 2s - loss: 0.1949 - acc: 0.9483 - val\_loss: 0.3585 - val\_acc: 0.8935

Epoch 12/25

- 2s - loss: 0.1828 - acc: 0.9489 - val\_loss: 0.3670 - val\_acc: 0.8982

```

Epoch 13/25
- 2s - loss: 0.2030 - acc: 0.9438 - val_loss: 0.3187 - val_acc: 0.9158
Epoch 14/25
- 2s - loss: 0.1789 - acc: 0.9501 - val_loss: 0.3459 - val_acc: 0.8999
Epoch 15/25
- 2s - loss: 0.1884 - acc: 0.9465 - val_loss: 0.3262 - val_acc: 0.9077
Epoch 16/25
- 2s - loss: 0.1741 - acc: 0.9499 - val_loss: 0.4076 - val_acc: 0.8697
Epoch 17/25
- 2s - loss: 0.1801 - acc: 0.9476 - val_loss: 0.3142 - val_acc: 0.9063
Epoch 18/25
- 2s - loss: 0.1716 - acc: 0.9508 - val_loss: 0.3178 - val_acc: 0.9033
Epoch 19/25
- 2s - loss: 0.1648 - acc: 0.9527 - val_loss: 0.3241 - val_acc: 0.8945
Epoch 20/25
- 2s - loss: 0.1716 - acc: 0.9498 - val_loss: 0.3180 - val_acc: 0.9128
Epoch 21/25
- 2s - loss: 0.1664 - acc: 0.9505 - val_loss: 0.3195 - val_acc: 0.8911
Epoch 22/25
- 2s - loss: 0.1597 - acc: 0.9521 - val_loss: 0.3119 - val_acc: 0.8968
Epoch 23/25
- 2s - loss: 0.1578 - acc: 0.9502 - val_loss: 0.3099 - val_acc: 0.8958
Epoch 24/25
- 2s - loss: 0.1659 - acc: 0.9482 - val_loss: 0.2908 - val_acc: 0.9033
Epoch 25/25
- 2s - loss: 0.1596 - acc: 0.9518 - val_loss: 0.3146 - val_acc: 0.8935
Train accuracy 0.9575625680087051 Test accuracy: 0.8934509670851714

```

Layer (type)	Output Shape	Param #
conv1d_51 (Conv1D)	(None, 124, 32)	1472
conv1d_52 (Conv1D)	(None, 118, 24)	5400
dropout_26 (Dropout)	(None, 118, 24)	0
max_pooling1d_26 (MaxPooling)	(None, 39, 24)	0
flatten_26 (Flatten)	(None, 936)	0
dense_51 (Dense)	(None, 32)	29984
dense_52 (Dense)	(None, 6)	198

```

Total params: 37,054
Trainable params: 37,054
Non-trainable params: 0

```

```

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 5s - loss: 8.2183 - acc: 0.7568 - val_loss: 1.5245 - val_acc: 0.8459
Epoch 2/25
  - 4s - loss: 0.6555 - acc: 0.9153 - val_loss: 0.6685 - val_acc: 0.8860
Epoch 3/25
  - 4s - loss: 0.3905 - acc: 0.9204 - val_loss: 0.5843 - val_acc: 0.8666
Epoch 4/25
  - 4s - loss: 0.3311 - acc: 0.9283 - val_loss: 0.5501 - val_acc: 0.8799
Epoch 5/25
  - 4s - loss: 0.3065 - acc: 0.9280 - val_loss: 0.5932 - val_acc: 0.8005
Epoch 6/25
  - 4s - loss: 0.2766 - acc: 0.9357 - val_loss: 0.4405 - val_acc: 0.8890
Epoch 7/25
  - 4s - loss: 0.2612 - acc: 0.9365 - val_loss: 0.4637 - val_acc: 0.8731
Epoch 8/25
  - 4s - loss: 0.2752 - acc: 0.9316 - val_loss: 0.4310 - val_acc: 0.8894
Epoch 9/25
  - 4s - loss: 0.2395 - acc: 0.9377 - val_loss: 0.4556 - val_acc: 0.8714
Epoch 10/25
  - 4s - loss: 0.2419 - acc: 0.9385 - val_loss: 0.6264 - val_acc: 0.8137
Epoch 11/25
  - 4s - loss: 0.2520 - acc: 0.9359 - val_loss: 0.3904 - val_acc: 0.9033
Epoch 12/25
  - 4s - loss: 0.2366 - acc: 0.9422 - val_loss: 0.3757 - val_acc: 0.9016
Epoch 13/25
  - 4s - loss: 0.2257 - acc: 0.9410 - val_loss: 0.4105 - val_acc: 0.8911
Epoch 14/25
  - 4s - loss: 0.2392 - acc: 0.9376 - val_loss: 0.3785 - val_acc: 0.8826
Epoch 15/25
  - 4s - loss: 0.2316 - acc: 0.9381 - val_loss: 0.4930 - val_acc: 0.8761
Epoch 16/25
  - 4s - loss: 0.2187 - acc: 0.9445 - val_loss: 0.3751 - val_acc: 0.8904
Epoch 17/25
  - 4s - loss: 0.2327 - acc: 0.9397 - val_loss: 0.4270 - val_acc: 0.8894
Epoch 18/25
  - 4s - loss: 0.2185 - acc: 0.9434 - val_loss: 0.3625 - val_acc: 0.9043
Epoch 19/25
  - 4s - loss: 0.2102 - acc: 0.9448 - val_loss: 0.3493 - val_acc: 0.8979
Epoch 20/25
  - 4s - loss: 0.2091 - acc: 0.9461 - val_loss: 0.3420 - val_acc: 0.9019
Epoch 21/25
  - 4s - loss: 0.1945 - acc: 0.9480 - val_loss: 0.4161 - val_acc: 0.8616
Epoch 22/25
  - 4s - loss: 0.2100 - acc: 0.9427 - val_loss: 0.3706 - val_acc: 0.8897
Epoch 23/25

```

```

- 4s - loss: 0.2017 - acc: 0.9438 - val_loss: 0.4271 - val_acc: 0.8853
Epoch 24/25
- 4s - loss: 0.2043 - acc: 0.9440 - val_loss: 0.3463 - val_acc: 0.8968
Epoch 25/25
- 4s - loss: 0.2002 - acc: 0.9445 - val_loss: 0.4215 - val_acc: 0.8907
Train accuracy 0.9416485309471114 Test accuracy: 0.8907363420427553

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_53 (Conv1D)	(None, 124, 28)	1288
-----		
conv1d_54 (Conv1D)	(None, 118, 16)	3152
-----		
dropout_27 (Dropout)	(None, 118, 16)	0
-----		
max_pooling1d_27 (MaxPooling)	(None, 39, 16)	0
-----		
flatten_27 (Flatten)	(None, 624)	0
-----		
dense_53 (Dense)	(None, 32)	20000
-----		
dense_54 (Dense)	(None, 6)	198
=====		

```

Total params: 24,638
Trainable params: 24,638
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 4s - loss: 21.1995 - acc: 0.7001 - val_loss: 10.0623 - val_acc: 0.8171
Epoch 2/25
- 2s - loss: 5.2907 - acc: 0.9090 - val_loss: 2.7035 - val_acc: 0.8785
Epoch 3/25
- 2s - loss: 1.3800 - acc: 0.9195 - val_loss: 1.0836 - val_acc: 0.8728
Epoch 4/25
- 2s - loss: 0.5472 - acc: 0.9278 - val_loss: 0.7491 - val_acc: 0.8670
Epoch 5/25
- 2s - loss: 0.3920 - acc: 0.9264 - val_loss: 0.6373 - val_acc: 0.8816
Epoch 6/25
- 2s - loss: 0.3393 - acc: 0.9320 - val_loss: 0.5626 - val_acc: 0.8907
Epoch 7/25
- 2s - loss: 0.3163 - acc: 0.9339 - val_loss: 0.5400 - val_acc: 0.8999
Epoch 8/25
- 2s - loss: 0.2926 - acc: 0.9351 - val_loss: 0.5653 - val_acc: 0.8717
Epoch 9/25
- 2s - loss: 0.2879 - acc: 0.9351 - val_loss: 0.4906 - val_acc: 0.8802

```

```

Epoch 10/25
- 2s - loss: 0.2761 - acc: 0.9351 - val_loss: 0.5171 - val_acc: 0.8870
Epoch 11/25
- 2s - loss: 0.2649 - acc: 0.9373 - val_loss: 0.5018 - val_acc: 0.8724
Epoch 12/25
- 2s - loss: 0.2614 - acc: 0.9359 - val_loss: 0.4748 - val_acc: 0.8731
Epoch 13/25
- 2s - loss: 0.2491 - acc: 0.9402 - val_loss: 0.4643 - val_acc: 0.8945
Epoch 14/25
- 2s - loss: 0.2494 - acc: 0.9396 - val_loss: 0.4874 - val_acc: 0.8765
Epoch 15/25
- 2s - loss: 0.2330 - acc: 0.9440 - val_loss: 0.4579 - val_acc: 0.9036
Epoch 16/25
- 2s - loss: 0.2394 - acc: 0.9393 - val_loss: 0.4404 - val_acc: 0.8897
Epoch 17/25
- 2s - loss: 0.2232 - acc: 0.9448 - val_loss: 0.4375 - val_acc: 0.8931
Epoch 18/25
- 2s - loss: 0.2202 - acc: 0.9436 - val_loss: 0.4440 - val_acc: 0.8833
Epoch 19/25
- 2s - loss: 0.2301 - acc: 0.9393 - val_loss: 0.4260 - val_acc: 0.9053
Epoch 20/25
- 2s - loss: 0.2273 - acc: 0.9399 - val_loss: 0.4500 - val_acc: 0.9033
Epoch 21/25
- 2s - loss: 0.2151 - acc: 0.9422 - val_loss: 0.4379 - val_acc: 0.8816
Epoch 22/25
- 2s - loss: 0.2092 - acc: 0.9464 - val_loss: 0.4113 - val_acc: 0.8972
Epoch 23/25
- 2s - loss: 0.2051 - acc: 0.9448 - val_loss: 0.3817 - val_acc: 0.8989
Epoch 24/25
- 2s - loss: 0.2300 - acc: 0.9369 - val_loss: 0.4581 - val_acc: 0.8904
Epoch 25/25
- 2s - loss: 0.2039 - acc: 0.9455 - val_loss: 0.4044 - val_acc: 0.8853
Train accuracy 0.9494015233949945 Test accuracy: 0.8853070919579233

```

Layer (type)	Output Shape	Param #
conv1d_55 (Conv1D)	(None, 124, 32)	1472
conv1d_56 (Conv1D)	(None, 120, 16)	2576
dropout_28 (Dropout)	(None, 120, 16)	0
max_pooling1d_28 (MaxPooling)	(None, 40, 16)	0
flatten_28 (Flatten)	(None, 640)	0
dense_55 (Dense)	(None, 32)	20512



```

-----
dense_56 (Dense)                (None, 6)                198
=====
Total params: 24,758
Trainable params: 24,758
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 4s - loss: 20.9253 - acc: 0.7541 - val_loss: 1.3615 - val_acc: 0.8137
Epoch 2/25
  - 3s - loss: 0.6803 - acc: 0.8592 - val_loss: 0.8534 - val_acc: 0.8263
Epoch 3/25
  - 3s - loss: 0.5249 - acc: 0.8800 - val_loss: 0.6695 - val_acc: 0.8463
Epoch 4/25
  - 3s - loss: 0.4987 - acc: 0.8794 - val_loss: 0.6479 - val_acc: 0.8721
Epoch 5/25
  - 2s - loss: 0.4581 - acc: 0.8832 - val_loss: 0.6530 - val_acc: 0.8280
Epoch 6/25
  - 3s - loss: 0.4513 - acc: 0.8852 - val_loss: 0.6092 - val_acc: 0.8765
Epoch 7/25
  - 3s - loss: 0.4057 - acc: 0.9044 - val_loss: 0.5580 - val_acc: 0.8619
Epoch 8/25
  - 3s - loss: 0.4046 - acc: 0.9015 - val_loss: 0.5896 - val_acc: 0.8527
Epoch 9/25
  - 3s - loss: 0.4048 - acc: 0.8999 - val_loss: 0.5836 - val_acc: 0.8629
Epoch 10/25
  - 3s - loss: 0.3715 - acc: 0.9117 - val_loss: 0.6280 - val_acc: 0.8174
Epoch 11/25
  - 3s - loss: 0.3650 - acc: 0.9104 - val_loss: 0.5921 - val_acc: 0.8449
Epoch 12/25
  - 3s - loss: 0.3500 - acc: 0.9138 - val_loss: 0.5282 - val_acc: 0.8636
Epoch 13/25
  - 3s - loss: 0.3516 - acc: 0.9105 - val_loss: 0.5432 - val_acc: 0.8680
Epoch 14/25
  - 3s - loss: 0.3617 - acc: 0.9134 - val_loss: 0.5011 - val_acc: 0.8687
Epoch 15/25
  - 2s - loss: 0.3414 - acc: 0.9129 - val_loss: 0.5325 - val_acc: 0.8768
Epoch 16/25
  - 3s - loss: 0.3380 - acc: 0.9142 - val_loss: 0.4699 - val_acc: 0.8775
Epoch 17/25
  - 3s - loss: 0.3194 - acc: 0.9214 - val_loss: 0.5342 - val_acc: 0.8453
Epoch 18/25
  - 3s - loss: 0.3163 - acc: 0.9211 - val_loss: 0.5421 - val_acc: 0.8368
Epoch 19/25
  - 2s - loss: 0.3047 - acc: 0.9230 - val_loss: 0.4552 - val_acc: 0.8761
Epoch 20/25

```

```

- 3s - loss: 0.3207 - acc: 0.9183 - val_loss: 0.4877 - val_acc: 0.8561
Epoch 21/25
- 3s - loss: 0.3187 - acc: 0.9187 - val_loss: 0.4502 - val_acc: 0.8714
Epoch 22/25
- 3s - loss: 0.3164 - acc: 0.9180 - val_loss: 0.4595 - val_acc: 0.8812
Epoch 23/25
- 3s - loss: 0.3084 - acc: 0.9211 - val_loss: 0.4473 - val_acc: 0.8772
Epoch 24/25
- 3s - loss: 0.2982 - acc: 0.9255 - val_loss: 0.4461 - val_acc: 0.8938
Epoch 25/25
- 3s - loss: 0.3228 - acc: 0.9177 - val_loss: 0.4827 - val_acc: 0.8656
Train accuracy 0.9287268770402611 Test accuracy: 0.8656260604004072
-----

```

Layer (type)	Output Shape	Param #
conv1d_57 (Conv1D)	(None, 124, 32)	1472
conv1d_58 (Conv1D)	(None, 118, 24)	5400
dropout_29 (Dropout)	(None, 118, 24)	0
max_pooling1d_29 (MaxPooling)	(None, 39, 24)	0
flatten_29 (Flatten)	(None, 936)	0
dense_57 (Dense)	(None, 32)	29984
dense_58 (Dense)	(None, 6)	198

```

=====
Total params: 37,054
Trainable params: 37,054
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 5s - loss: 15.8902 - acc: 0.7901 - val_loss: 1.5902 - val_acc: 0.8619
Epoch 2/25
- 4s - loss: 0.6730 - acc: 0.8917 - val_loss: 0.6986 - val_acc: 0.8599
Epoch 3/25
- 4s - loss: 0.4482 - acc: 0.8988 - val_loss: 0.6891 - val_acc: 0.8375
Epoch 4/25
- 4s - loss: 0.4055 - acc: 0.9061 - val_loss: 0.5604 - val_acc: 0.8792
Epoch 5/25
- 4s - loss: 0.3848 - acc: 0.9143 - val_loss: 0.5358 - val_acc: 0.8928
Epoch 6/25
- 4s - loss: 0.3572 - acc: 0.9187 - val_loss: 0.5392 - val_acc: 0.8846

```

```

Epoch 7/25
- 4s - loss: 0.3428 - acc: 0.9166 - val_loss: 0.5019 - val_acc: 0.8856
Epoch 8/25
- 4s - loss: 0.3173 - acc: 0.9268 - val_loss: 0.5586 - val_acc: 0.8361
Epoch 9/25
- 4s - loss: 0.3008 - acc: 0.9256 - val_loss: 0.5069 - val_acc: 0.8527
Epoch 10/25
- 4s - loss: 0.3155 - acc: 0.9222 - val_loss: 0.4887 - val_acc: 0.8826
Epoch 11/25
- 4s - loss: 0.3025 - acc: 0.9255 - val_loss: 0.4418 - val_acc: 0.8911
Epoch 12/25
- 4s - loss: 0.2945 - acc: 0.9276 - val_loss: 0.4566 - val_acc: 0.8782
Epoch 13/25
- 4s - loss: 0.2833 - acc: 0.9282 - val_loss: 0.4643 - val_acc: 0.8670
Epoch 14/25
- 4s - loss: 0.2811 - acc: 0.9268 - val_loss: 0.4348 - val_acc: 0.8785
Epoch 15/25
- 4s - loss: 0.2736 - acc: 0.9316 - val_loss: 0.5820 - val_acc: 0.8005
Epoch 16/25
- 4s - loss: 0.2745 - acc: 0.9300 - val_loss: 0.4390 - val_acc: 0.8867
Epoch 17/25
- 4s - loss: 0.2730 - acc: 0.9280 - val_loss: 0.4034 - val_acc: 0.8897
Epoch 18/25
- 4s - loss: 0.2631 - acc: 0.9329 - val_loss: 0.3644 - val_acc: 0.9006
Epoch 19/25
- 4s - loss: 0.2693 - acc: 0.9280 - val_loss: 0.4187 - val_acc: 0.8714
Epoch 20/25
- 4s - loss: 0.2544 - acc: 0.9338 - val_loss: 0.4191 - val_acc: 0.8744
Epoch 21/25
- 4s - loss: 0.2605 - acc: 0.9304 - val_loss: 0.3695 - val_acc: 0.9087
Epoch 22/25
- 4s - loss: 0.2488 - acc: 0.9366 - val_loss: 0.3962 - val_acc: 0.8751
Epoch 23/25
- 4s - loss: 0.2472 - acc: 0.9350 - val_loss: 0.3843 - val_acc: 0.8918
Epoch 24/25
- 4s - loss: 0.2666 - acc: 0.9301 - val_loss: 0.4031 - val_acc: 0.8731
Epoch 25/25
- 4s - loss: 0.2480 - acc: 0.9358 - val_loss: 0.3756 - val_acc: 0.8778
Train accuracy 0.9447769314472253 Test accuracy: 0.8778418730912793

```

---

Layer (type)	Output Shape	Param #
conv1d_59 (Conv1D)	(None, 124, 28)	1288
conv1d_60 (Conv1D)	(None, 118, 24)	4728
dropout_30 (Dropout)	(None, 118, 24)	0

---

```

-----
max_pooling1d_30 (MaxPooling (None, 39, 24))          0
-----
flatten_30 (Flatten)          (None, 936)          0
-----
dense_59 (Dense)              (None, 32)          29984
-----
dense_60 (Dense)              (None, 6)          198
=====
Total params: 36,198
Trainable params: 36,198
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 5s - loss: 9.9628 - acc: 0.7378 - val_loss: 0.9818 - val_acc: 0.8039
Epoch 2/25
  - 4s - loss: 0.5760 - acc: 0.8694 - val_loss: 0.7367 - val_acc: 0.8405
Epoch 3/25
  - 4s - loss: 0.4965 - acc: 0.8825 - val_loss: 0.8518 - val_acc: 0.7570
Epoch 4/25
  - 4s - loss: 0.4417 - acc: 0.8930 - val_loss: 0.8363 - val_acc: 0.7428
Epoch 5/25
  - 4s - loss: 0.4082 - acc: 0.9015 - val_loss: 0.6166 - val_acc: 0.8670
Epoch 6/25
  - 4s - loss: 0.4024 - acc: 0.8995 - val_loss: 0.6572 - val_acc: 0.8242
Epoch 7/25
  - 4s - loss: 0.3734 - acc: 0.9079 - val_loss: 0.6035 - val_acc: 0.8426
Epoch 8/25
  - 4s - loss: 0.3609 - acc: 0.9095 - val_loss: 0.5459 - val_acc: 0.8609
Epoch 9/25
  - 4s - loss: 0.3459 - acc: 0.9165 - val_loss: 0.5682 - val_acc: 0.8541
Epoch 10/25
  - 4s - loss: 0.3371 - acc: 0.9139 - val_loss: 0.5187 - val_acc: 0.8772
Epoch 11/25
  - 4s - loss: 0.3281 - acc: 0.9200 - val_loss: 0.5440 - val_acc: 0.8524
Epoch 12/25
  - 4s - loss: 0.3103 - acc: 0.9214 - val_loss: 0.5263 - val_acc: 0.8660
Epoch 13/25
  - 4s - loss: 0.3046 - acc: 0.9252 - val_loss: 0.4650 - val_acc: 0.8877
Epoch 14/25
  - 4s - loss: 0.2900 - acc: 0.9289 - val_loss: 0.5126 - val_acc: 0.8666
Epoch 15/25
  - 4s - loss: 0.2861 - acc: 0.9278 - val_loss: 0.4231 - val_acc: 0.8958
Epoch 16/25
  - 4s - loss: 0.2813 - acc: 0.9263 - val_loss: 0.5353 - val_acc: 0.8578
Epoch 17/25

```

```

- 4s - loss: 0.2700 - acc: 0.9306 - val_loss: 0.4654 - val_acc: 0.8721
Epoch 18/25
- 4s - loss: 0.2736 - acc: 0.9305 - val_loss: 0.4120 - val_acc: 0.8955
Epoch 19/25
- 4s - loss: 0.2544 - acc: 0.9359 - val_loss: 0.4773 - val_acc: 0.8724
Epoch 20/25
- 4s - loss: 0.2581 - acc: 0.9308 - val_loss: 0.4545 - val_acc: 0.8812
Epoch 21/25
- 4s - loss: 0.2573 - acc: 0.9329 - val_loss: 0.4221 - val_acc: 0.8948
Epoch 22/25
- 4s - loss: 0.2472 - acc: 0.9343 - val_loss: 0.4365 - val_acc: 0.8744
Epoch 23/25
- 4s - loss: 0.2446 - acc: 0.9338 - val_loss: 0.4151 - val_acc: 0.8819
Epoch 24/25
- 4s - loss: 0.2453 - acc: 0.9348 - val_loss: 0.4562 - val_acc: 0.8795
Epoch 25/25
- 4s - loss: 0.2536 - acc: 0.9321 - val_loss: 0.3726 - val_acc: 0.9033
Train accuracy 0.9440968443960827 Test accuracy: 0.9032914828639295

```

Layer (type)	Output Shape	Param #
conv1d_61 (Conv1D)	(None, 126, 32)	896
conv1d_62 (Conv1D)	(None, 120, 24)	5400
dropout_31 (Dropout)	(None, 120, 24)	0
max_pooling1d_31 (MaxPooling)	(None, 60, 24)	0
flatten_31 (Flatten)	(None, 1440)	0
dense_61 (Dense)	(None, 32)	46112
dense_62 (Dense)	(None, 6)	198

```

Total params: 52,606
Trainable params: 52,606
Non-trainable params: 0

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 5s - loss: 32.2143 - acc: 0.7006 - val_loss: 12.4195 - val_acc: 0.8276
Epoch 2/25
- 4s - loss: 6.3320 - acc: 0.8531 - val_loss: 2.9475 - val_acc: 0.8402
Epoch 3/25
- 4s - loss: 1.5363 - acc: 0.8766 - val_loss: 1.0293 - val_acc: 0.8327

```

```

Epoch 4/25
- 4s - loss: 0.6344 - acc: 0.8879 - val_loss: 0.7495 - val_acc: 0.7896
Epoch 5/25
- 4s - loss: 0.4675 - acc: 0.9006 - val_loss: 0.6167 - val_acc: 0.8585
Epoch 6/25
- 4s - loss: 0.4215 - acc: 0.9052 - val_loss: 0.5821 - val_acc: 0.8558
Epoch 7/25
- 4s - loss: 0.3993 - acc: 0.9055 - val_loss: 0.5463 - val_acc: 0.8748
Epoch 8/25
- 4s - loss: 0.3875 - acc: 0.9042 - val_loss: 0.5566 - val_acc: 0.8806
Epoch 9/25
- 4s - loss: 0.3564 - acc: 0.9143 - val_loss: 0.5258 - val_acc: 0.8663
Epoch 10/25
- 4s - loss: 0.3469 - acc: 0.9197 - val_loss: 0.4740 - val_acc: 0.9026
Epoch 11/25
- 4s - loss: 0.3377 - acc: 0.9176 - val_loss: 0.4737 - val_acc: 0.8816
Epoch 12/25
- 4s - loss: 0.3217 - acc: 0.9226 - val_loss: 0.4828 - val_acc: 0.8839
Epoch 13/25
- 4s - loss: 0.3227 - acc: 0.9212 - val_loss: 0.4552 - val_acc: 0.9006
Epoch 14/25
- 4s - loss: 0.3117 - acc: 0.9256 - val_loss: 0.4900 - val_acc: 0.8758
Epoch 15/25
- 4s - loss: 0.2957 - acc: 0.9286 - val_loss: 0.4653 - val_acc: 0.8890
Epoch 16/25
- 4s - loss: 0.2941 - acc: 0.9252 - val_loss: 0.4273 - val_acc: 0.8941
Epoch 17/25
- 3s - loss: 0.2900 - acc: 0.9291 - val_loss: 0.4684 - val_acc: 0.8602
Epoch 18/25
- 4s - loss: 0.2824 - acc: 0.9279 - val_loss: 0.4394 - val_acc: 0.8768
Epoch 19/25
- 4s - loss: 0.2770 - acc: 0.9327 - val_loss: 0.4269 - val_acc: 0.8948
Epoch 20/25
- 4s - loss: 0.2645 - acc: 0.9331 - val_loss: 0.4069 - val_acc: 0.8867
Epoch 21/25
- 4s - loss: 0.2625 - acc: 0.9362 - val_loss: 0.4195 - val_acc: 0.8789
Epoch 22/25
- 4s - loss: 0.2693 - acc: 0.9294 - val_loss: 0.4198 - val_acc: 0.8911
Epoch 23/25
- 4s - loss: 0.2496 - acc: 0.9376 - val_loss: 0.3832 - val_acc: 0.8985
Epoch 24/25
- 4s - loss: 0.2473 - acc: 0.9369 - val_loss: 0.4074 - val_acc: 0.8812
Epoch 25/25
- 4s - loss: 0.2498 - acc: 0.9347 - val_loss: 0.4370 - val_acc: 0.8911
Train accuracy 0.9287268770402611 Test accuracy: 0.8910756701730573

```

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Layer (type)	Output Shape	Param #
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```

=====
conv1d_63 (Conv1D)          (None, 124, 28)          1288
-----
conv1d_64 (Conv1D)          (None, 120, 32)          4512
-----
dropout_32 (Dropout)        (None, 120, 32)          0
-----
max_pooling1d_32 (MaxPooling (None, 40, 32)          0
-----
flatten_32 (Flatten)        (None, 1280)             0
-----
dense_63 (Dense)            (None, 32)               40992
-----
dense_64 (Dense)            (None, 6)                198
=====
Total params: 46,990
Trainable params: 46,990
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
  - 5s - loss: 20.4811 - acc: 0.7839 - val_loss: 3.7449 - val_acc: 0.7988
Epoch 2/35
  - 3s - loss: 1.2836 - acc: 0.9049 - val_loss: 0.8167 - val_acc: 0.8208
Epoch 3/35
  - 3s - loss: 0.4713 - acc: 0.9029 - val_loss: 0.6202 - val_acc: 0.8897
Epoch 4/35
  - 3s - loss: 0.4039 - acc: 0.9140 - val_loss: 0.6257 - val_acc: 0.8714
Epoch 5/35
  - 3s - loss: 0.3537 - acc: 0.9248 - val_loss: 0.5373 - val_acc: 0.8792
Epoch 6/35
  - 3s - loss: 0.3418 - acc: 0.9221 - val_loss: 0.5179 - val_acc: 0.8863
Epoch 7/35
  - 3s - loss: 0.3141 - acc: 0.9297 - val_loss: 0.4832 - val_acc: 0.9043
Epoch 8/35
  - 3s - loss: 0.3211 - acc: 0.9251 - val_loss: 0.4651 - val_acc: 0.8962
Epoch 9/35
  - 3s - loss: 0.2915 - acc: 0.9308 - val_loss: 0.4530 - val_acc: 0.9026
Epoch 10/35
  - 3s - loss: 0.2804 - acc: 0.9317 - val_loss: 0.4376 - val_acc: 0.8975
Epoch 11/35
  - 3s - loss: 0.2675 - acc: 0.9344 - val_loss: 0.4519 - val_acc: 0.8823
Epoch 12/35
  - 3s - loss: 0.2715 - acc: 0.9338 - val_loss: 0.5556 - val_acc: 0.8544
Epoch 13/35
  - 3s - loss: 0.2862 - acc: 0.9304 - val_loss: 0.4472 - val_acc: 0.8755
Epoch 14/35

```

```

- 3s - loss: 0.2581 - acc: 0.9335 - val_loss: 0.4250 - val_acc: 0.8853
Epoch 15/35
- 3s - loss: 0.2584 - acc: 0.9340 - val_loss: 0.4055 - val_acc: 0.9002
Epoch 16/35
- 3s - loss: 0.2548 - acc: 0.9368 - val_loss: 0.3967 - val_acc: 0.8941
Epoch 17/35
- 3s - loss: 0.2362 - acc: 0.9387 - val_loss: 0.3925 - val_acc: 0.8972
Epoch 18/35
- 3s - loss: 0.2431 - acc: 0.9382 - val_loss: 0.4084 - val_acc: 0.8948
Epoch 19/35
- 3s - loss: 0.2411 - acc: 0.9362 - val_loss: 0.3832 - val_acc: 0.9053
Epoch 20/35
- 3s - loss: 0.2382 - acc: 0.9374 - val_loss: 0.4067 - val_acc: 0.8918
Epoch 21/35
- 3s - loss: 0.2559 - acc: 0.9350 - val_loss: 0.4027 - val_acc: 0.8941
Epoch 22/35
- 3s - loss: 0.2368 - acc: 0.9359 - val_loss: 0.4339 - val_acc: 0.8890
Epoch 23/35
- 3s - loss: 0.2401 - acc: 0.9314 - val_loss: 0.3901 - val_acc: 0.8890
Epoch 24/35
- 3s - loss: 0.2324 - acc: 0.9391 - val_loss: 0.3588 - val_acc: 0.8962
Epoch 25/35
- 3s - loss: 0.2315 - acc: 0.9385 - val_loss: 0.4640 - val_acc: 0.8728
Epoch 26/35
- 3s - loss: 0.2378 - acc: 0.9380 - val_loss: 0.3979 - val_acc: 0.8795
Epoch 27/35
- 3s - loss: 0.2238 - acc: 0.9378 - val_loss: 0.3723 - val_acc: 0.8809
Epoch 28/35
- 3s - loss: 0.2224 - acc: 0.9418 - val_loss: 0.3706 - val_acc: 0.8948
Epoch 29/35
- 3s - loss: 0.2195 - acc: 0.9406 - val_loss: 0.3572 - val_acc: 0.8938
Epoch 30/35
- 3s - loss: 0.2308 - acc: 0.9374 - val_loss: 0.3824 - val_acc: 0.8870
Epoch 31/35
- 3s - loss: 0.2183 - acc: 0.9415 - val_loss: 0.4050 - val_acc: 0.8819
Epoch 32/35
- 3s - loss: 0.2223 - acc: 0.9377 - val_loss: 0.3652 - val_acc: 0.8928
Epoch 33/35
- 3s - loss: 0.2135 - acc: 0.9400 - val_loss: 0.3510 - val_acc: 0.9063
Epoch 34/35
- 3s - loss: 0.2112 - acc: 0.9388 - val_loss: 0.3684 - val_acc: 0.8948
Epoch 35/35
- 3s - loss: 0.2198 - acc: 0.9397 - val_loss: 0.3414 - val_acc: 0.9013
Train accuracy 0.9540261153427638 Test accuracy: 0.9012555140821175

```

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-----
Layer (type)                Output Shape                Param #
=====

```



conv1d_65 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_66 (Conv1D)	(None, 118, 16)	3600
-----		
dropout_33 (Dropout)	(None, 118, 16)	0
-----		
max_pooling1d_33 (MaxPooling)	(None, 59, 16)	0
-----		
flatten_33 (Flatten)	(None, 944)	0
-----		
dense_65 (Dense)	(None, 32)	30240
-----		
dense_66 (Dense)	(None, 6)	198
=====		
Total params: 35,510		
Trainable params: 35,510		
Non-trainable params: 0		
-----		
None		
Train on 7352 samples, validate on 2947 samples		
Epoch 1/25		
- 6s - loss: 2.4119 - acc: 0.8198 - val_loss: 0.7778 - val_acc: 0.8229		
Epoch 2/25		
- 5s - loss: 0.4228 - acc: 0.9158 - val_loss: 0.5392 - val_acc: 0.8924		
Epoch 3/25		
- 4s - loss: 0.3405 - acc: 0.9312 - val_loss: 0.5935 - val_acc: 0.8582		
Epoch 4/25		
- 5s - loss: 0.2995 - acc: 0.9391 - val_loss: 0.6060 - val_acc: 0.8198		
Epoch 5/25		
- 4s - loss: 0.2902 - acc: 0.9339 - val_loss: 0.3616 - val_acc: 0.8989		
Epoch 6/25		
- 4s - loss: 0.2491 - acc: 0.9442 - val_loss: 0.3794 - val_acc: 0.8935		
Epoch 7/25		
- 5s - loss: 0.2455 - acc: 0.9406 - val_loss: 0.3848 - val_acc: 0.8924		
Epoch 8/25		
- 4s - loss: 0.2234 - acc: 0.9431 - val_loss: 0.4754 - val_acc: 0.8558		
Epoch 9/25		
- 4s - loss: 0.2337 - acc: 0.9430 - val_loss: 0.3442 - val_acc: 0.9080		
Epoch 10/25		
- 5s - loss: 0.2033 - acc: 0.9452 - val_loss: 0.3499 - val_acc: 0.9162		
Epoch 11/25		
- 4s - loss: 0.1916 - acc: 0.9461 - val_loss: 0.3332 - val_acc: 0.8972		
Epoch 12/25		
- 4s - loss: 0.1959 - acc: 0.9495 - val_loss: 0.3921 - val_acc: 0.8836		
Epoch 13/25		
- 4s - loss: 0.2336 - acc: 0.9418 - val_loss: 0.3809 - val_acc: 0.8989		
Epoch 14/25		
- 4s - loss: 0.1905 - acc: 0.9497 - val_loss: 0.3034 - val_acc: 0.9131		

```

Epoch 15/25
  - 5s - loss: 0.1843 - acc: 0.9484 - val_loss: 0.3028 - val_acc: 0.8992
Epoch 16/25
  - 4s - loss: 0.1848 - acc: 0.9478 - val_loss: 0.4612 - val_acc: 0.8806
Epoch 17/25
  - 4s - loss: 0.1932 - acc: 0.9478 - val_loss: 0.3630 - val_acc: 0.9131
Epoch 18/25
  - 5s - loss: 0.1895 - acc: 0.9471 - val_loss: 0.3528 - val_acc: 0.8928
Epoch 19/25
  - 4s - loss: 0.1685 - acc: 0.9494 - val_loss: 0.3101 - val_acc: 0.9067
Epoch 20/25
  - 4s - loss: 0.1716 - acc: 0.9497 - val_loss: 0.2922 - val_acc: 0.9077
Epoch 21/25
  - 5s - loss: 0.1626 - acc: 0.9532 - val_loss: 0.2974 - val_acc: 0.8901
Epoch 22/25
  - 4s - loss: 0.1713 - acc: 0.9516 - val_loss: 0.3523 - val_acc: 0.8833
Epoch 23/25
  - 4s - loss: 0.1687 - acc: 0.9505 - val_loss: 0.3381 - val_acc: 0.8945
Epoch 24/25
  - 4s - loss: 0.1799 - acc: 0.9484 - val_loss: 0.2832 - val_acc: 0.9138
Epoch 25/25
  - 4s - loss: 0.1663 - acc: 0.9517 - val_loss: 0.3124 - val_acc: 0.9152
Train accuracy 0.9585146898803046 Test accuracy: 0.9151679674244995

```

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Layer (type)	Output Shape	Param #
conv1d_67 (Conv1D)	(None, 122, 28)	1792
conv1d_68 (Conv1D)	(None, 118, 16)	2256
dropout_34 (Dropout)	(None, 118, 16)	0
max_pooling1d_34 (MaxPooling)	(None, 59, 16)	0
flatten_34 (Flatten)	(None, 944)	0
dense_67 (Dense)	(None, 32)	30240
dense_68 (Dense)	(None, 6)	198

---

```

Total params: 34,486
Trainable params: 34,486
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25

```

- 4s - loss: 2.2122 - acc: 0.8433 - val\_loss: 0.5873 - val\_acc: 0.8965  
 Epoch 2/25  
 - 2s - loss: 0.3555 - acc: 0.9280 - val\_loss: 0.4135 - val\_acc: 0.9046  
 Epoch 3/25  
 - 2s - loss: 0.2836 - acc: 0.9344 - val\_loss: 0.5157 - val\_acc: 0.8544  
 Epoch 4/25  
 - 2s - loss: 0.2740 - acc: 0.9355 - val\_loss: 0.3735 - val\_acc: 0.9040  
 Epoch 5/25  
 - 2s - loss: 0.2601 - acc: 0.9325 - val\_loss: 0.3419 - val\_acc: 0.9226  
 Epoch 6/25  
 - 2s - loss: 0.2409 - acc: 0.9418 - val\_loss: 0.4031 - val\_acc: 0.8795  
 Epoch 7/25  
 - 2s - loss: 0.2663 - acc: 0.9344 - val\_loss: 0.3566 - val\_acc: 0.8924  
 Epoch 8/25  
 - 2s - loss: 0.2545 - acc: 0.9355 - val\_loss: 0.3538 - val\_acc: 0.9074  
 Epoch 9/25  
 - 2s - loss: 0.2184 - acc: 0.9423 - val\_loss: 0.3228 - val\_acc: 0.9158  
 Epoch 10/25  
 - 2s - loss: 0.2392 - acc: 0.9380 - val\_loss: 0.3983 - val\_acc: 0.8887  
 Epoch 11/25  
 - 2s - loss: 0.2166 - acc: 0.9396 - val\_loss: 0.3430 - val\_acc: 0.8992  
 Epoch 12/25  
 - 2s - loss: 0.2218 - acc: 0.9414 - val\_loss: 0.3157 - val\_acc: 0.9125  
 Epoch 13/25  
 - 2s - loss: 0.2486 - acc: 0.9331 - val\_loss: 0.4027 - val\_acc: 0.8972  
 Epoch 14/25  
 - 2s - loss: 0.1996 - acc: 0.9471 - val\_loss: 0.3472 - val\_acc: 0.9009  
 Epoch 15/25  
 - 2s - loss: 0.2281 - acc: 0.9397 - val\_loss: 0.4514 - val\_acc: 0.8823  
 Epoch 16/25  
 - 2s - loss: 0.2149 - acc: 0.9430 - val\_loss: 0.3734 - val\_acc: 0.9009  
 Epoch 17/25  
 - 2s - loss: 0.1987 - acc: 0.9427 - val\_loss: 0.3768 - val\_acc: 0.8884  
 Epoch 18/25  
 - 2s - loss: 0.2461 - acc: 0.9332 - val\_loss: 0.3856 - val\_acc: 0.9002  
 Epoch 19/25  
 - 2s - loss: 0.2026 - acc: 0.9445 - val\_loss: 0.3621 - val\_acc: 0.9050  
 Epoch 20/25  
 - 2s - loss: 0.2095 - acc: 0.9445 - val\_loss: 0.3526 - val\_acc: 0.9023  
 Epoch 21/25  
 - 2s - loss: 0.2152 - acc: 0.9415 - val\_loss: 0.4049 - val\_acc: 0.8890  
 Epoch 22/25  
 - 2s - loss: 0.2125 - acc: 0.9431 - val\_loss: 0.4043 - val\_acc: 0.8935  
 Epoch 23/25  
 - 2s - loss: 0.1983 - acc: 0.9425 - val\_loss: 0.3984 - val\_acc: 0.8636  
 Epoch 24/25  
 - 2s - loss: 0.2078 - acc: 0.9423 - val\_loss: 0.3213 - val\_acc: 0.9040  
 Epoch 25/25

- 2s - loss: 0.2058 - acc: 0.9430 - val\_loss: 0.3594 - val\_acc: 0.8938  
Train accuracy 0.934031556039173 Test accuracy: 0.8937902952154734

Layer (type)	Output Shape	Param #
conv1d_69 (Conv1D)	(None, 126, 32)	896
conv1d_70 (Conv1D)	(None, 120, 16)	3600
dropout_35 (Dropout)	(None, 120, 16)	0
max_pooling1d_35 (MaxPooling)	(None, 60, 16)	0
flatten_35 (Flatten)	(None, 960)	0
dense_69 (Dense)	(None, 32)	30752
dense_70 (Dense)	(None, 6)	198

Total params: 35,446  
Trainable params: 35,446  
Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/35

- 6s - loss: 2.5612 - acc: 0.7599 - val\_loss: 0.7490 - val\_acc: 0.8018

Epoch 2/35

- 5s - loss: 0.4629 - acc: 0.9034 - val\_loss: 0.5412 - val\_acc: 0.8799

Epoch 3/35

- 4s - loss: 0.3807 - acc: 0.9203 - val\_loss: 0.4479 - val\_acc: 0.8914

Epoch 4/35

- 4s - loss: 0.3636 - acc: 0.9270 - val\_loss: 0.4425 - val\_acc: 0.8853

Epoch 5/35

- 5s - loss: 0.3062 - acc: 0.9295 - val\_loss: 0.3972 - val\_acc: 0.8846

Epoch 6/35

- 4s - loss: 0.2649 - acc: 0.9384 - val\_loss: 0.3870 - val\_acc: 0.8962

Epoch 7/35

- 4s - loss: 0.2820 - acc: 0.9362 - val\_loss: 0.4678 - val\_acc: 0.8806

Epoch 8/35

- 4s - loss: 0.2970 - acc: 0.9304 - val\_loss: 0.4722 - val\_acc: 0.8867

Epoch 9/35

- 4s - loss: 0.2377 - acc: 0.9436 - val\_loss: 0.4379 - val\_acc: 0.8704

Epoch 10/35

- 5s - loss: 0.2221 - acc: 0.9407 - val\_loss: 0.4688 - val\_acc: 0.8636

Epoch 11/35

- 4s - loss: 0.2250 - acc: 0.9423 - val\_loss: 0.4391 - val\_acc: 0.8656

Epoch 12/35  
 - 4s - loss: 0.2381 - acc: 0.9431 - val\_loss: 0.3621 - val\_acc: 0.8996

Epoch 13/35  
 - 5s - loss: 0.2137 - acc: 0.9442 - val\_loss: 0.4561 - val\_acc: 0.8877

Epoch 14/35  
 - 4s - loss: 0.2428 - acc: 0.9430 - val\_loss: 0.3843 - val\_acc: 0.8955

Epoch 15/35  
 - 4s - loss: 0.2032 - acc: 0.9476 - val\_loss: 0.4148 - val\_acc: 0.8839

Epoch 16/35  
 - 5s - loss: 0.2330 - acc: 0.9427 - val\_loss: 0.3740 - val\_acc: 0.8958

Epoch 17/35  
 - 4s - loss: 0.2696 - acc: 0.9374 - val\_loss: 0.5510 - val\_acc: 0.8829

Epoch 18/35  
 - 4s - loss: 0.1959 - acc: 0.9508 - val\_loss: 0.3538 - val\_acc: 0.9043

Epoch 19/35  
 - 4s - loss: 0.2249 - acc: 0.9470 - val\_loss: 0.3870 - val\_acc: 0.8996

Epoch 20/35  
 - 4s - loss: 0.1939 - acc: 0.9494 - val\_loss: 0.3746 - val\_acc: 0.8968

Epoch 21/35  
 - 4s - loss: 0.1891 - acc: 0.9498 - val\_loss: 0.3758 - val\_acc: 0.8951

Epoch 22/35  
 - 4s - loss: 0.2256 - acc: 0.9452 - val\_loss: 0.4527 - val\_acc: 0.8724

Epoch 23/35  
 - 4s - loss: 0.2121 - acc: 0.9483 - val\_loss: 0.3777 - val\_acc: 0.8921

Epoch 24/35  
 - 4s - loss: 0.1988 - acc: 0.9482 - val\_loss: 0.4232 - val\_acc: 0.8921

Epoch 25/35  
 - 4s - loss: 0.1821 - acc: 0.9497 - val\_loss: 0.4229 - val\_acc: 0.8782

Epoch 26/35  
 - 4s - loss: 0.1841 - acc: 0.9525 - val\_loss: 0.4539 - val\_acc: 0.8612

Epoch 27/35  
 - 4s - loss: 0.1986 - acc: 0.9450 - val\_loss: 0.4321 - val\_acc: 0.8711

Epoch 28/35  
 - 4s - loss: 0.1956 - acc: 0.9479 - val\_loss: 0.3892 - val\_acc: 0.8836

Epoch 29/35  
 - 4s - loss: 0.1886 - acc: 0.9470 - val\_loss: 0.5471 - val\_acc: 0.8592

Epoch 30/35  
 - 5s - loss: 0.1883 - acc: 0.9493 - val\_loss: 0.5066 - val\_acc: 0.8599

Epoch 31/35  
 - 4s - loss: 0.2226 - acc: 0.9461 - val\_loss: 0.4548 - val\_acc: 0.8673

Epoch 32/35  
 - 4s - loss: 0.1762 - acc: 0.9516 - val\_loss: 0.3916 - val\_acc: 0.8795

Epoch 33/35  
 - 5s - loss: 0.1942 - acc: 0.9505 - val\_loss: 0.4922 - val\_acc: 0.8646

Epoch 34/35  
 - 4s - loss: 0.1785 - acc: 0.9502 - val\_loss: 0.3825 - val\_acc: 0.8955

Epoch 35/35  
 - 4s - loss: 0.2650 - acc: 0.9429 - val\_loss: 0.4766 - val\_acc: 0.8633

Train accuracy 0.9304951033732318 Test accuracy: 0.8632507634882932

Layer (type)	Output Shape	Param #
conv1d_71 (Conv1D)	(None, 124, 28)	1288
conv1d_72 (Conv1D)	(None, 118, 16)	3152
dropout_36 (Dropout)	(None, 118, 16)	0
max_pooling1d_36 (MaxPooling)	(None, 59, 16)	0
flatten_36 (Flatten)	(None, 944)	0
dense_71 (Dense)	(None, 64)	60480
dense_72 (Dense)	(None, 6)	390

Total params: 65,310

Trainable params: 65,310

Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 4s - loss: 5.5761 - acc: 0.8137 - val\_loss: 0.7347 - val\_acc: 0.7832

Epoch 2/25

- 2s - loss: 0.4795 - acc: 0.8924 - val\_loss: 0.5773 - val\_acc: 0.8768

Epoch 3/25

- 2s - loss: 0.4126 - acc: 0.9064 - val\_loss: 0.5362 - val\_acc: 0.8778

Epoch 4/25

- 2s - loss: 0.4368 - acc: 0.8969 - val\_loss: 0.5178 - val\_acc: 0.8928

Epoch 5/25

- 2s - loss: 0.3629 - acc: 0.9162 - val\_loss: 0.5410 - val\_acc: 0.8748

Epoch 6/25

- 2s - loss: 0.3657 - acc: 0.9134 - val\_loss: 0.5629 - val\_acc: 0.8392

Epoch 7/25

- 2s - loss: 0.3419 - acc: 0.9199 - val\_loss: 0.5049 - val\_acc: 0.8656

Epoch 8/25

- 2s - loss: 0.3261 - acc: 0.9197 - val\_loss: 0.4725 - val\_acc: 0.8806

Epoch 9/25

- 2s - loss: 0.3275 - acc: 0.9229 - val\_loss: 0.4221 - val\_acc: 0.8850

Epoch 10/25

- 2s - loss: 0.3101 - acc: 0.9227 - val\_loss: 0.4963 - val\_acc: 0.8877

Epoch 11/25

- 2s - loss: 0.3072 - acc: 0.9267 - val\_loss: 0.4794 - val\_acc: 0.8765

Epoch 12/25

```

- 2s - loss: 0.3274 - acc: 0.9185 - val_loss: 0.4268 - val_acc: 0.8656
Epoch 13/25
- 2s - loss: 0.3060 - acc: 0.9252 - val_loss: 0.5090 - val_acc: 0.8612
Epoch 14/25
- 2s - loss: 0.3193 - acc: 0.9236 - val_loss: 0.4052 - val_acc: 0.8839
Epoch 15/25
- 2s - loss: 0.3037 - acc: 0.9200 - val_loss: 0.4777 - val_acc: 0.8636
Epoch 16/25
- 2s - loss: 0.3061 - acc: 0.9241 - val_loss: 0.3998 - val_acc: 0.8775
Epoch 17/25
- 2s - loss: 0.2884 - acc: 0.9282 - val_loss: 0.7031 - val_acc: 0.7509
Epoch 18/25
- 2s - loss: 0.3100 - acc: 0.9229 - val_loss: 0.7581 - val_acc: 0.7760
Epoch 19/25
- 2s - loss: 0.3268 - acc: 0.9197 - val_loss: 0.5099 - val_acc: 0.8497
Epoch 20/25
- 2s - loss: 0.2762 - acc: 0.9279 - val_loss: 0.4932 - val_acc: 0.8680
Epoch 21/25
- 2s - loss: 0.3013 - acc: 0.9251 - val_loss: 0.4776 - val_acc: 0.8541
Epoch 22/25
- 2s - loss: 0.2814 - acc: 0.9266 - val_loss: 0.5030 - val_acc: 0.8558
Epoch 23/25
- 2s - loss: 0.3099 - acc: 0.9173 - val_loss: 0.5241 - val_acc: 0.8320
Epoch 24/25
- 2s - loss: 0.2794 - acc: 0.9260 - val_loss: 0.4706 - val_acc: 0.8544
Epoch 25/25
- 2s - loss: 0.2760 - acc: 0.9255 - val_loss: 0.5598 - val_acc: 0.8378
Train accuracy 0.891050054406964 Test accuracy: 0.837801153715643

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_73 (Conv1D)	(None, 122, 42)	2688
-----		
conv1d_74 (Conv1D)	(None, 116, 16)	4720
-----		
dropout_37 (Dropout)	(None, 116, 16)	0
-----		
max_pooling1d_37 (MaxPooling)	(None, 58, 16)	0
-----		
flatten_37 (Flatten)	(None, 928)	0
-----		
dense_73 (Dense)	(None, 32)	29728
-----		
dense_74 (Dense)	(None, 6)	198
=====		

```

Total params: 37,334
Trainable params: 37,334

```

Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/35

- 5s - loss: 2.5312 - acc: 0.7933 - val\_loss: 0.5613 - val\_acc: 0.8683

Epoch 2/35

- 3s - loss: 0.4623 - acc: 0.8867 - val\_loss: 0.5049 - val\_acc: 0.8884

Epoch 3/35

- 3s - loss: 0.4133 - acc: 0.9018 - val\_loss: 0.4686 - val\_acc: 0.8772

Epoch 4/35

- 4s - loss: 0.3690 - acc: 0.9061 - val\_loss: 0.4792 - val\_acc: 0.8694

Epoch 5/35

- 3s - loss: 0.3565 - acc: 0.9120 - val\_loss: 0.5586 - val\_acc: 0.8527

Epoch 6/35

- 3s - loss: 0.3525 - acc: 0.9124 - val\_loss: 1.8120 - val\_acc: 0.6064

Epoch 7/35

- 3s - loss: 0.3508 - acc: 0.9075 - val\_loss: 0.8299 - val\_acc: 0.8154

Epoch 8/35

- 3s - loss: 0.3660 - acc: 0.9108 - val\_loss: 0.5537 - val\_acc: 0.8361

Epoch 9/35

- 3s - loss: 0.3443 - acc: 0.9105 - val\_loss: 0.5436 - val\_acc: 0.8480

Epoch 10/35

- 4s - loss: 0.3360 - acc: 0.9101 - val\_loss: 0.4817 - val\_acc: 0.8605

Epoch 11/35

- 3s - loss: 0.3405 - acc: 0.9128 - val\_loss: 0.7536 - val\_acc: 0.7855

Epoch 12/35

- 3s - loss: 0.3422 - acc: 0.9095 - val\_loss: 0.3939 - val\_acc: 0.8734

Epoch 13/35

- 3s - loss: 0.3373 - acc: 0.9093 - val\_loss: 0.4616 - val\_acc: 0.8792

Epoch 14/35

- 3s - loss: 0.3444 - acc: 0.9128 - val\_loss: 0.4564 - val\_acc: 0.8619

Epoch 15/35

- 3s - loss: 0.3242 - acc: 0.9191 - val\_loss: 0.4572 - val\_acc: 0.8622

Epoch 16/35

- 3s - loss: 0.3480 - acc: 0.9121 - val\_loss: 0.4201 - val\_acc: 0.8795

Epoch 17/35

- 3s - loss: 0.3233 - acc: 0.9189 - val\_loss: 0.5386 - val\_acc: 0.8473

Epoch 18/35

- 3s - loss: 0.3296 - acc: 0.9112 - val\_loss: 0.4228 - val\_acc: 0.8850

Epoch 19/35

- 4s - loss: 0.3336 - acc: 0.9151 - val\_loss: 0.4307 - val\_acc: 0.8643

Epoch 20/35

- 3s - loss: 0.3377 - acc: 0.9127 - val\_loss: 0.5739 - val\_acc: 0.8483

Epoch 21/35

- 3s - loss: 0.3313 - acc: 0.9158 - val\_loss: 0.5802 - val\_acc: 0.8544

Epoch 22/35

- 3s - loss: 0.3213 - acc: 0.9181 - val\_loss: 0.5462 - val\_acc: 0.8286



```

Epoch 23/35
- 3s - loss: 0.3313 - acc: 0.9120 - val_loss: 0.3995 - val_acc: 0.8992
Epoch 24/35
- 3s - loss: 0.3287 - acc: 0.9095 - val_loss: 0.4161 - val_acc: 0.8799
Epoch 25/35
- 4s - loss: 0.3203 - acc: 0.9138 - val_loss: 0.4464 - val_acc: 0.8741
Epoch 26/35
- 4s - loss: 0.3230 - acc: 0.9132 - val_loss: 0.5774 - val_acc: 0.8409
Epoch 27/35
- 3s - loss: 0.3279 - acc: 0.9131 - val_loss: 0.7065 - val_acc: 0.8107
Epoch 28/35
- 3s - loss: 0.3305 - acc: 0.9129 - val_loss: 0.3893 - val_acc: 0.9023
Epoch 29/35
- 4s - loss: 0.3362 - acc: 0.9135 - val_loss: 0.5070 - val_acc: 0.8371
Epoch 30/35
- 3s - loss: 0.3317 - acc: 0.9200 - val_loss: 0.4695 - val_acc: 0.8812
Epoch 31/35
- 3s - loss: 0.3269 - acc: 0.9131 - val_loss: 1.2070 - val_acc: 0.7750
Epoch 32/35
- 3s - loss: 0.3240 - acc: 0.9163 - val_loss: 0.4437 - val_acc: 0.8622
Epoch 33/35
- 3s - loss: 0.3274 - acc: 0.9176 - val_loss: 0.6468 - val_acc: 0.8449
Epoch 34/35
- 3s - loss: 0.3402 - acc: 0.9150 - val_loss: 0.3913 - val_acc: 0.8870
Epoch 35/35
- 3s - loss: 0.3264 - acc: 0.9176 - val_loss: 0.4415 - val_acc: 0.8901
Train accuracy 0.9294069640914037 Test accuracy: 0.8900576857821514

```

Layer (type)	Output Shape	Param #
conv1d_75 (Conv1D)	(None, 124, 32)	1472
conv1d_76 (Conv1D)	(None, 120, 16)	2576
dropout_38 (Dropout)	(None, 120, 16)	0
max_pooling1d_38 (MaxPooling)	(None, 60, 16)	0
flatten_38 (Flatten)	(None, 960)	0
dense_75 (Dense)	(None, 32)	30752
dense_76 (Dense)	(None, 6)	198

```

Total params: 34,998
Trainable params: 34,998
Non-trainable params: 0

```

```

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 5s - loss: 5.6099 - acc: 0.7828 - val_loss: 0.6939 - val_acc: 0.8517
Epoch 2/25
  - 3s - loss: 0.5010 - acc: 0.8832 - val_loss: 0.6320 - val_acc: 0.8660
Epoch 3/25
  - 3s - loss: 0.4524 - acc: 0.8980 - val_loss: 0.6079 - val_acc: 0.8198
Epoch 4/25
  - 3s - loss: 0.4149 - acc: 0.9021 - val_loss: 0.6310 - val_acc: 0.8578
Epoch 5/25
  - 3s - loss: 0.3934 - acc: 0.9059 - val_loss: 0.5392 - val_acc: 0.8622
Epoch 6/25
  - 3s - loss: 0.3836 - acc: 0.9074 - val_loss: 0.5226 - val_acc: 0.8697
Epoch 7/25
  - 3s - loss: 0.3900 - acc: 0.9057 - val_loss: 0.6099 - val_acc: 0.8239
Epoch 8/25
  - 3s - loss: 0.3778 - acc: 0.9086 - val_loss: 0.5498 - val_acc: 0.8507
Epoch 9/25
  - 3s - loss: 0.3354 - acc: 0.9192 - val_loss: 0.5142 - val_acc: 0.8799
Epoch 10/25
  - 3s - loss: 0.3553 - acc: 0.9129 - val_loss: 0.5267 - val_acc: 0.8456
Epoch 11/25
  - 3s - loss: 0.3488 - acc: 0.9151 - val_loss: 0.4650 - val_acc: 0.8633
Epoch 12/25
  - 3s - loss: 0.3224 - acc: 0.9191 - val_loss: 0.6858 - val_acc: 0.8144
Epoch 13/25
  - 3s - loss: 0.3712 - acc: 0.9125 - val_loss: 0.5496 - val_acc: 0.8612
Epoch 14/25
  - 3s - loss: 0.3105 - acc: 0.9275 - val_loss: 0.4865 - val_acc: 0.8795
Epoch 15/25
  - 3s - loss: 0.3486 - acc: 0.9153 - val_loss: 0.4788 - val_acc: 0.8839
Epoch 16/25
  - 3s - loss: 0.3032 - acc: 0.9242 - val_loss: 0.4418 - val_acc: 0.8938
Epoch 17/25
  - 3s - loss: 0.2958 - acc: 0.9246 - val_loss: 0.4957 - val_acc: 0.8775
Epoch 18/25
  - 3s - loss: 0.3211 - acc: 0.9178 - val_loss: 0.4835 - val_acc: 0.8622
Epoch 19/25
  - 3s - loss: 0.3163 - acc: 0.9208 - val_loss: 0.4780 - val_acc: 0.8626
Epoch 20/25
  - 3s - loss: 0.2868 - acc: 0.9280 - val_loss: 0.5658 - val_acc: 0.8269
Epoch 21/25
  - 3s - loss: 0.2977 - acc: 0.9286 - val_loss: 0.4155 - val_acc: 0.8806
Epoch 22/25
  - 3s - loss: 0.2764 - acc: 0.9282 - val_loss: 0.4576 - val_acc: 0.8483
Epoch 23/25

```

```

- 3s - loss: 0.3157 - acc: 0.9196 - val_loss: 0.5375 - val_acc: 0.8537
Epoch 24/25
- 3s - loss: 0.2962 - acc: 0.9276 - val_loss: 0.6315 - val_acc: 0.8537
Epoch 25/25
- 3s - loss: 0.2972 - acc: 0.9260 - val_loss: 0.4336 - val_acc: 0.8724
Train accuracy 0.941784548422198 Test accuracy: 0.8724126230064473
-----

```

Layer (type)	Output Shape	Param #
conv1d_77 (Conv1D)	(None, 126, 28)	784
conv1d_78 (Conv1D)	(None, 120, 16)	3152
dropout_39 (Dropout)	(None, 120, 16)	0
max_pooling1d_39 (MaxPooling)	(None, 60, 16)	0
flatten_39 (Flatten)	(None, 960)	0
dense_77 (Dense)	(None, 32)	30752
dense_78 (Dense)	(None, 6)	198

```

=====
Total params: 34,886
Trainable params: 34,886
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 4s - loss: 3.5671 - acc: 0.7036 - val_loss: 0.7161 - val_acc: 0.8208
Epoch 2/25
- 2s - loss: 0.5217 - acc: 0.8678 - val_loss: 0.6253 - val_acc: 0.8409
Epoch 3/25
- 2s - loss: 0.4482 - acc: 0.8853 - val_loss: 0.5464 - val_acc: 0.8439
Epoch 4/25
- 2s - loss: 0.4033 - acc: 0.8969 - val_loss: 0.4733 - val_acc: 0.8677
Epoch 5/25
- 2s - loss: 0.3860 - acc: 0.9091 - val_loss: 0.4315 - val_acc: 0.8907
Epoch 6/25
- 2s - loss: 0.3728 - acc: 0.9064 - val_loss: 0.5506 - val_acc: 0.8622
Epoch 7/25
- 2s - loss: 0.3557 - acc: 0.9115 - val_loss: 0.4047 - val_acc: 0.8867
Epoch 8/25
- 2s - loss: 0.3560 - acc: 0.9089 - val_loss: 0.4743 - val_acc: 0.8521
Epoch 9/25
- 2s - loss: 0.3516 - acc: 0.9075 - val_loss: 0.4290 - val_acc: 0.8782

```

```

Epoch 10/25
- 2s - loss: 0.3422 - acc: 0.9129 - val_loss: 0.4792 - val_acc: 0.8599
Epoch 11/25
- 2s - loss: 0.3385 - acc: 0.9149 - val_loss: 0.5192 - val_acc: 0.8473
Epoch 12/25
- 2s - loss: 0.3365 - acc: 0.9146 - val_loss: 0.4417 - val_acc: 0.8592
Epoch 13/25
- 2s - loss: 0.3314 - acc: 0.9162 - val_loss: 0.4792 - val_acc: 0.8442
Epoch 14/25
- 2s - loss: 0.3220 - acc: 0.9192 - val_loss: 0.3905 - val_acc: 0.8860
Epoch 15/25
- 2s - loss: 0.3228 - acc: 0.9140 - val_loss: 0.3868 - val_acc: 0.8809
Epoch 16/25
- 2s - loss: 0.3231 - acc: 0.9153 - val_loss: 0.4041 - val_acc: 0.8836
Epoch 17/25
- 2s - loss: 0.3044 - acc: 0.9219 - val_loss: 0.7424 - val_acc: 0.8280
Epoch 18/25
- 2s - loss: 0.3146 - acc: 0.9151 - val_loss: 0.5913 - val_acc: 0.8144
Epoch 19/25
- 2s - loss: 0.3013 - acc: 0.9197 - val_loss: 0.3994 - val_acc: 0.8819
Epoch 20/25
- 2s - loss: 0.2992 - acc: 0.9188 - val_loss: 0.5800 - val_acc: 0.8134
Epoch 21/25
- 2s - loss: 0.2907 - acc: 0.9223 - val_loss: 0.6808 - val_acc: 0.8076
Epoch 22/25
- 2s - loss: 0.3042 - acc: 0.9189 - val_loss: 0.4588 - val_acc: 0.8442
Epoch 23/25
- 2s - loss: 0.2983 - acc: 0.9192 - val_loss: 0.4702 - val_acc: 0.8463
Epoch 24/25
- 2s - loss: 0.2894 - acc: 0.9219 - val_loss: 0.4336 - val_acc: 0.8649
Epoch 25/25
- 2s - loss: 0.2836 - acc: 0.9215 - val_loss: 0.4237 - val_acc: 0.8639
Train accuracy 0.9202937976060935 Test accuracy: 0.8639294197488971

```

Layer (type)	Output Shape	Param #
conv1d_79 (Conv1D)	(None, 124, 32)	1472
conv1d_80 (Conv1D)	(None, 122, 16)	1552
dropout_40 (Dropout)	(None, 122, 16)	0
max_pooling1d_40 (MaxPooling)	(None, 61, 16)	0
flatten_40 (Flatten)	(None, 976)	0
dense_79 (Dense)	(None, 64)	62528

```

-----
dense_80 (Dense)                (None, 6)                390
=====
Total params: 65,942
Trainable params: 65,942
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
  - 9s - loss: 11.2076 - acc: 0.7520 - val_loss: 0.8034 - val_acc: 0.7920
Epoch 2/35
  - 7s - loss: 0.6549 - acc: 0.8127 - val_loss: 0.7062 - val_acc: 0.8178
Epoch 3/35
  - 7s - loss: 0.5877 - acc: 0.8346 - val_loss: 0.6881 - val_acc: 0.8100
Epoch 4/35
  - 7s - loss: 0.5794 - acc: 0.8387 - val_loss: 0.6425 - val_acc: 0.8049
Epoch 5/35
  - 7s - loss: 0.5203 - acc: 0.8555 - val_loss: 0.6667 - val_acc: 0.8045
Epoch 6/35
  - 7s - loss: 0.4922 - acc: 0.8615 - val_loss: 0.6576 - val_acc: 0.8157
Epoch 7/35
  - 7s - loss: 0.5112 - acc: 0.8581 - val_loss: 0.6307 - val_acc: 0.8266
Epoch 8/35
  - 7s - loss: 0.4910 - acc: 0.8675 - val_loss: 0.6155 - val_acc: 0.8548
Epoch 9/35
  - 7s - loss: 0.4987 - acc: 0.8694 - val_loss: 0.5561 - val_acc: 0.8663
Epoch 10/35
  - 7s - loss: 0.4598 - acc: 0.8799 - val_loss: 0.6157 - val_acc: 0.8344
Epoch 11/35
  - 7s - loss: 0.4413 - acc: 0.8826 - val_loss: 0.6809 - val_acc: 0.7995
Epoch 12/35
  - 7s - loss: 0.4368 - acc: 0.8837 - val_loss: 0.6414 - val_acc: 0.8042
Epoch 13/35
  - 7s - loss: 0.4171 - acc: 0.8887 - val_loss: 0.5622 - val_acc: 0.8585
Epoch 14/35
  - 7s - loss: 0.4180 - acc: 0.8913 - val_loss: 0.6346 - val_acc: 0.8147
Epoch 15/35
  - 7s - loss: 0.3999 - acc: 0.9027 - val_loss: 0.4814 - val_acc: 0.8622
Epoch 16/35
  - 7s - loss: 0.4157 - acc: 0.8939 - val_loss: 0.5273 - val_acc: 0.8470
Epoch 17/35
  - 7s - loss: 0.3781 - acc: 0.9029 - val_loss: 0.4904 - val_acc: 0.8521
Epoch 18/35
  - 7s - loss: 0.3856 - acc: 0.8980 - val_loss: 0.4701 - val_acc: 0.8751
Epoch 19/35
  - 7s - loss: 0.3920 - acc: 0.9013 - val_loss: 0.5584 - val_acc: 0.8314
Epoch 20/35

```

```

- 7s - loss: 0.4000 - acc: 0.8968 - val_loss: 0.6300 - val_acc: 0.8185
Epoch 21/35
- 7s - loss: 0.4000 - acc: 0.8964 - val_loss: 0.5349 - val_acc: 0.8276
Epoch 22/35
- 7s - loss: 0.3756 - acc: 0.9036 - val_loss: 0.6662 - val_acc: 0.8049
Epoch 23/35
- 7s - loss: 0.3614 - acc: 0.9075 - val_loss: 0.4985 - val_acc: 0.8225
Epoch 24/35
- 7s - loss: 0.3590 - acc: 0.9095 - val_loss: 0.5227 - val_acc: 0.8381
Epoch 25/35
- 7s - loss: 0.3492 - acc: 0.9117 - val_loss: 0.6006 - val_acc: 0.8124
Epoch 26/35
- 7s - loss: 0.3557 - acc: 0.9124 - val_loss: 0.5154 - val_acc: 0.8446
Epoch 27/35
- 7s - loss: 0.3574 - acc: 0.9082 - val_loss: 0.5310 - val_acc: 0.8683
Epoch 28/35
- 7s - loss: 0.3736 - acc: 0.9087 - val_loss: 0.5884 - val_acc: 0.8076
Epoch 29/35
- 7s - loss: 0.3774 - acc: 0.9042 - val_loss: 0.5426 - val_acc: 0.8476
Epoch 30/35
- 7s - loss: 0.3362 - acc: 0.9162 - val_loss: 0.5364 - val_acc: 0.8232
Epoch 31/35
- 7s - loss: 0.3665 - acc: 0.9095 - val_loss: 0.5893 - val_acc: 0.8127
Epoch 32/35
- 7s - loss: 0.3421 - acc: 0.9101 - val_loss: 0.4220 - val_acc: 0.8819
Epoch 33/35
- 7s - loss: 0.3553 - acc: 0.9102 - val_loss: 0.5093 - val_acc: 0.8093
Epoch 34/35
- 7s - loss: 0.3334 - acc: 0.9134 - val_loss: 0.5105 - val_acc: 0.8154
Epoch 35/35
- 7s - loss: 0.3646 - acc: 0.9070 - val_loss: 0.4887 - val_acc: 0.8337
Train accuracy 0.8881936887921654 Test accuracy: 0.833729216152019

```

Layer (type)	Output Shape	Param #
conv1d_81 (Conv1D)	(None, 124, 42)	1932
conv1d_82 (Conv1D)	(None, 118, 32)	9440
dropout_41 (Dropout)	(None, 118, 32)	0
max_pooling1d_41 (MaxPooling)	(None, 59, 32)	0
flatten_41 (Flatten)	(None, 1888)	0
dense_81 (Dense)	(None, 32)	60448

```

dense_82 (Dense)                (None, 6)                198
=====
Total params: 72,018
Trainable params: 72,018
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 5s - loss: 11.1514 - acc: 0.7269 - val_loss: 0.8073 - val_acc: 0.7530
Epoch 2/25
  - 3s - loss: 0.5540 - acc: 0.8512 - val_loss: 0.5737 - val_acc: 0.8565
Epoch 3/25
  - 3s - loss: 0.4798 - acc: 0.8764 - val_loss: 0.5821 - val_acc: 0.8276
Epoch 4/25
  - 3s - loss: 0.4592 - acc: 0.8828 - val_loss: 0.5394 - val_acc: 0.8578
Epoch 5/25
  - 3s - loss: 0.4336 - acc: 0.8898 - val_loss: 0.5852 - val_acc: 0.8510
Epoch 6/25
  - 3s - loss: 0.4165 - acc: 0.8959 - val_loss: 0.4568 - val_acc: 0.8758
Epoch 7/25
  - 3s - loss: 0.3984 - acc: 0.9027 - val_loss: 0.4529 - val_acc: 0.8948
Epoch 8/25
  - 3s - loss: 0.3941 - acc: 0.9061 - val_loss: 0.4660 - val_acc: 0.8795
Epoch 9/25
  - 3s - loss: 0.3833 - acc: 0.9017 - val_loss: 0.4501 - val_acc: 0.8758
Epoch 10/25
  - 3s - loss: 0.3835 - acc: 0.9019 - val_loss: 0.3798 - val_acc: 0.9084
Epoch 11/25
  - 3s - loss: 0.3836 - acc: 0.9053 - val_loss: 0.4024 - val_acc: 0.8945
Epoch 12/25
  - 3s - loss: 0.3799 - acc: 0.9011 - val_loss: 0.4412 - val_acc: 0.8700
Epoch 13/25
  - 3s - loss: 0.3761 - acc: 0.9119 - val_loss: 0.4387 - val_acc: 0.8867
Epoch 14/25
  - 3s - loss: 0.3649 - acc: 0.9082 - val_loss: 0.4185 - val_acc: 0.8887
Epoch 15/25
  - 3s - loss: 0.3622 - acc: 0.9093 - val_loss: 0.5608 - val_acc: 0.8409
Epoch 16/25
  - 3s - loss: 0.3610 - acc: 0.9119 - val_loss: 0.4241 - val_acc: 0.8785
Epoch 17/25
  - 3s - loss: 0.3747 - acc: 0.9072 - val_loss: 0.4768 - val_acc: 0.8480
Epoch 18/25
  - 3s - loss: 0.3602 - acc: 0.9106 - val_loss: 0.3897 - val_acc: 0.8918
Epoch 19/25
  - 3s - loss: 0.3659 - acc: 0.9124 - val_loss: 0.4663 - val_acc: 0.8616
Epoch 20/25
  - 3s - loss: 0.3626 - acc: 0.9098 - val_loss: 0.4184 - val_acc: 0.8941

```

```

Epoch 21/25
- 3s - loss: 0.3507 - acc: 0.9064 - val_loss: 0.4477 - val_acc: 0.8751
Epoch 22/25
- 3s - loss: 0.3676 - acc: 0.9068 - val_loss: 0.5146 - val_acc: 0.8300
Epoch 23/25
- 3s - loss: 0.3578 - acc: 0.9101 - val_loss: 0.4066 - val_acc: 0.8945
Epoch 24/25
- 3s - loss: 0.3486 - acc: 0.9057 - val_loss: 0.8198 - val_acc: 0.7238
Epoch 25/25
- 3s - loss: 0.3455 - acc: 0.9093 - val_loss: 0.4381 - val_acc: 0.8714
Train accuracy 0.9215179542981502 Test accuracy: 0.8713946386155412
-----

```

Layer (type)	Output Shape	Param #
conv1d_83 (Conv1D)	(None, 122, 32)	2048
conv1d_84 (Conv1D)	(None, 118, 16)	2576
dropout_42 (Dropout)	(None, 118, 16)	0
max_pooling1d_42 (MaxPooling)	(None, 59, 16)	0
flatten_42 (Flatten)	(None, 944)	0
dense_83 (Dense)	(None, 32)	30240
dense_84 (Dense)	(None, 6)	198

```

=====
Total params: 35,062
Trainable params: 35,062
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 7s - loss: 27.1762 - acc: 0.7277 - val_loss: 1.3614 - val_acc: 0.8324
Epoch 2/25
- 5s - loss: 0.7013 - acc: 0.8685 - val_loss: 0.7475 - val_acc: 0.8286
Epoch 3/25
- 4s - loss: 0.5337 - acc: 0.8848 - val_loss: 0.7020 - val_acc: 0.8042
Epoch 4/25
- 4s - loss: 0.4675 - acc: 0.8973 - val_loss: 0.5805 - val_acc: 0.8639
Epoch 5/25
- 5s - loss: 0.4652 - acc: 0.8923 - val_loss: 0.5888 - val_acc: 0.8870
Epoch 6/25
- 4s - loss: 0.4253 - acc: 0.9034 - val_loss: 0.5460 - val_acc: 0.8914
Epoch 7/25

```



```

- 5s - loss: 0.3952 - acc: 0.9076 - val_loss: 0.5269 - val_acc: 0.8907
Epoch 8/25
- 4s - loss: 0.3785 - acc: 0.9125 - val_loss: 0.5370 - val_acc: 0.8551
Epoch 9/25
- 4s - loss: 0.3821 - acc: 0.9037 - val_loss: 0.5373 - val_acc: 0.8463
Epoch 10/25
- 4s - loss: 0.3620 - acc: 0.9120 - val_loss: 0.4670 - val_acc: 0.8904
Epoch 11/25
- 4s - loss: 0.3776 - acc: 0.9095 - val_loss: 0.4725 - val_acc: 0.8918
Epoch 12/25
- 4s - loss: 0.3663 - acc: 0.9091 - val_loss: 0.4567 - val_acc: 0.8968
Epoch 13/25
- 5s - loss: 0.3628 - acc: 0.9068 - val_loss: 0.5204 - val_acc: 0.8521
Epoch 14/25
- 4s - loss: 0.3461 - acc: 0.9165 - val_loss: 0.4536 - val_acc: 0.8816
Epoch 15/25
- 4s - loss: 0.3321 - acc: 0.9173 - val_loss: 0.5775 - val_acc: 0.8432
Epoch 16/25
- 5s - loss: 0.3288 - acc: 0.9183 - val_loss: 0.4953 - val_acc: 0.8636
Epoch 17/25
- 4s - loss: 0.3338 - acc: 0.9159 - val_loss: 0.5608 - val_acc: 0.8174
Epoch 18/25
- 5s - loss: 0.3311 - acc: 0.9180 - val_loss: 0.4057 - val_acc: 0.9060
Epoch 19/25
- 5s - loss: 0.3323 - acc: 0.9178 - val_loss: 0.4332 - val_acc: 0.8833
Epoch 20/25
- 4s - loss: 0.3295 - acc: 0.9197 - val_loss: 0.4325 - val_acc: 0.8921
Epoch 21/25
- 5s - loss: 0.3137 - acc: 0.9245 - val_loss: 0.4407 - val_acc: 0.8968
Epoch 22/25
- 4s - loss: 0.3205 - acc: 0.9177 - val_loss: 0.4486 - val_acc: 0.8951
Epoch 23/25
- 4s - loss: 0.3210 - acc: 0.9226 - val_loss: 0.4261 - val_acc: 0.8894
Epoch 24/25
- 5s - loss: 0.3268 - acc: 0.9199 - val_loss: 0.5320 - val_acc: 0.8765
Epoch 25/25
- 4s - loss: 0.3123 - acc: 0.9233 - val_loss: 0.4226 - val_acc: 0.8836
Train accuracy 0.9300870512074044 Test accuracy: 0.8836104513064132

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_85 (Conv1D)           (None, 126, 28)          784
-----
conv1d_86 (Conv1D)           (None, 120, 16)          3152
-----
dropout_43 (Dropout)         (None, 120, 16)          0
-----

```

```

max_pooling1d_43 (MaxPooling (None, 60, 16))          0
-----
flatten_43 (Flatten)          (None, 960)          0
-----
dense_85 (Dense)              (None, 64)          61504
-----
dense_86 (Dense)              (None, 6)           390
=====
Total params: 65,830
Trainable params: 65,830
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 6s - loss: 3.9236 - acc: 0.7994 - val_loss: 0.6350 - val_acc: 0.8541
Epoch 2/25
  - 4s - loss: 0.4266 - acc: 0.9008 - val_loss: 0.5079 - val_acc: 0.8853
Epoch 3/25
  - 4s - loss: 0.3860 - acc: 0.9061 - val_loss: 0.6102 - val_acc: 0.8517
Epoch 4/25
  - 4s - loss: 0.3581 - acc: 0.9135 - val_loss: 0.4793 - val_acc: 0.8768
Epoch 5/25
  - 4s - loss: 0.3196 - acc: 0.9232 - val_loss: 0.4518 - val_acc: 0.8728
Epoch 6/25
  - 4s - loss: 0.3006 - acc: 0.9290 - val_loss: 0.4396 - val_acc: 0.8758
Epoch 7/25
  - 4s - loss: 0.3352 - acc: 0.9181 - val_loss: 0.4172 - val_acc: 0.9023
Epoch 8/25
  - 4s - loss: 0.2960 - acc: 0.9260 - val_loss: 0.3940 - val_acc: 0.8972
Epoch 9/25
  - 4s - loss: 0.2797 - acc: 0.9287 - val_loss: 0.4360 - val_acc: 0.8687
Epoch 10/25
  - 4s - loss: 0.2927 - acc: 0.9298 - val_loss: 0.4079 - val_acc: 0.8833
Epoch 11/25
  - 4s - loss: 0.2651 - acc: 0.9339 - val_loss: 0.3828 - val_acc: 0.8738
Epoch 12/25
  - 4s - loss: 0.2762 - acc: 0.9293 - val_loss: 0.3679 - val_acc: 0.8765
Epoch 13/25
  - 4s - loss: 0.2584 - acc: 0.9368 - val_loss: 0.3531 - val_acc: 0.8907
Epoch 14/25
  - 4s - loss: 0.2741 - acc: 0.9301 - val_loss: 0.4148 - val_acc: 0.8531
Epoch 15/25
  - 4s - loss: 0.2732 - acc: 0.9310 - val_loss: 0.3899 - val_acc: 0.8918
Epoch 16/25
  - 4s - loss: 0.2587 - acc: 0.9316 - val_loss: 0.3720 - val_acc: 0.8802
Epoch 17/25
  - 4s - loss: 0.2657 - acc: 0.9309 - val_loss: 0.4303 - val_acc: 0.8687

```

```

Epoch 18/25
- 4s - loss: 0.2567 - acc: 0.9373 - val_loss: 0.4024 - val_acc: 0.8568
Epoch 19/25
- 4s - loss: 0.2452 - acc: 0.9380 - val_loss: 0.3703 - val_acc: 0.8751
Epoch 20/25
- 4s - loss: 0.2698 - acc: 0.9331 - val_loss: 0.4168 - val_acc: 0.8761
Epoch 21/25
- 4s - loss: 0.2315 - acc: 0.9403 - val_loss: 0.5369 - val_acc: 0.8375
Epoch 22/25
- 4s - loss: 0.2329 - acc: 0.9381 - val_loss: 0.4783 - val_acc: 0.8656
Epoch 23/25
- 4s - loss: 0.2570 - acc: 0.9325 - val_loss: 0.3702 - val_acc: 0.9030
Epoch 24/25
- 4s - loss: 0.2298 - acc: 0.9423 - val_loss: 0.3321 - val_acc: 0.8884
Epoch 25/25
- 4s - loss: 0.2247 - acc: 0.9416 - val_loss: 0.5164 - val_acc: 0.8582
Train accuracy 0.9231501632857504 Test accuracy: 0.8581608415337632

```

Layer (type)	Output Shape	Param #
conv1d_87 (Conv1D)	(None, 124, 42)	1932
conv1d_88 (Conv1D)	(None, 122, 32)	4064
dropout_44 (Dropout)	(None, 122, 32)	0
max_pooling1d_44 (MaxPooling)	(None, 61, 32)	0
flatten_44 (Flatten)	(None, 1952)	0
dense_87 (Dense)	(None, 32)	62496
dense_88 (Dense)	(None, 6)	198

```

Total params: 68,690
Trainable params: 68,690
Non-trainable params: 0

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 5s - loss: 15.4742 - acc: 0.7338 - val_loss: 0.7912 - val_acc: 0.8100
Epoch 2/30
- 3s - loss: 0.5992 - acc: 0.8464 - val_loss: 0.5625 - val_acc: 0.8537
Epoch 3/30
- 3s - loss: 0.4923 - acc: 0.8807 - val_loss: 0.5012 - val_acc: 0.8802
Epoch 4/30

```

- 3s - loss: 0.4579 - acc: 0.8847 - val\_loss: 0.5514 - val\_acc: 0.8561  
 Epoch 5/30  
 - 3s - loss: 0.4439 - acc: 0.8901 - val\_loss: 0.5712 - val\_acc: 0.8181  
 Epoch 6/30  
 - 3s - loss: 0.4265 - acc: 0.8946 - val\_loss: 0.4373 - val\_acc: 0.8948  
 Epoch 7/30  
 - 3s - loss: 0.4266 - acc: 0.8964 - val\_loss: 0.4360 - val\_acc: 0.8850  
 Epoch 8/30  
 - 3s - loss: 0.4167 - acc: 0.8925 - val\_loss: 0.6559 - val\_acc: 0.7499  
 Epoch 9/30  
 - 3s - loss: 0.4134 - acc: 0.8953 - val\_loss: 0.4291 - val\_acc: 0.8877  
 Epoch 10/30  
 - 3s - loss: 0.3963 - acc: 0.8970 - val\_loss: 0.5227 - val\_acc: 0.8202  
 Epoch 11/30  
 - 3s - loss: 0.3913 - acc: 0.9022 - val\_loss: 0.4991 - val\_acc: 0.8551  
 Epoch 12/30  
 - 3s - loss: 0.4025 - acc: 0.8985 - val\_loss: 0.5791 - val\_acc: 0.8147  
 Epoch 13/30  
 - 3s - loss: 0.3869 - acc: 0.9057 - val\_loss: 0.5648 - val\_acc: 0.8025  
 Epoch 14/30  
 - 3s - loss: 0.4073 - acc: 0.8953 - val\_loss: 0.4612 - val\_acc: 0.8734  
 Epoch 15/30  
 - 3s - loss: 0.3964 - acc: 0.9041 - val\_loss: 0.4749 - val\_acc: 0.8531  
 Epoch 16/30  
 - 3s - loss: 0.3814 - acc: 0.9049 - val\_loss: 0.4152 - val\_acc: 0.8717  
 Epoch 17/30  
 - 3s - loss: 0.3879 - acc: 0.9063 - val\_loss: 0.4685 - val\_acc: 0.8829  
 Epoch 18/30  
 - 3s - loss: 0.3878 - acc: 0.9025 - val\_loss: 0.4877 - val\_acc: 0.8578  
 Epoch 19/30  
 - 3s - loss: 0.3885 - acc: 0.8981 - val\_loss: 0.5265 - val\_acc: 0.8490  
 Epoch 20/30  
 - 3s - loss: 0.3793 - acc: 0.9037 - val\_loss: 0.4773 - val\_acc: 0.8537  
 Epoch 21/30  
 - 3s - loss: 0.3839 - acc: 0.9060 - val\_loss: 0.4736 - val\_acc: 0.8850  
 Epoch 22/30  
 - 3s - loss: 0.3708 - acc: 0.9051 - val\_loss: 0.5082 - val\_acc: 0.8246  
 Epoch 23/30  
 - 3s - loss: 0.3729 - acc: 0.9048 - val\_loss: 0.5330 - val\_acc: 0.8565  
 Epoch 24/30  
 - 3s - loss: 0.3717 - acc: 0.9063 - val\_loss: 0.6459 - val\_acc: 0.8371  
 Epoch 25/30  
 - 3s - loss: 0.3813 - acc: 0.8998 - val\_loss: 0.5365 - val\_acc: 0.7988  
 Epoch 26/30  
 - 3s - loss: 0.3742 - acc: 0.9048 - val\_loss: 0.5463 - val\_acc: 0.8548  
 Epoch 27/30  
 - 3s - loss: 0.3766 - acc: 0.9066 - val\_loss: 0.4888 - val\_acc: 0.8633  
 Epoch 28/30

```

- 3s - loss: 0.3722 - acc: 0.9071 - val_loss: 0.4506 - val_acc: 0.8785
Epoch 29/30
- 3s - loss: 0.3634 - acc: 0.9110 - val_loss: 0.4248 - val_acc: 0.8717
Epoch 30/30
- 3s - loss: 0.3792 - acc: 0.9041 - val_loss: 0.4477 - val_acc: 0.8826
Train accuracy 0.9065560391730142 Test accuracy: 0.8825924669155073

```

---

Layer (type)	Output Shape	Param #
<hr/>		
conv1d_89 (Conv1D)	(None, 124, 32)	1472
<hr/>		
conv1d_90 (Conv1D)	(None, 118, 16)	3600
<hr/>		
dropout_45 (Dropout)	(None, 118, 16)	0
<hr/>		
max_pooling1d_45 (MaxPooling)	(None, 59, 16)	0
<hr/>		
flatten_45 (Flatten)	(None, 944)	0
<hr/>		
dense_89 (Dense)	(None, 32)	30240
<hr/>		
dense_90 (Dense)	(None, 6)	198
<hr/>		

```

Total params: 35,510
Trainable params: 35,510
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
- 5s - loss: 11.5468 - acc: 0.7382 - val_loss: 0.7696 - val_acc: 0.8045
Epoch 2/35
- 3s - loss: 0.5729 - acc: 0.8530 - val_loss: 0.6834 - val_acc: 0.8249
Epoch 3/35
- 3s - loss: 0.5067 - acc: 0.8692 - val_loss: 0.5984 - val_acc: 0.8592
Epoch 4/35
- 3s - loss: 0.4702 - acc: 0.8840 - val_loss: 0.5183 - val_acc: 0.8931
Epoch 5/35
- 3s - loss: 0.4204 - acc: 0.8980 - val_loss: 0.5299 - val_acc: 0.8517
Epoch 6/35
- 3s - loss: 0.4289 - acc: 0.8934 - val_loss: 0.5291 - val_acc: 0.8700
Epoch 7/35
- 3s - loss: 0.4082 - acc: 0.8966 - val_loss: 0.4704 - val_acc: 0.8938
Epoch 8/35
- 3s - loss: 0.3915 - acc: 0.9030 - val_loss: 0.4849 - val_acc: 0.8690
Epoch 9/35
- 3s - loss: 0.4005 - acc: 0.9002 - val_loss: 0.5663 - val_acc: 0.8724

```

Epoch 10/35  
- 3s - loss: 0.3988 - acc: 0.9038 - val\_loss: 0.5646 - val\_acc: 0.8154  
Epoch 11/35  
- 3s - loss: 0.3717 - acc: 0.9060 - val\_loss: 0.4617 - val\_acc: 0.8785  
Epoch 12/35  
- 3s - loss: 0.3922 - acc: 0.9044 - val\_loss: 0.4656 - val\_acc: 0.8819  
Epoch 13/35  
- 3s - loss: 0.3537 - acc: 0.9093 - val\_loss: 0.4923 - val\_acc: 0.8371  
Epoch 14/35  
- 3s - loss: 0.3690 - acc: 0.9049 - val\_loss: 0.4180 - val\_acc: 0.8755  
Epoch 15/35  
- 3s - loss: 0.3711 - acc: 0.9072 - val\_loss: 0.4063 - val\_acc: 0.8772  
Epoch 16/35  
- 3s - loss: 0.3532 - acc: 0.9083 - val\_loss: 0.4669 - val\_acc: 0.8768  
Epoch 17/35  
- 3s - loss: 0.3594 - acc: 0.9089 - val\_loss: 0.5369 - val\_acc: 0.8412  
Epoch 18/35  
- 3s - loss: 0.3800 - acc: 0.9052 - val\_loss: 0.4391 - val\_acc: 0.8839  
Epoch 19/35  
- 3s - loss: 0.3646 - acc: 0.9095 - val\_loss: 0.4745 - val\_acc: 0.8670  
Epoch 20/35  
- 3s - loss: 0.3599 - acc: 0.9089 - val\_loss: 0.4247 - val\_acc: 0.8772  
Epoch 21/35  
- 3s - loss: 0.3310 - acc: 0.9140 - val\_loss: 0.4418 - val\_acc: 0.8765  
Epoch 22/35  
- 3s - loss: 0.3285 - acc: 0.9161 - val\_loss: 0.4521 - val\_acc: 0.8582  
Epoch 23/35  
- 3s - loss: 0.3630 - acc: 0.9072 - val\_loss: 0.4044 - val\_acc: 0.8761  
Epoch 24/35  
- 3s - loss: 0.3331 - acc: 0.9117 - val\_loss: 0.5197 - val\_acc: 0.8422  
Epoch 25/35  
- 3s - loss: 0.3525 - acc: 0.9095 - val\_loss: 0.6099 - val\_acc: 0.7978  
Epoch 26/35  
- 3s - loss: 0.3891 - acc: 0.9026 - val\_loss: 0.6096 - val\_acc: 0.8239  
Epoch 27/35  
- 3s - loss: 0.3508 - acc: 0.9116 - val\_loss: 0.4641 - val\_acc: 0.8429  
Epoch 28/35  
- 3s - loss: 0.3181 - acc: 0.9143 - val\_loss: 0.4692 - val\_acc: 0.8507  
Epoch 29/35  
- 3s - loss: 0.3120 - acc: 0.9176 - val\_loss: 0.4287 - val\_acc: 0.8656  
Epoch 30/35  
- 3s - loss: 0.3266 - acc: 0.9108 - val\_loss: 0.4353 - val\_acc: 0.8463  
Epoch 31/35  
- 3s - loss: 0.3295 - acc: 0.9095 - val\_loss: 0.4434 - val\_acc: 0.8670  
Epoch 32/35  
- 3s - loss: 0.3670 - acc: 0.9048 - val\_loss: 0.4375 - val\_acc: 0.8558  
Epoch 33/35  
- 3s - loss: 0.3205 - acc: 0.9195 - val\_loss: 0.4123 - val\_acc: 0.8639

Epoch 34/35  
 - 3s - loss: 0.3349 - acc: 0.9127 - val\_loss: 0.5441 - val\_acc: 0.8191  
 Epoch 35/35  
 - 3s - loss: 0.3298 - acc: 0.9135 - val\_loss: 0.4155 - val\_acc: 0.8670  
 Train accuracy 0.9151251360174102 Test accuracy: 0.8669833729216152

---

Layer (type)	Output Shape	Param #
=====		
conv1d_91 (Conv1D)	(None, 122, 28)	1792
-----		
conv1d_92 (Conv1D)	(None, 116, 16)	3152
-----		
dropout_46 (Dropout)	(None, 116, 16)	0
-----		
max_pooling1d_46 (MaxPooling)	(None, 58, 16)	0
-----		
flatten_46 (Flatten)	(None, 928)	0
-----		
dense_91 (Dense)	(None, 64)	59456
-----		
dense_92 (Dense)	(None, 6)	390
=====		

Total params: 64,790  
 Trainable params: 64,790  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 4s - loss: 14.1224 - acc: 0.7764 - val\_loss: 0.8613 - val\_acc: 0.8324  
 Epoch 2/25  
 - 2s - loss: 0.5556 - acc: 0.8751 - val\_loss: 0.7224 - val\_acc: 0.7940  
 Epoch 3/25  
 - 2s - loss: 0.4908 - acc: 0.8901 - val\_loss: 0.7228 - val\_acc: 0.8124  
 Epoch 4/25  
 - 2s - loss: 0.4757 - acc: 0.8913 - val\_loss: 0.5623 - val\_acc: 0.8894  
 Epoch 5/25  
 - 2s - loss: 0.4047 - acc: 0.9091 - val\_loss: 0.6285 - val\_acc: 0.8690  
 Epoch 6/25  
 - 2s - loss: 0.4235 - acc: 0.9029 - val\_loss: 0.5732 - val\_acc: 0.8636  
 Epoch 7/25  
 - 2s - loss: 0.3981 - acc: 0.9108 - val\_loss: 0.5661 - val\_acc: 0.8894  
 Epoch 8/25  
 - 2s - loss: 0.3818 - acc: 0.9121 - val\_loss: 0.4896 - val\_acc: 0.8887  
 Epoch 9/25  
 - 2s - loss: 0.3650 - acc: 0.9127 - val\_loss: 0.5023 - val\_acc: 0.8666  
 Epoch 10/25

```

- 2s - loss: 0.3698 - acc: 0.9158 - val_loss: 0.5703 - val_acc: 0.8307
Epoch 11/25
- 2s - loss: 0.3430 - acc: 0.9180 - val_loss: 0.5050 - val_acc: 0.8911
Epoch 12/25
- 2s - loss: 0.3577 - acc: 0.9177 - val_loss: 0.5017 - val_acc: 0.8965
Epoch 13/25
- 2s - loss: 0.3643 - acc: 0.9163 - val_loss: 0.4940 - val_acc: 0.9030
Epoch 14/25
- 2s - loss: 0.3304 - acc: 0.9240 - val_loss: 0.4770 - val_acc: 0.8799
Epoch 15/25
- 2s - loss: 0.3455 - acc: 0.9146 - val_loss: 0.6261 - val_acc: 0.8239
Epoch 16/25
- 2s - loss: 0.3338 - acc: 0.9241 - val_loss: 0.4990 - val_acc: 0.8877
Epoch 17/25
- 2s - loss: 0.3156 - acc: 0.9255 - val_loss: 0.4398 - val_acc: 0.8965
Epoch 18/25
- 2s - loss: 0.3075 - acc: 0.9260 - val_loss: 0.5896 - val_acc: 0.8212
Epoch 19/25
- 2s - loss: 0.3441 - acc: 0.9221 - val_loss: 0.6169 - val_acc: 0.8164
Epoch 20/25
- 2s - loss: 0.3255 - acc: 0.9249 - val_loss: 0.5002 - val_acc: 0.8704
Epoch 21/25
- 2s - loss: 0.2894 - acc: 0.9324 - val_loss: 0.4547 - val_acc: 0.8911
Epoch 22/25
- 2s - loss: 0.3026 - acc: 0.9268 - val_loss: 0.5328 - val_acc: 0.8544
Epoch 23/25
- 2s - loss: 0.2981 - acc: 0.9291 - val_loss: 0.4558 - val_acc: 0.8599
Epoch 24/25
- 2s - loss: 0.3203 - acc: 0.9222 - val_loss: 0.5094 - val_acc: 0.8765
Epoch 25/25
- 2s - loss: 0.3036 - acc: 0.9261 - val_loss: 0.4021 - val_acc: 0.9019
Train accuracy 0.9472252448313384 Test accuracy: 0.9019341703427214

```

Layer (type)	Output Shape	Param #
conv1d_93 (Conv1D)	(None, 124, 42)	1932
conv1d_94 (Conv1D)	(None, 120, 32)	6752
dropout_47 (Dropout)	(None, 120, 32)	0
max_pooling1d_47 (MaxPooling)	(None, 60, 32)	0
flatten_47 (Flatten)	(None, 1920)	0
dense_93 (Dense)	(None, 32)	61472



```

dense_94 (Dense)                (None, 6)                198
=====
Total params: 70,354
Trainable params: 70,354
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 6s - loss: 20.6513 - acc: 0.7474 - val_loss: 0.8795 - val_acc: 0.7231
Epoch 2/30
  - 4s - loss: 0.5524 - acc: 0.8553 - val_loss: 0.6381 - val_acc: 0.8568
Epoch 3/30
  - 4s - loss: 0.4818 - acc: 0.8690 - val_loss: 0.5706 - val_acc: 0.8283
Epoch 4/30
  - 4s - loss: 0.4561 - acc: 0.8781 - val_loss: 0.6439 - val_acc: 0.7967
Epoch 5/30
  - 4s - loss: 0.4442 - acc: 0.8791 - val_loss: 0.5864 - val_acc: 0.8103
Epoch 6/30
  - 4s - loss: 0.4307 - acc: 0.8852 - val_loss: 0.5405 - val_acc: 0.8375
Epoch 7/30
  - 4s - loss: 0.4205 - acc: 0.8825 - val_loss: 0.5517 - val_acc: 0.8368
Epoch 8/30
  - 4s - loss: 0.4073 - acc: 0.8890 - val_loss: 0.6337 - val_acc: 0.7794
Epoch 9/30
  - 4s - loss: 0.3932 - acc: 0.8896 - val_loss: 0.5910 - val_acc: 0.7961
Epoch 10/30
  - 4s - loss: 0.3904 - acc: 0.8951 - val_loss: 0.4510 - val_acc: 0.8510
Epoch 11/30
  - 4s - loss: 0.3888 - acc: 0.8927 - val_loss: 0.4871 - val_acc: 0.8711
Epoch 12/30
  - 4s - loss: 0.3840 - acc: 0.8934 - val_loss: 0.3956 - val_acc: 0.8877
Epoch 13/30
  - 4s - loss: 0.3740 - acc: 0.9019 - val_loss: 0.3951 - val_acc: 0.8860
Epoch 14/30
  - 4s - loss: 0.3817 - acc: 0.8957 - val_loss: 0.6313 - val_acc: 0.8314
Epoch 15/30
  - 4s - loss: 0.3750 - acc: 0.9010 - val_loss: 0.5276 - val_acc: 0.8069
Epoch 16/30
  - 4s - loss: 0.3744 - acc: 0.8988 - val_loss: 0.4497 - val_acc: 0.8490
Epoch 17/30
  - 4s - loss: 0.3640 - acc: 0.9011 - val_loss: 0.3706 - val_acc: 0.8873
Epoch 18/30
  - 4s - loss: 0.3587 - acc: 0.9032 - val_loss: 0.4298 - val_acc: 0.8816
Epoch 19/30
  - 4s - loss: 0.3614 - acc: 0.9021 - val_loss: 0.4474 - val_acc: 0.8680
Epoch 20/30
  - 4s - loss: 0.3690 - acc: 0.8996 - val_loss: 0.4803 - val_acc: 0.8327

```

Epoch 21/30  
 - 4s - loss: 0.3646 - acc: 0.9059 - val\_loss: 0.4852 - val\_acc: 0.8191  
 Epoch 22/30  
 - 4s - loss: 0.3619 - acc: 0.9066 - val\_loss: 0.8657 - val\_acc: 0.7061  
 Epoch 23/30  
 - 4s - loss: 0.3597 - acc: 0.9060 - val\_loss: 0.4068 - val\_acc: 0.8863  
 Epoch 24/30  
 - 4s - loss: 0.3690 - acc: 0.9003 - val\_loss: 0.6379 - val\_acc: 0.8188  
 Epoch 25/30  
 - 4s - loss: 0.3586 - acc: 0.9021 - val\_loss: 0.4374 - val\_acc: 0.8670  
 Epoch 26/30  
 - 4s - loss: 0.3593 - acc: 0.9045 - val\_loss: 0.4816 - val\_acc: 0.8375  
 Epoch 27/30  
 - 4s - loss: 0.3702 - acc: 0.9060 - val\_loss: 0.7920 - val\_acc: 0.7594  
 Epoch 28/30  
 - 4s - loss: 0.3581 - acc: 0.9048 - val\_loss: 0.4391 - val\_acc: 0.8565  
 Epoch 29/30  
 - 4s - loss: 0.3517 - acc: 0.9076 - val\_loss: 0.7177 - val\_acc: 0.7917  
 Epoch 30/30  
 - 4s - loss: 0.3618 - acc: 0.9041 - val\_loss: 0.3884 - val\_acc: 0.8904  
 Train accuracy 0.925734494015234 Test accuracy: 0.8903970139124533

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Layer (type)	Output Shape	Param #
conv1d_95 (Conv1D)	(None, 126, 32)	896
conv1d_96 (Conv1D)	(None, 124, 16)	1552
dropout_48 (Dropout)	(None, 124, 16)	0
max_pooling1d_48 (MaxPooling)	(None, 41, 16)	0
flatten_48 (Flatten)	(None, 656)	0
dense_95 (Dense)	(None, 32)	21024
dense_96 (Dense)	(None, 6)	198

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Total params: 23,670  
 Trainable params: 23,670  
 Non-trainable params: 0

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None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 7s - loss: 3.9199 - acc: 0.7568 - val\_loss: 1.3115 - val\_acc: 0.8504  
 Epoch 2/25

```

- 4s - loss: 0.5764 - acc: 0.9207 - val_loss: 0.6236 - val_acc: 0.8259
Epoch 3/25
- 5s - loss: 0.3302 - acc: 0.9264 - val_loss: 0.4838 - val_acc: 0.8850
Epoch 4/25
- 4s - loss: 0.2730 - acc: 0.9343 - val_loss: 0.4120 - val_acc: 0.8989
Epoch 5/25
- 4s - loss: 0.2438 - acc: 0.9408 - val_loss: 0.4230 - val_acc: 0.8867
Epoch 6/25
- 4s - loss: 0.2204 - acc: 0.9456 - val_loss: 0.3906 - val_acc: 0.9070
Epoch 7/25
- 4s - loss: 0.2359 - acc: 0.9388 - val_loss: 0.3531 - val_acc: 0.8985
Epoch 8/25
- 4s - loss: 0.2122 - acc: 0.9476 - val_loss: 0.3350 - val_acc: 0.9074
Epoch 9/25
- 5s - loss: 0.2003 - acc: 0.9425 - val_loss: 0.3846 - val_acc: 0.8846
Epoch 10/25
- 4s - loss: 0.1874 - acc: 0.9498 - val_loss: 0.3056 - val_acc: 0.9233
Epoch 11/25
- 5s - loss: 0.1895 - acc: 0.9494 - val_loss: 0.3580 - val_acc: 0.9118
Epoch 12/25
- 4s - loss: 0.1969 - acc: 0.9444 - val_loss: 0.3796 - val_acc: 0.8982
Epoch 13/25
- 4s - loss: 0.1860 - acc: 0.9509 - val_loss: 0.3324 - val_acc: 0.9013
Epoch 14/25
- 5s - loss: 0.1712 - acc: 0.9543 - val_loss: 0.3050 - val_acc: 0.9135
Epoch 15/25
- 4s - loss: 0.1810 - acc: 0.9475 - val_loss: 0.3063 - val_acc: 0.9094
Epoch 16/25
- 4s - loss: 0.1636 - acc: 0.9516 - val_loss: 0.3497 - val_acc: 0.9104
Epoch 17/25
- 5s - loss: 0.1579 - acc: 0.9535 - val_loss: 0.3284 - val_acc: 0.9077
Epoch 18/25
- 4s - loss: 0.1715 - acc: 0.9495 - val_loss: 0.2929 - val_acc: 0.9209
Epoch 19/25
- 4s - loss: 0.1720 - acc: 0.9510 - val_loss: 0.2761 - val_acc: 0.9002
Epoch 20/25
- 4s - loss: 0.1516 - acc: 0.9565 - val_loss: 0.3332 - val_acc: 0.9050
Epoch 21/25
- 4s - loss: 0.1854 - acc: 0.9433 - val_loss: 0.3419 - val_acc: 0.8972
Epoch 22/25
- 4s - loss: 0.1568 - acc: 0.9539 - val_loss: 0.3314 - val_acc: 0.8989
Epoch 23/25
- 4s - loss: 0.1568 - acc: 0.9539 - val_loss: 0.3017 - val_acc: 0.9087
Epoch 24/25
- 4s - loss: 0.1506 - acc: 0.9538 - val_loss: 0.3026 - val_acc: 0.9070
Epoch 25/25
- 4s - loss: 0.1608 - acc: 0.9533 - val_loss: 0.2811 - val_acc: 0.9145
Train accuracy 0.9613710554951034 Test accuracy: 0.9144893111638955

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Layer (type)	Output Shape	Param #
conv1d_97 (Conv1D)	(None, 126, 32)	896
conv1d_98 (Conv1D)	(None, 124, 16)	1552
dropout_49 (Dropout)	(None, 124, 16)	0
max_pooling1d_49 (MaxPooling)	(None, 62, 16)	0
flatten_49 (Flatten)	(None, 992)	0
dense_97 (Dense)	(None, 64)	63552
dense_98 (Dense)	(None, 6)	390

---

Total params: 66,390

Trainable params: 66,390

Non-trainable params: 0

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None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 5s - loss: 16.4565 - acc: 0.5947 - val\_loss: 3.7476 - val\_acc: 0.8012

Epoch 2/25

- 2s - loss: 1.5969 - acc: 0.8796 - val\_loss: 0.9833 - val\_acc: 0.8616

Epoch 3/25

- 2s - loss: 0.6378 - acc: 0.9120 - val\_loss: 0.7204 - val\_acc: 0.8887

Epoch 4/25

- 3s - loss: 0.4893 - acc: 0.9211 - val\_loss: 0.6302 - val\_acc: 0.8806

Epoch 5/25

- 2s - loss: 0.4115 - acc: 0.9211 - val\_loss: 0.5471 - val\_acc: 0.8931

Epoch 6/25

- 2s - loss: 0.3678 - acc: 0.9256 - val\_loss: 0.4995 - val\_acc: 0.8935

Epoch 7/25

- 2s - loss: 0.3099 - acc: 0.9350 - val\_loss: 0.4832 - val\_acc: 0.8860

Epoch 8/25

- 2s - loss: 0.3044 - acc: 0.9308 - val\_loss: 0.4442 - val\_acc: 0.9016

Epoch 9/25

- 3s - loss: 0.2944 - acc: 0.9319 - val\_loss: 0.4784 - val\_acc: 0.8677

Epoch 10/25

- 2s - loss: 0.2729 - acc: 0.9339 - val\_loss: 0.4225 - val\_acc: 0.9111

Epoch 11/25

- 2s - loss: 0.2450 - acc: 0.9416 - val\_loss: 0.4151 - val\_acc: 0.8904

Epoch 12/25

- 2s - loss: 0.2444 - acc: 0.9384 - val\_loss: 0.3890 - val\_acc: 0.8863

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Epoch 13/25
- 2s - loss: 0.2417 - acc: 0.9378 - val_loss: 0.4039 - val_acc: 0.8785
Epoch 14/25
- 3s - loss: 0.2609 - acc: 0.9332 - val_loss: 0.4009 - val_acc: 0.9043
Epoch 15/25
- 2s - loss: 0.2288 - acc: 0.9391 - val_loss: 0.3991 - val_acc: 0.8846
Epoch 16/25
- 2s - loss: 0.2235 - acc: 0.9412 - val_loss: 0.3854 - val_acc: 0.8914
Epoch 17/25
- 3s - loss: 0.2077 - acc: 0.9470 - val_loss: 0.3681 - val_acc: 0.9013
Epoch 18/25
- 3s - loss: 0.2275 - acc: 0.9376 - val_loss: 0.3870 - val_acc: 0.9080
Epoch 19/25
- 3s - loss: 0.2135 - acc: 0.9442 - val_loss: 0.3656 - val_acc: 0.8955
Epoch 20/25
- 2s - loss: 0.2119 - acc: 0.9416 - val_loss: 0.3578 - val_acc: 0.9057
Epoch 21/25
- 3s - loss: 0.2102 - acc: 0.9437 - val_loss: 0.3854 - val_acc: 0.8907
Epoch 22/25
- 2s - loss: 0.2099 - acc: 0.9407 - val_loss: 0.3475 - val_acc: 0.8989
Epoch 23/25
- 2s - loss: 0.1956 - acc: 0.9440 - val_loss: 0.3455 - val_acc: 0.9145
Epoch 24/25
- 3s - loss: 0.2010 - acc: 0.9442 - val_loss: 0.3476 - val_acc: 0.9030
Epoch 25/25
- 2s - loss: 0.2221 - acc: 0.9412 - val_loss: 0.3550 - val_acc: 0.9046
Train accuracy 0.9381120783460283 Test accuracy: 0.9046487953851374

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Layer (type)	Output Shape	Param #
conv1d_99 (Conv1D)	(None, 126, 32)	896
conv1d_100 (Conv1D)	(None, 124, 16)	1552
dropout_50 (Dropout)	(None, 124, 16)	0
max_pooling1d_50 (MaxPooling)	(None, 41, 16)	0
flatten_50 (Flatten)	(None, 656)	0
dense_99 (Dense)	(None, 32)	21024
dense_100 (Dense)	(None, 6)	198

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```

Total params: 23,670
Trainable params: 23,670
Non-trainable params: 0

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```

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None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 6s - loss: 48.8144 - acc: 0.6893 - val_loss: 4.1941 - val_acc: 0.6790
Epoch 2/30
  - 4s - loss: 1.1903 - acc: 0.7703 - val_loss: 0.9750 - val_acc: 0.6943
Epoch 3/30
  - 4s - loss: 0.6784 - acc: 0.8028 - val_loss: 0.8482 - val_acc: 0.7638
Epoch 4/30
  - 4s - loss: 0.6153 - acc: 0.8211 - val_loss: 0.7753 - val_acc: 0.8222
Epoch 5/30
  - 4s - loss: 0.5791 - acc: 0.8405 - val_loss: 0.7997 - val_acc: 0.7754
Epoch 6/30
  - 4s - loss: 0.5462 - acc: 0.8490 - val_loss: 0.7971 - val_acc: 0.7689
Epoch 7/30
  - 4s - loss: 0.5238 - acc: 0.8576 - val_loss: 0.6791 - val_acc: 0.8205
Epoch 8/30
  - 4s - loss: 0.5081 - acc: 0.8613 - val_loss: 0.6642 - val_acc: 0.8059
Epoch 9/30
  - 4s - loss: 0.4941 - acc: 0.8630 - val_loss: 0.7097 - val_acc: 0.7859
Epoch 10/30
  - 4s - loss: 0.4803 - acc: 0.8724 - val_loss: 0.6713 - val_acc: 0.8354
Epoch 11/30
  - 4s - loss: 0.4761 - acc: 0.8692 - val_loss: 0.6530 - val_acc: 0.8371
Epoch 12/30
  - 4s - loss: 0.4656 - acc: 0.8735 - val_loss: 0.6509 - val_acc: 0.7913
Epoch 13/30
  - 4s - loss: 0.4600 - acc: 0.8727 - val_loss: 0.6125 - val_acc: 0.8344
Epoch 14/30
  - 4s - loss: 0.4551 - acc: 0.8798 - val_loss: 0.6285 - val_acc: 0.8449
Epoch 15/30
  - 4s - loss: 0.4441 - acc: 0.8811 - val_loss: 0.6167 - val_acc: 0.8456
Epoch 16/30
  - 4s - loss: 0.4413 - acc: 0.8853 - val_loss: 0.6444 - val_acc: 0.8198
Epoch 17/30
  - 4s - loss: 0.4287 - acc: 0.8849 - val_loss: 0.6124 - val_acc: 0.8188
Epoch 18/30
  - 4s - loss: 0.4213 - acc: 0.8920 - val_loss: 0.5524 - val_acc: 0.8629
Epoch 19/30
  - 4s - loss: 0.4203 - acc: 0.8866 - val_loss: 0.6787 - val_acc: 0.7604
Epoch 20/30
  - 4s - loss: 0.4217 - acc: 0.8882 - val_loss: 0.6011 - val_acc: 0.8466
Epoch 21/30
  - 4s - loss: 0.4128 - acc: 0.8916 - val_loss: 0.5849 - val_acc: 0.8181
Epoch 22/30
  - 4s - loss: 0.4131 - acc: 0.8901 - val_loss: 0.5697 - val_acc: 0.8388
Epoch 23/30

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```

- 4s - loss: 0.4116 - acc: 0.8904 - val_loss: 0.5820 - val_acc: 0.8436
Epoch 24/30
- 4s - loss: 0.3989 - acc: 0.8957 - val_loss: 0.5713 - val_acc: 0.8466
Epoch 25/30
- 4s - loss: 0.3948 - acc: 0.8949 - val_loss: 0.5398 - val_acc: 0.8595
Epoch 26/30
- 4s - loss: 0.3994 - acc: 0.8950 - val_loss: 0.8517 - val_acc: 0.7119
Epoch 27/30
- 4s - loss: 0.3878 - acc: 0.8977 - val_loss: 0.7485 - val_acc: 0.7628
Epoch 28/30
- 4s - loss: 0.3910 - acc: 0.8984 - val_loss: 0.5619 - val_acc: 0.8331
Epoch 29/30
- 4s - loss: 0.3803 - acc: 0.8984 - val_loss: 0.5217 - val_acc: 0.8324
Epoch 30/30
- 4s - loss: 0.3792 - acc: 0.8999 - val_loss: 0.5470 - val_acc: 0.8409
Train accuracy 0.9148531011969532 Test accuracy: 0.8408551068883611
-----

```

Layer (type)	Output Shape	Param #
conv1d_101 (Conv1D)	(None, 126, 32)	896
conv1d_102 (Conv1D)	(None, 124, 32)	3104
dropout_51 (Dropout)	(None, 124, 32)	0
max_pooling1d_51 (MaxPooling)	(None, 41, 32)	0
flatten_51 (Flatten)	(None, 1312)	0
dense_101 (Dense)	(None, 32)	42016
dense_102 (Dense)	(None, 6)	198

```

=====
Total params: 46,214
Trainable params: 46,214
Non-trainable params: 0
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```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
- 7s - loss: 7.2376 - acc: 0.7301 - val_loss: 1.9546 - val_acc: 0.8327
Epoch 2/35
- 3s - loss: 0.8647 - acc: 0.9000 - val_loss: 0.7990 - val_acc: 0.8269
Epoch 3/35
- 4s - loss: 0.4210 - acc: 0.9149 - val_loss: 0.6137 - val_acc: 0.8507
Epoch 4/35
- 3s - loss: 0.3414 - acc: 0.9246 - val_loss: 0.5740 - val_acc: 0.8605

```

Epoch 5/35  
- 3s - loss: 0.3235 - acc: 0.9207 - val\_loss: 0.5459 - val\_acc: 0.8734  
Epoch 6/35  
- 4s - loss: 0.3136 - acc: 0.9221 - val\_loss: 0.5366 - val\_acc: 0.8697  
Epoch 7/35  
- 3s - loss: 0.2866 - acc: 0.9261 - val\_loss: 0.4931 - val\_acc: 0.8724  
Epoch 8/35  
- 3s - loss: 0.2726 - acc: 0.9317 - val\_loss: 0.4879 - val\_acc: 0.8884  
Epoch 9/35  
- 3s - loss: 0.2686 - acc: 0.9329 - val\_loss: 0.4603 - val\_acc: 0.8914  
Epoch 10/35  
- 4s - loss: 0.2562 - acc: 0.9325 - val\_loss: 0.4843 - val\_acc: 0.8843  
Epoch 11/35  
- 3s - loss: 0.2531 - acc: 0.9338 - val\_loss: 0.4647 - val\_acc: 0.8924  
Epoch 12/35  
- 3s - loss: 0.2462 - acc: 0.9344 - val\_loss: 0.4693 - val\_acc: 0.8826  
Epoch 13/35  
- 3s - loss: 0.2455 - acc: 0.9347 - val\_loss: 0.4400 - val\_acc: 0.8907  
Epoch 14/35  
- 4s - loss: 0.2431 - acc: 0.9357 - val\_loss: 0.4232 - val\_acc: 0.8935  
Epoch 15/35  
- 3s - loss: 0.2235 - acc: 0.9399 - val\_loss: 0.4123 - val\_acc: 0.8951  
Epoch 16/35  
- 3s - loss: 0.2200 - acc: 0.9406 - val\_loss: 0.4153 - val\_acc: 0.8962  
Epoch 17/35  
- 4s - loss: 0.2162 - acc: 0.9445 - val\_loss: 0.4383 - val\_acc: 0.8816  
Epoch 18/35  
- 3s - loss: 0.2277 - acc: 0.9410 - val\_loss: 0.4660 - val\_acc: 0.8711  
Epoch 19/35  
- 3s - loss: 0.2346 - acc: 0.9395 - val\_loss: 0.3980 - val\_acc: 0.8965  
Epoch 20/35  
- 3s - loss: 0.2203 - acc: 0.9403 - val\_loss: 0.4091 - val\_acc: 0.8836  
Epoch 21/35  
- 4s - loss: 0.2067 - acc: 0.9445 - val\_loss: 0.4286 - val\_acc: 0.8758  
Epoch 22/35  
- 3s - loss: 0.2040 - acc: 0.9437 - val\_loss: 0.4247 - val\_acc: 0.8863  
Epoch 23/35  
- 3s - loss: 0.2072 - acc: 0.9419 - val\_loss: 0.4068 - val\_acc: 0.8873  
Epoch 24/35  
- 3s - loss: 0.2095 - acc: 0.9406 - val\_loss: 0.4240 - val\_acc: 0.8948  
Epoch 25/35  
- 4s - loss: 0.2030 - acc: 0.9437 - val\_loss: 0.4013 - val\_acc: 0.8887  
Epoch 26/35  
- 3s - loss: 0.2031 - acc: 0.9434 - val\_loss: 0.3460 - val\_acc: 0.9013  
Epoch 27/35  
- 3s - loss: 0.1993 - acc: 0.9433 - val\_loss: 0.4110 - val\_acc: 0.8894  
Epoch 28/35  
- 3s - loss: 0.2109 - acc: 0.9423 - val\_loss: 0.3851 - val\_acc: 0.8941



Epoch 29/35  
 - 4s - loss: 0.1909 - acc: 0.9470 - val\_loss: 0.3839 - val\_acc: 0.8700  
 Epoch 30/35  
 - 3s - loss: 0.1944 - acc: 0.9436 - val\_loss: 0.4124 - val\_acc: 0.8819  
 Epoch 31/35  
 - 3s - loss: 0.1880 - acc: 0.9446 - val\_loss: 0.3479 - val\_acc: 0.9057  
 Epoch 32/35  
 - 3s - loss: 0.1930 - acc: 0.9440 - val\_loss: 0.3635 - val\_acc: 0.9033  
 Epoch 33/35  
 - 4s - loss: 0.2100 - acc: 0.9406 - val\_loss: 0.4027 - val\_acc: 0.8823  
 Epoch 34/35  
 - 3s - loss: 0.1966 - acc: 0.9422 - val\_loss: 0.3719 - val\_acc: 0.8958  
 Epoch 35/35  
 - 3s - loss: 0.1822 - acc: 0.9467 - val\_loss: 0.3555 - val\_acc: 0.8958  
 Train accuracy 0.9435527747551686 Test accuracy: 0.8958262639972854

---

Layer (type)	Output Shape	Param #
conv1d_103 (Conv1D)	(None, 126, 32)	896
conv1d_104 (Conv1D)	(None, 124, 16)	1552
dropout_52 (Dropout)	(None, 124, 16)	0
max_pooling1d_52 (MaxPooling)	(None, 62, 16)	0
flatten_52 (Flatten)	(None, 992)	0
dense_103 (Dense)	(None, 64)	63552
dense_104 (Dense)	(None, 6)	390

---

Total params: 66,390  
 Trainable params: 66,390  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 5s - loss: 61.2418 - acc: 0.7807 - val\_loss: 17.9154 - val\_acc: 0.8307  
 Epoch 2/25  
 - 3s - loss: 7.0004 - acc: 0.9026 - val\_loss: 2.0242 - val\_acc: 0.8775  
 Epoch 3/25  
 - 3s - loss: 0.9250 - acc: 0.9052 - val\_loss: 0.7673 - val\_acc: 0.8320  
 Epoch 4/25  
 - 3s - loss: 0.5172 - acc: 0.8939 - val\_loss: 0.6225 - val\_acc: 0.8734  
 Epoch 5/25

```

- 3s - loss: 0.3989 - acc: 0.9127 - val_loss: 0.5753 - val_acc: 0.8785
Epoch 6/25
- 2s - loss: 0.3933 - acc: 0.9134 - val_loss: 0.4969 - val_acc: 0.8785
Epoch 7/25
- 3s - loss: 0.3592 - acc: 0.9139 - val_loss: 0.5046 - val_acc: 0.8609
Epoch 8/25
- 2s - loss: 0.3358 - acc: 0.9191 - val_loss: 0.4716 - val_acc: 0.8894
Epoch 9/25
- 2s - loss: 0.3132 - acc: 0.9290 - val_loss: 0.4663 - val_acc: 0.8853
Epoch 10/25
- 3s - loss: 0.2976 - acc: 0.9286 - val_loss: 0.4955 - val_acc: 0.8860
Epoch 11/25
- 2s - loss: 0.2789 - acc: 0.9327 - val_loss: 0.4329 - val_acc: 0.8795
Epoch 12/25
- 3s - loss: 0.3145 - acc: 0.9233 - val_loss: 0.4440 - val_acc: 0.8968
Epoch 13/25
- 2s - loss: 0.2949 - acc: 0.9301 - val_loss: 0.4286 - val_acc: 0.8911
Epoch 14/25
- 2s - loss: 0.2932 - acc: 0.9286 - val_loss: 0.4314 - val_acc: 0.8894
Epoch 15/25
- 3s - loss: 0.2767 - acc: 0.9310 - val_loss: 0.4166 - val_acc: 0.8901
Epoch 16/25
- 2s - loss: 0.2638 - acc: 0.9361 - val_loss: 0.3961 - val_acc: 0.9080
Epoch 17/25
- 3s - loss: 0.2878 - acc: 0.9240 - val_loss: 0.4237 - val_acc: 0.8914
Epoch 18/25
- 2s - loss: 0.2730 - acc: 0.9310 - val_loss: 0.3735 - val_acc: 0.9036
Epoch 19/25
- 3s - loss: 0.2677 - acc: 0.9316 - val_loss: 0.3703 - val_acc: 0.8975
Epoch 20/25
- 3s - loss: 0.2409 - acc: 0.9358 - val_loss: 0.3753 - val_acc: 0.8914
Epoch 21/25
- 2s - loss: 0.2577 - acc: 0.9331 - val_loss: 0.3721 - val_acc: 0.9053
Epoch 22/25
- 2s - loss: 0.2369 - acc: 0.9380 - val_loss: 0.3560 - val_acc: 0.9033
Epoch 23/25
- 2s - loss: 0.2323 - acc: 0.9395 - val_loss: 0.4107 - val_acc: 0.8697
Epoch 24/25
- 2s - loss: 0.2446 - acc: 0.9355 - val_loss: 0.3456 - val_acc: 0.9077
Epoch 25/25
- 3s - loss: 0.2238 - acc: 0.9389 - val_loss: 0.3664 - val_acc: 0.8918
Train accuracy 0.9435527747551686 Test accuracy: 0.8917543264336614

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_105 (Conv1D)         (None, 126, 32)            896
-----

```

conv1d_106 (Conv1D)	(None, 124, 16)	1552
-----		
dropout_53 (Dropout)	(None, 124, 16)	0
-----		
max_pooling1d_53 (MaxPooling)	(None, 41, 16)	0
-----		
flatten_53 (Flatten)	(None, 656)	0
-----		
dense_105 (Dense)	(None, 32)	21024
-----		
dense_106 (Dense)	(None, 6)	198
=====		
Total params: 23,670		
Trainable params: 23,670		
Non-trainable params: 0		
-----		
None		
Train on 7352 samples, validate on 2947 samples		
Epoch 1/25		
- 7s - loss: 16.4963 - acc: 0.7205 - val_loss: 0.9762 - val_acc: 0.7618		
Epoch 2/25		
- 5s - loss: 0.7177 - acc: 0.7885 - val_loss: 0.8843 - val_acc: 0.7262		
Epoch 3/25		
- 5s - loss: 0.6427 - acc: 0.8033 - val_loss: 0.8549 - val_acc: 0.7533		
Epoch 4/25		
- 5s - loss: 0.5748 - acc: 0.8334 - val_loss: 0.7417 - val_acc: 0.7693		
Epoch 5/25		
- 5s - loss: 0.5670 - acc: 0.8413 - val_loss: 0.7641 - val_acc: 0.8005		
Epoch 6/25		
- 4s - loss: 0.5483 - acc: 0.8477 - val_loss: 0.8034 - val_acc: 0.7577		
Epoch 7/25		
- 5s - loss: 0.5015 - acc: 0.8679 - val_loss: 0.7603 - val_acc: 0.7838		
Epoch 8/25		
- 5s - loss: 0.4859 - acc: 0.8700 - val_loss: 0.6257 - val_acc: 0.8483		
Epoch 9/25		
- 5s - loss: 0.4862 - acc: 0.8690 - val_loss: 0.6675 - val_acc: 0.8120		
Epoch 10/25		
- 5s - loss: 0.4650 - acc: 0.8716 - val_loss: 0.6007 - val_acc: 0.8551		
Epoch 11/25		
- 5s - loss: 0.4490 - acc: 0.8837 - val_loss: 0.8165 - val_acc: 0.6970		
Epoch 12/25		
- 5s - loss: 0.4440 - acc: 0.8815 - val_loss: 0.6560 - val_acc: 0.8358		
Epoch 13/25		
- 4s - loss: 0.4510 - acc: 0.8821 - val_loss: 0.6922 - val_acc: 0.7920		
Epoch 14/25		
- 5s - loss: 0.4448 - acc: 0.8808 - val_loss: 0.5452 - val_acc: 0.8551		
Epoch 15/25		
- 5s - loss: 0.4215 - acc: 0.8905 - val_loss: 0.6148 - val_acc: 0.8364		

```

Epoch 16/25
  - 5s - loss: 0.4211 - acc: 0.8908 - val_loss: 0.6086 - val_acc: 0.8364
Epoch 17/25
  - 5s - loss: 0.4142 - acc: 0.8913 - val_loss: 0.5331 - val_acc: 0.8537
Epoch 18/25
  - 4s - loss: 0.4037 - acc: 0.8946 - val_loss: 0.6793 - val_acc: 0.7917
Epoch 19/25
  - 4s - loss: 0.4182 - acc: 0.8916 - val_loss: 0.6947 - val_acc: 0.7876
Epoch 20/25
  - 5s - loss: 0.4134 - acc: 0.8947 - val_loss: 0.4953 - val_acc: 0.8521
Epoch 21/25
  - 4s - loss: 0.4253 - acc: 0.8894 - val_loss: 0.6991 - val_acc: 0.7998
Epoch 22/25
  - 5s - loss: 0.4191 - acc: 0.8909 - val_loss: 0.5239 - val_acc: 0.8554
Epoch 23/25
  - 5s - loss: 0.3939 - acc: 0.8965 - val_loss: 0.5239 - val_acc: 0.8290
Epoch 24/25
  - 4s - loss: 0.3978 - acc: 0.9004 - val_loss: 0.5010 - val_acc: 0.8571
Epoch 25/25
  - 5s - loss: 0.3926 - acc: 0.8983 - val_loss: 0.5566 - val_acc: 0.8521
Train accuracy 0.8876496191512514 Test accuracy: 0.8520529351883271

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_107 (Conv1D)	(None, 126, 32)	896
conv1d_108 (Conv1D)	(None, 124, 16)	1552
dropout_54 (Dropout)	(None, 124, 16)	0
max_pooling1d_54 (MaxPooling)	(None, 41, 16)	0
flatten_54 (Flatten)	(None, 656)	0
dense_107 (Dense)	(None, 32)	21024
dense_108 (Dense)	(None, 6)	198
=====		

```

Total params: 23,670
Trainable params: 23,670
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 6s - loss: 7.2943 - acc: 0.7276 - val_loss: 0.8502 - val_acc: 0.7431
Epoch 2/30

```

- 3s - loss: 0.5941 - acc: 0.8410 - val\_loss: 0.7489 - val\_acc: 0.7570  
Epoch 3/30  
- 3s - loss: 0.5049 - acc: 0.8648 - val\_loss: 0.6635 - val\_acc: 0.8062  
Epoch 4/30  
- 3s - loss: 0.4655 - acc: 0.8711 - val\_loss: 0.5653 - val\_acc: 0.8531  
Epoch 5/30  
- 3s - loss: 0.4304 - acc: 0.8838 - val\_loss: 0.5208 - val\_acc: 0.8616  
Epoch 6/30  
- 4s - loss: 0.3982 - acc: 0.8901 - val\_loss: 0.5428 - val\_acc: 0.8578  
Epoch 7/30  
- 3s - loss: 0.3815 - acc: 0.8980 - val\_loss: 0.7239 - val\_acc: 0.7750  
Epoch 8/30  
- 3s - loss: 0.3717 - acc: 0.8989 - val\_loss: 0.5074 - val\_acc: 0.8649  
Epoch 9/30  
- 3s - loss: 0.3615 - acc: 0.9022 - val\_loss: 0.4470 - val\_acc: 0.8962  
Epoch 10/30  
- 4s - loss: 0.3477 - acc: 0.9066 - val\_loss: 0.4825 - val\_acc: 0.8636  
Epoch 11/30  
- 3s - loss: 0.3445 - acc: 0.9048 - val\_loss: 0.4878 - val\_acc: 0.8490  
Epoch 12/30  
- 3s - loss: 0.3378 - acc: 0.9097 - val\_loss: 0.5034 - val\_acc: 0.8602  
Epoch 13/30  
- 4s - loss: 0.3318 - acc: 0.9085 - val\_loss: 0.4340 - val\_acc: 0.8924  
Epoch 14/30  
- 3s - loss: 0.3295 - acc: 0.9104 - val\_loss: 0.4473 - val\_acc: 0.8809  
Epoch 15/30  
- 3s - loss: 0.3224 - acc: 0.9187 - val\_loss: 0.4072 - val\_acc: 0.8938  
Epoch 16/30  
- 3s - loss: 0.3168 - acc: 0.9129 - val\_loss: 0.4318 - val\_acc: 0.8761  
Epoch 17/30  
- 4s - loss: 0.3249 - acc: 0.9119 - val\_loss: 0.4234 - val\_acc: 0.8833  
Epoch 18/30  
- 3s - loss: 0.3150 - acc: 0.9159 - val\_loss: 0.4262 - val\_acc: 0.8778  
Epoch 19/30  
- 3s - loss: 0.3131 - acc: 0.9158 - val\_loss: 0.4219 - val\_acc: 0.8680  
Epoch 20/30  
- 4s - loss: 0.3087 - acc: 0.9153 - val\_loss: 0.4145 - val\_acc: 0.8755  
Epoch 21/30  
- 3s - loss: 0.3102 - acc: 0.9183 - val\_loss: 0.5523 - val\_acc: 0.8415  
Epoch 22/30  
- 3s - loss: 0.3104 - acc: 0.9172 - val\_loss: 0.7635 - val\_acc: 0.7448  
Epoch 23/30  
- 3s - loss: 0.3073 - acc: 0.9150 - val\_loss: 0.7141 - val\_acc: 0.7628  
Epoch 24/30  
- 4s - loss: 0.3022 - acc: 0.9212 - val\_loss: 0.4858 - val\_acc: 0.8259  
Epoch 25/30  
- 3s - loss: 0.3095 - acc: 0.9219 - val\_loss: 0.5848 - val\_acc: 0.7947  
Epoch 26/30

```

- 3s - loss: 0.2968 - acc: 0.9222 - val_loss: 0.5530 - val_acc: 0.8107
Epoch 27/30
- 4s - loss: 0.2942 - acc: 0.9215 - val_loss: 0.4663 - val_acc: 0.8537
Epoch 28/30
- 3s - loss: 0.3014 - acc: 0.9189 - val_loss: 0.4815 - val_acc: 0.8263
Epoch 29/30
- 3s - loss: 0.2998 - acc: 0.9187 - val_loss: 0.6146 - val_acc: 0.7825
Epoch 30/30
- 4s - loss: 0.3029 - acc: 0.9177 - val_loss: 0.5795 - val_acc: 0.8025
Train accuracy 0.8590859630032645 Test accuracy: 0.8025110281642348

```

Layer (type)	Output Shape	Param #
conv1d_109 (Conv1D)	(None, 126, 32)	896
conv1d_110 (Conv1D)	(None, 124, 32)	3104
dropout_55 (Dropout)	(None, 124, 32)	0
max_pooling1d_55 (MaxPooling)	(None, 62, 32)	0
flatten_55 (Flatten)	(None, 1984)	0
dense_109 (Dense)	(None, 32)	63520
dense_110 (Dense)	(None, 6)	198

```

Total params: 67,718
Trainable params: 67,718
Non-trainable params: 0

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 7s - loss: 8.6993 - acc: 0.7422 - val_loss: 0.9144 - val_acc: 0.7784
Epoch 2/25
- 5s - loss: 0.5869 - acc: 0.8547 - val_loss: 0.7051 - val_acc: 0.8303
Epoch 3/25
- 5s - loss: 0.4864 - acc: 0.8800 - val_loss: 0.6360 - val_acc: 0.8276
Epoch 4/25
- 5s - loss: 0.4354 - acc: 0.8913 - val_loss: 0.6226 - val_acc: 0.8449
Epoch 5/25
- 5s - loss: 0.4105 - acc: 0.8932 - val_loss: 0.5604 - val_acc: 0.8558
Epoch 6/25
- 5s - loss: 0.3962 - acc: 0.8989 - val_loss: 0.6237 - val_acc: 0.8049
Epoch 7/25
- 5s - loss: 0.3891 - acc: 0.9027 - val_loss: 0.5631 - val_acc: 0.8487

```

```

Epoch 8/25
- 5s - loss: 0.3631 - acc: 0.9071 - val_loss: 0.5022 - val_acc: 0.8568
Epoch 9/25
- 5s - loss: 0.3509 - acc: 0.9106 - val_loss: 0.5078 - val_acc: 0.8738
Epoch 10/25
- 5s - loss: 0.3263 - acc: 0.9173 - val_loss: 0.4969 - val_acc: 0.8483
Epoch 11/25
- 5s - loss: 0.3202 - acc: 0.9200 - val_loss: 0.4656 - val_acc: 0.8616
Epoch 12/25
- 5s - loss: 0.3206 - acc: 0.9196 - val_loss: 0.4649 - val_acc: 0.8785
Epoch 13/25
- 5s - loss: 0.3091 - acc: 0.9232 - val_loss: 0.4803 - val_acc: 0.8812
Epoch 14/25
- 5s - loss: 0.3051 - acc: 0.9263 - val_loss: 0.4823 - val_acc: 0.8619
Epoch 15/25
- 5s - loss: 0.2792 - acc: 0.9289 - val_loss: 0.5387 - val_acc: 0.8429
Epoch 16/25
- 5s - loss: 0.3156 - acc: 0.9218 - val_loss: 0.4439 - val_acc: 0.8626
Epoch 17/25
- 5s - loss: 0.2922 - acc: 0.9238 - val_loss: 0.4209 - val_acc: 0.8924
Epoch 18/25
- 5s - loss: 0.2949 - acc: 0.9249 - val_loss: 0.3998 - val_acc: 0.8921
Epoch 19/25
- 5s - loss: 0.3135 - acc: 0.9197 - val_loss: 0.4041 - val_acc: 0.8856
Epoch 20/25
- 5s - loss: 0.3087 - acc: 0.9219 - val_loss: 0.4810 - val_acc: 0.8551
Epoch 21/25
- 5s - loss: 0.3053 - acc: 0.9222 - val_loss: 0.3927 - val_acc: 0.8812
Epoch 22/25
- 5s - loss: 0.2906 - acc: 0.9253 - val_loss: 0.4503 - val_acc: 0.8761
Epoch 23/25
- 5s - loss: 0.2750 - acc: 0.9282 - val_loss: 0.4167 - val_acc: 0.8687
Epoch 24/25
- 5s - loss: 0.2985 - acc: 0.9210 - val_loss: 0.4217 - val_acc: 0.8768
Epoch 25/25
- 5s - loss: 0.2726 - acc: 0.9304 - val_loss: 0.4347 - val_acc: 0.8551
Train accuracy 0.9181175190424374 Test accuracy: 0.8551068883610451

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_111 (Conv1D)	(None, 126, 32)	896
-----		
conv1d_112 (Conv1D)	(None, 124, 16)	1552
-----		
dropout_56 (Dropout)	(None, 124, 16)	0
-----		
max_pooling1d_56 (MaxPooling)	(None, 41, 16)	0

```

-----
flatten_56 (Flatten)          (None, 656)          0
-----
dense_111 (Dense)             (None, 64)           42048
-----
dense_112 (Dense)             (None, 6)            390
=====
Total params: 44,886
Trainable params: 44,886
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
  - 5s - loss: 27.9803 - acc: 0.7326 - val_loss: 4.8843 - val_acc: 0.8341
Epoch 2/35
  - 2s - loss: 1.7250 - acc: 0.8796 - val_loss: 0.9626 - val_acc: 0.8531
Epoch 3/35
  - 2s - loss: 0.5489 - acc: 0.8970 - val_loss: 0.7314 - val_acc: 0.8690
Epoch 4/35
  - 2s - loss: 0.4823 - acc: 0.8976 - val_loss: 0.7276 - val_acc: 0.8517
Epoch 5/35
  - 2s - loss: 0.4579 - acc: 0.8988 - val_loss: 0.6242 - val_acc: 0.8812
Epoch 6/35
  - 2s - loss: 0.4022 - acc: 0.9132 - val_loss: 0.6094 - val_acc: 0.8711
Epoch 7/35
  - 2s - loss: 0.4023 - acc: 0.9068 - val_loss: 0.5805 - val_acc: 0.8717
Epoch 8/35
  - 2s - loss: 0.3912 - acc: 0.9120 - val_loss: 0.5675 - val_acc: 0.8687
Epoch 9/35
  - 2s - loss: 0.3744 - acc: 0.9151 - val_loss: 0.5704 - val_acc: 0.8646
Epoch 10/35
  - 2s - loss: 0.3729 - acc: 0.9116 - val_loss: 0.5922 - val_acc: 0.8558
Epoch 11/35
  - 2s - loss: 0.3599 - acc: 0.9142 - val_loss: 0.5119 - val_acc: 0.8789
Epoch 12/35
  - 2s - loss: 0.3326 - acc: 0.9197 - val_loss: 0.4924 - val_acc: 0.9002
Epoch 13/35
  - 2s - loss: 0.3300 - acc: 0.9226 - val_loss: 0.5215 - val_acc: 0.8690
Epoch 14/35
  - 2s - loss: 0.3783 - acc: 0.9075 - val_loss: 0.5516 - val_acc: 0.8683
Epoch 15/35
  - 2s - loss: 0.3454 - acc: 0.9181 - val_loss: 0.5556 - val_acc: 0.8521
Epoch 16/35
  - 2s - loss: 0.3029 - acc: 0.9256 - val_loss: 0.5167 - val_acc: 0.8490
Epoch 17/35
  - 2s - loss: 0.3295 - acc: 0.9169 - val_loss: 0.5313 - val_acc: 0.8429
Epoch 18/35

```



```

- 2s - loss: 0.3239 - acc: 0.9177 - val_loss: 0.4892 - val_acc: 0.8880
Epoch 19/35
- 2s - loss: 0.3016 - acc: 0.9241 - val_loss: 0.4432 - val_acc: 0.8968
Epoch 20/35
- 2s - loss: 0.3012 - acc: 0.9274 - val_loss: 0.4653 - val_acc: 0.8738
Epoch 21/35
- 2s - loss: 0.3161 - acc: 0.9225 - val_loss: 0.5062 - val_acc: 0.8497
Epoch 22/35
- 2s - loss: 0.3164 - acc: 0.9255 - val_loss: 0.4527 - val_acc: 0.8728
Epoch 23/35
- 2s - loss: 0.3161 - acc: 0.9203 - val_loss: 0.4972 - val_acc: 0.8347
Epoch 24/35
- 2s - loss: 0.2993 - acc: 0.9259 - val_loss: 0.5269 - val_acc: 0.8290
Epoch 25/35
- 2s - loss: 0.2912 - acc: 0.9300 - val_loss: 0.4920 - val_acc: 0.8585
Epoch 26/35
- 2s - loss: 0.3039 - acc: 0.9289 - val_loss: 0.5328 - val_acc: 0.8076
Epoch 27/35
- 2s - loss: 0.2863 - acc: 0.9274 - val_loss: 0.6839 - val_acc: 0.7805
Epoch 28/35
- 2s - loss: 0.3049 - acc: 0.9226 - val_loss: 0.5165 - val_acc: 0.8307
Epoch 29/35
- 2s - loss: 0.2806 - acc: 0.9295 - val_loss: 0.4749 - val_acc: 0.8493
Epoch 30/35
- 2s - loss: 0.2847 - acc: 0.9260 - val_loss: 0.5675 - val_acc: 0.8361
Epoch 31/35
- 2s - loss: 0.3033 - acc: 0.9251 - val_loss: 0.5231 - val_acc: 0.8137
Epoch 32/35
- 2s - loss: 0.2704 - acc: 0.9350 - val_loss: 0.4261 - val_acc: 0.8694
Epoch 33/35
- 2s - loss: 0.2841 - acc: 0.9278 - val_loss: 0.4470 - val_acc: 0.8565
Epoch 34/35
- 2s - loss: 0.3377 - acc: 0.9181 - val_loss: 0.5030 - val_acc: 0.8497
Epoch 35/35
- 2s - loss: 0.2961 - acc: 0.9260 - val_loss: 0.4879 - val_acc: 0.8402
Train accuracy 0.8993471164309031 Test accuracy: 0.840176450627757

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_113 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_114 (Conv1D)	(None, 120, 24)	2328
-----		
dropout_57 (Dropout)	(None, 120, 24)	0
-----		
max_pooling1d_57 (MaxPooling)	(None, 40, 24)	0
-----		

flatten_57 (Flatten)	(None, 960)	0
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dense_113 (Dense)	(None, 32)	30752
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dense_114 (Dense)	(None, 6)	198
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Total params: 35,326  
 Trainable params: 35,326  
 Non-trainable params: 0

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None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 7s - loss: 11.9047 - acc: 0.7330 - val\_loss: 1.0429 - val\_acc: 0.8388

Epoch 2/25

- 4s - loss: 0.5299 - acc: 0.9006 - val\_loss: 0.7633 - val\_acc: 0.7896

Epoch 3/25

- 4s - loss: 0.4528 - acc: 0.9064 - val\_loss: 0.6281 - val\_acc: 0.8914

Epoch 4/25

- 4s - loss: 0.3801 - acc: 0.9203 - val\_loss: 0.5500 - val\_acc: 0.8972

Epoch 5/25

- 4s - loss: 0.3590 - acc: 0.9234 - val\_loss: 0.5300 - val\_acc: 0.9067

Epoch 6/25

- 4s - loss: 0.3219 - acc: 0.9336 - val\_loss: 0.4778 - val\_acc: 0.9114

Epoch 7/25

- 4s - loss: 0.3146 - acc: 0.9314 - val\_loss: 0.4738 - val\_acc: 0.9209

Epoch 8/25

- 4s - loss: 0.2984 - acc: 0.9348 - val\_loss: 0.4679 - val\_acc: 0.8965

Epoch 9/25

- 4s - loss: 0.2966 - acc: 0.9324 - val\_loss: 0.4545 - val\_acc: 0.8996

Epoch 10/25

- 4s - loss: 0.2879 - acc: 0.9372 - val\_loss: 0.4596 - val\_acc: 0.8951

Epoch 11/25

- 4s - loss: 0.2605 - acc: 0.9369 - val\_loss: 0.4331 - val\_acc: 0.9087

Epoch 12/25

- 4s - loss: 0.2811 - acc: 0.9325 - val\_loss: 0.4510 - val\_acc: 0.8880

Epoch 13/25

- 4s - loss: 0.2786 - acc: 0.9289 - val\_loss: 0.4101 - val\_acc: 0.9101

Epoch 14/25

- 4s - loss: 0.2687 - acc: 0.9357 - val\_loss: 0.4053 - val\_acc: 0.9094

Epoch 15/25

- 4s - loss: 0.2467 - acc: 0.9358 - val\_loss: 0.4430 - val\_acc: 0.8744

Epoch 16/25

- 4s - loss: 0.2594 - acc: 0.9343 - val\_loss: 0.3756 - val\_acc: 0.9118

Epoch 17/25

- 4s - loss: 0.2373 - acc: 0.9392 - val\_loss: 0.4044 - val\_acc: 0.9013

Epoch 18/25

- 4s - loss: 0.2518 - acc: 0.9340 - val\_loss: 0.4091 - val\_acc: 0.8999

Epoch 19/25  
 - 4s - loss: 0.2256 - acc: 0.9395 - val\_loss: 0.4113 - val\_acc: 0.9030  
 Epoch 20/25  
 - 4s - loss: 0.2416 - acc: 0.9382 - val\_loss: 0.3761 - val\_acc: 0.9063  
 Epoch 21/25  
 - 4s - loss: 0.2725 - acc: 0.9342 - val\_loss: 0.4235 - val\_acc: 0.8700  
 Epoch 22/25  
 - 4s - loss: 0.2309 - acc: 0.9408 - val\_loss: 0.3487 - val\_acc: 0.9094  
 Epoch 23/25  
 - 4s - loss: 0.2238 - acc: 0.9393 - val\_loss: 0.3771 - val\_acc: 0.8921  
 Epoch 24/25  
 - 4s - loss: 0.2318 - acc: 0.9395 - val\_loss: 0.3915 - val\_acc: 0.8948  
 Epoch 25/25  
 - 4s - loss: 0.2398 - acc: 0.9385 - val\_loss: 0.3975 - val\_acc: 0.8992  
 Train accuracy 0.9426006528835691 Test accuracy: 0.8992195453003053

Layer (type)	Output Shape	Param #
conv1d_115 (Conv1D)	(None, 126, 42)	1176
conv1d_116 (Conv1D)	(None, 124, 16)	2032
dropout_58 (Dropout)	(None, 124, 16)	0
max_pooling1d_58 (MaxPooling)	(None, 62, 16)	0
flatten_58 (Flatten)	(None, 992)	0
dense_115 (Dense)	(None, 32)	31776
dense_116 (Dense)	(None, 6)	198

Total params: 35,182  
 Trainable params: 35,182  
 Non-trainable params: 0

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 6s - loss: 14.7012 - acc: 0.6877 - val\_loss: 0.8706 - val\_acc: 0.7360  
 Epoch 2/30  
 - 3s - loss: 0.6944 - acc: 0.7756 - val\_loss: 0.8193 - val\_acc: 0.7041  
 Epoch 3/30  
 - 3s - loss: 0.6406 - acc: 0.7889 - val\_loss: 0.8631 - val\_acc: 0.6956  
 Epoch 4/30  
 - 3s - loss: 0.5999 - acc: 0.8164 - val\_loss: 0.6735 - val\_acc: 0.8215  
 Epoch 5/30

- 3s - loss: 0.5779 - acc: 0.8229 - val\_loss: 0.6811 - val\_acc: 0.7900  
 Epoch 6/30  
 - 4s - loss: 0.5616 - acc: 0.8368 - val\_loss: 0.7271 - val\_acc: 0.7516  
 Epoch 7/30  
 - 3s - loss: 0.5464 - acc: 0.8478 - val\_loss: 0.6052 - val\_acc: 0.8320  
 Epoch 8/30  
 - 4s - loss: 0.5315 - acc: 0.8543 - val\_loss: 0.5811 - val\_acc: 0.8527  
 Epoch 9/30  
 - 3s - loss: 0.5092 - acc: 0.8615 - val\_loss: 0.7547 - val\_acc: 0.7231  
 Epoch 10/30  
 - 3s - loss: 0.5060 - acc: 0.8584 - val\_loss: 0.6030 - val\_acc: 0.8249  
 Epoch 11/30  
 - 4s - loss: 0.4834 - acc: 0.8675 - val\_loss: 0.5663 - val\_acc: 0.8500  
 Epoch 12/30  
 - 4s - loss: 0.4845 - acc: 0.8712 - val\_loss: 0.7085 - val\_acc: 0.7655  
 Epoch 13/30  
 - 4s - loss: 0.4791 - acc: 0.8742 - val\_loss: 0.8315 - val\_acc: 0.6878  
 Epoch 14/30  
 - 3s - loss: 0.4715 - acc: 0.8764 - val\_loss: 0.5696 - val\_acc: 0.8534  
 Epoch 15/30  
 - 4s - loss: 0.4533 - acc: 0.8830 - val\_loss: 0.5168 - val\_acc: 0.8687  
 Epoch 16/30  
 - 4s - loss: 0.4437 - acc: 0.8872 - val\_loss: 0.6593 - val\_acc: 0.8100  
 Epoch 17/30  
 - 4s - loss: 0.4491 - acc: 0.8818 - val\_loss: 0.5698 - val\_acc: 0.8300  
 Epoch 18/30  
 - 4s - loss: 0.4456 - acc: 0.8821 - val\_loss: 0.6786 - val\_acc: 0.8168  
 Epoch 19/30  
 - 3s - loss: 0.4313 - acc: 0.8872 - val\_loss: 0.5501 - val\_acc: 0.8354  
 Epoch 20/30  
 - 4s - loss: 0.4336 - acc: 0.8834 - val\_loss: 0.5132 - val\_acc: 0.8544  
 Epoch 21/30  
 - 3s - loss: 0.4324 - acc: 0.8874 - val\_loss: 0.5285 - val\_acc: 0.8558  
 Epoch 22/30  
 - 3s - loss: 0.4168 - acc: 0.8891 - val\_loss: 0.5715 - val\_acc: 0.8327  
 Epoch 23/30  
 - 3s - loss: 0.4104 - acc: 0.8916 - val\_loss: 0.5952 - val\_acc: 0.7900  
 Epoch 24/30  
 - 4s - loss: 0.4203 - acc: 0.8908 - val\_loss: 0.5545 - val\_acc: 0.8660  
 Epoch 25/30  
 - 4s - loss: 0.4052 - acc: 0.8955 - val\_loss: 0.5544 - val\_acc: 0.8524  
 Epoch 26/30  
 - 4s - loss: 0.4167 - acc: 0.8909 - val\_loss: 0.5528 - val\_acc: 0.8320  
 Epoch 27/30  
 - 3s - loss: 0.4202 - acc: 0.8921 - val\_loss: 0.8486 - val\_acc: 0.7513  
 Epoch 28/30  
 - 3s - loss: 0.4147 - acc: 0.8939 - val\_loss: 0.7550 - val\_acc: 0.7662  
 Epoch 29/30

- 4s - loss: 0.4339 - acc: 0.8874 - val\_loss: 0.5216 - val\_acc: 0.8548  
Epoch 30/30  
- 3s - loss: 0.4258 - acc: 0.8906 - val\_loss: 0.5663 - val\_acc: 0.8303  
Train accuracy 0.8703754080522307 Test accuracy: 0.830335934848999

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Layer (type)	Output Shape	Param #
=====		
conv1d_117 (Conv1D)	(None, 126, 32)	896
-----		
conv1d_118 (Conv1D)	(None, 122, 16)	2576
-----		
dropout_59 (Dropout)	(None, 122, 16)	0
-----		
max_pooling1d_59 (MaxPooling)	(None, 40, 16)	0
-----		
flatten_59 (Flatten)	(None, 640)	0
-----		
dense_117 (Dense)	(None, 32)	20512
-----		
dense_118 (Dense)	(None, 6)	198
=====		

Total params: 24,182  
Trainable params: 24,182  
Non-trainable params: 0

---

None  
Train on 7352 samples, validate on 2947 samples  
Epoch 1/25  
- 7s - loss: 30.8358 - acc: 0.7058 - val\_loss: 4.4262 - val\_acc: 0.7044  
Epoch 2/25  
- 3s - loss: 1.6429 - acc: 0.8126 - val\_loss: 0.9871 - val\_acc: 0.7808  
Epoch 3/25  
- 3s - loss: 0.6854 - acc: 0.8286 - val\_loss: 0.8757 - val\_acc: 0.7448  
Epoch 4/25  
- 3s - loss: 0.6262 - acc: 0.8341 - val\_loss: 0.8295 - val\_acc: 0.7696  
Epoch 5/25  
- 3s - loss: 0.5936 - acc: 0.8429 - val\_loss: 0.7578 - val\_acc: 0.8246  
Epoch 6/25  
- 3s - loss: 0.5399 - acc: 0.8606 - val\_loss: 0.7201 - val\_acc: 0.8283  
Epoch 7/25  
- 3s - loss: 0.5115 - acc: 0.8711 - val\_loss: 0.7028 - val\_acc: 0.8398  
Epoch 8/25  
- 3s - loss: 0.4914 - acc: 0.8735 - val\_loss: 0.6664 - val\_acc: 0.8307  
Epoch 9/25  
- 3s - loss: 0.4766 - acc: 0.8785 - val\_loss: 0.6513 - val\_acc: 0.8012  
Epoch 10/25  
- 3s - loss: 0.4898 - acc: 0.8681 - val\_loss: 0.6588 - val\_acc: 0.8310

Epoch 11/25  
 - 3s - loss: 0.4643 - acc: 0.8757 - val\_loss: 0.5893 - val\_acc: 0.8470  
 Epoch 12/25  
 - 3s - loss: 0.4451 - acc: 0.8817 - val\_loss: 0.6121 - val\_acc: 0.8358  
 Epoch 13/25  
 - 3s - loss: 0.4549 - acc: 0.8784 - val\_loss: 0.6512 - val\_acc: 0.8504  
 Epoch 14/25  
 - 3s - loss: 0.4309 - acc: 0.8864 - val\_loss: 0.5802 - val\_acc: 0.8419  
 Epoch 15/25  
 - 3s - loss: 0.4286 - acc: 0.8844 - val\_loss: 0.5748 - val\_acc: 0.8442  
 Epoch 16/25  
 - 3s - loss: 0.4097 - acc: 0.8936 - val\_loss: 0.6548 - val\_acc: 0.8344  
 Epoch 17/25  
 - 3s - loss: 0.4001 - acc: 0.8968 - val\_loss: 0.6155 - val\_acc: 0.8320  
 Epoch 18/25  
 - 3s - loss: 0.3991 - acc: 0.8940 - val\_loss: 0.6884 - val\_acc: 0.7801  
 Epoch 19/25  
 - 3s - loss: 0.3960 - acc: 0.8954 - val\_loss: 0.5954 - val\_acc: 0.8470  
 Epoch 20/25  
 - 3s - loss: 0.3976 - acc: 0.8945 - val\_loss: 0.5961 - val\_acc: 0.8541  
 Epoch 21/25  
 - 3s - loss: 0.3984 - acc: 0.8927 - val\_loss: 0.5921 - val\_acc: 0.8609  
 Epoch 22/25  
 - 3s - loss: 0.3844 - acc: 0.9037 - val\_loss: 0.5499 - val\_acc: 0.8731  
 Epoch 23/25  
 - 3s - loss: 0.3692 - acc: 0.9052 - val\_loss: 0.6297 - val\_acc: 0.8683  
 Epoch 24/25  
 - 3s - loss: 0.3578 - acc: 0.9076 - val\_loss: 0.5555 - val\_acc: 0.8571  
 Epoch 25/25  
 - 3s - loss: 0.3592 - acc: 0.9101 - val\_loss: 0.5500 - val\_acc: 0.8653  
 Train accuracy 0.9319912948857454 Test accuracy: 0.8652867322701052

Layer (type)	Output Shape	Param #
conv1d_119 (Conv1D)	(None, 122, 32)	2048
conv1d_120 (Conv1D)	(None, 120, 24)	2328
dropout_60 (Dropout)	(None, 120, 24)	0
max_pooling1d_60 (MaxPooling)	(None, 40, 24)	0
flatten_60 (Flatten)	(None, 960)	0
dense_119 (Dense)	(None, 64)	61504
dense_120 (Dense)	(None, 6)	390

```

=====
Total params: 66,270
Trainable params: 66,270
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 5s - loss: 4.3495 - acc: 0.7495 - val_loss: 2.7413 - val_acc: 0.8459
Epoch 2/25
  - 2s - loss: 1.6296 - acc: 0.9180 - val_loss: 1.1715 - val_acc: 0.9030
Epoch 3/25
  - 2s - loss: 0.6645 - acc: 0.9475 - val_loss: 0.6454 - val_acc: 0.9036
Epoch 4/25
  - 2s - loss: 0.3430 - acc: 0.9521 - val_loss: 0.4889 - val_acc: 0.9077
Epoch 5/25
  - 2s - loss: 0.2451 - acc: 0.9516 - val_loss: 0.3857 - val_acc: 0.9318
Epoch 6/25
  - 2s - loss: 0.2238 - acc: 0.9494 - val_loss: 0.3657 - val_acc: 0.9165
Epoch 7/25
  - 2s - loss: 0.1939 - acc: 0.9551 - val_loss: 0.3421 - val_acc: 0.9274
Epoch 8/25
  - 2s - loss: 0.2014 - acc: 0.9508 - val_loss: 0.3561 - val_acc: 0.9040
Epoch 9/25
  - 2s - loss: 0.2014 - acc: 0.9498 - val_loss: 0.3117 - val_acc: 0.9192
Epoch 10/25
  - 2s - loss: 0.1794 - acc: 0.9544 - val_loss: 0.3435 - val_acc: 0.9138
Epoch 11/25
  - 2s - loss: 0.1780 - acc: 0.9514 - val_loss: 0.3316 - val_acc: 0.9138
Epoch 12/25
  - 2s - loss: 0.1713 - acc: 0.9553 - val_loss: 0.3260 - val_acc: 0.9186
Epoch 13/25
  - 2s - loss: 0.1568 - acc: 0.9577 - val_loss: 0.3113 - val_acc: 0.9220
Epoch 14/25
  - 2s - loss: 0.1623 - acc: 0.9536 - val_loss: 0.3801 - val_acc: 0.8907
Epoch 15/25
  - 2s - loss: 0.1637 - acc: 0.9558 - val_loss: 0.3516 - val_acc: 0.9257
Epoch 16/25
  - 2s - loss: 0.1611 - acc: 0.9531 - val_loss: 0.3047 - val_acc: 0.9155
Epoch 17/25
  - 2s - loss: 0.1498 - acc: 0.9578 - val_loss: 0.2892 - val_acc: 0.9301
Epoch 18/25
  - 2s - loss: 0.1437 - acc: 0.9573 - val_loss: 0.3393 - val_acc: 0.9243
Epoch 19/25
  - 2s - loss: 0.1408 - acc: 0.9591 - val_loss: 0.4105 - val_acc: 0.8721
Epoch 20/25
  - 2s - loss: 0.1563 - acc: 0.9555 - val_loss: 0.3408 - val_acc: 0.9233
Epoch 21/25

```

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- 2s - loss: 0.1300 - acc: 0.9606 - val_loss: 0.3021 - val_acc: 0.9287
Epoch 22/25
- 2s - loss: 0.1408 - acc: 0.9565 - val_loss: 0.3086 - val_acc: 0.9240
Epoch 23/25
- 2s - loss: 0.1346 - acc: 0.9587 - val_loss: 0.3492 - val_acc: 0.9114
Epoch 24/25
- 2s - loss: 0.1383 - acc: 0.9588 - val_loss: 0.3698 - val_acc: 0.9077
Epoch 25/25
- 2s - loss: 0.1302 - acc: 0.9607 - val_loss: 0.2972 - val_acc: 0.9230
Train accuracy 0.963139281828074 Test accuracy: 0.9229725144214456

```

Layer (type)	Output Shape	Param #
conv1d_121 (Conv1D)	(None, 122, 32)	2048
conv1d_122 (Conv1D)	(None, 120, 24)	2328
dropout_61 (Dropout)	(None, 120, 24)	0
max_pooling1d_61 (MaxPooling)	(None, 60, 24)	0
flatten_61 (Flatten)	(None, 1440)	0
dense_121 (Dense)	(None, 64)	92224
dense_122 (Dense)	(None, 6)	390

```

Total params: 96,990
Trainable params: 96,990
Non-trainable params: 0

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 5s - loss: 27.4172 - acc: 0.7273 - val_loss: 12.6662 - val_acc: 0.8453
Epoch 2/25
- 3s - loss: 6.5987 - acc: 0.9127 - val_loss: 3.0875 - val_acc: 0.8782
Epoch 3/25
- 2s - loss: 1.5861 - acc: 0.9219 - val_loss: 1.0655 - val_acc: 0.8765
Epoch 4/25
- 2s - loss: 0.5844 - acc: 0.9236 - val_loss: 0.6587 - val_acc: 0.9026
Epoch 5/25
- 2s - loss: 0.3850 - acc: 0.9339 - val_loss: 0.5537 - val_acc: 0.8982
Epoch 6/25
- 3s - loss: 0.3433 - acc: 0.9335 - val_loss: 0.5426 - val_acc: 0.9023
Epoch 7/25
- 3s - loss: 0.3233 - acc: 0.9340 - val_loss: 0.5043 - val_acc: 0.8962

```



Epoch 8/25  
 - 2s - loss: 0.2895 - acc: 0.9387 - val\_loss: 0.4914 - val\_acc: 0.9084  
 Epoch 9/25  
 - 2s - loss: 0.2862 - acc: 0.9366 - val\_loss: 0.4630 - val\_acc: 0.9057  
 Epoch 10/25  
 - 2s - loss: 0.2778 - acc: 0.9384 - val\_loss: 0.4865 - val\_acc: 0.8799  
 Epoch 11/25  
 - 3s - loss: 0.2695 - acc: 0.9363 - val\_loss: 0.4534 - val\_acc: 0.8812  
 Epoch 12/25  
 - 3s - loss: 0.2514 - acc: 0.9406 - val\_loss: 0.4256 - val\_acc: 0.8955  
 Epoch 13/25  
 - 2s - loss: 0.2533 - acc: 0.9406 - val\_loss: 0.4506 - val\_acc: 0.8965  
 Epoch 14/25  
 - 2s - loss: 0.2557 - acc: 0.9353 - val\_loss: 0.5058 - val\_acc: 0.8714  
 Epoch 15/25  
 - 2s - loss: 0.2636 - acc: 0.9373 - val\_loss: 0.4219 - val\_acc: 0.9060  
 Epoch 16/25  
 - 2s - loss: 0.2238 - acc: 0.9445 - val\_loss: 0.3794 - val\_acc: 0.9023  
 Epoch 17/25  
 - 3s - loss: 0.2370 - acc: 0.9412 - val\_loss: 0.4036 - val\_acc: 0.8965  
 Epoch 18/25  
 - 2s - loss: 0.2350 - acc: 0.9400 - val\_loss: 0.3961 - val\_acc: 0.9002  
 Epoch 19/25  
 - 2s - loss: 0.2232 - acc: 0.9426 - val\_loss: 0.3953 - val\_acc: 0.9053  
 Epoch 20/25  
 - 2s - loss: 0.2194 - acc: 0.9418 - val\_loss: 0.3681 - val\_acc: 0.8951  
 Epoch 21/25  
 - 2s - loss: 0.2250 - acc: 0.9406 - val\_loss: 0.4315 - val\_acc: 0.8806  
 Epoch 22/25  
 - 3s - loss: 0.2268 - acc: 0.9392 - val\_loss: 0.3884 - val\_acc: 0.8955  
 Epoch 23/25  
 - 3s - loss: 0.2149 - acc: 0.9429 - val\_loss: 0.3738 - val\_acc: 0.8999  
 Epoch 24/25  
 - 2s - loss: 0.2221 - acc: 0.9411 - val\_loss: 0.3491 - val\_acc: 0.8999  
 Epoch 25/25  
 - 2s - loss: 0.2237 - acc: 0.9422 - val\_loss: 0.3724 - val\_acc: 0.9101  
 Train accuracy 0.9445048966267682 Test accuracy: 0.9100780454699695

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_123 (Conv1D)	(None, 122, 42)	2688
<hr/>		
conv1d_124 (Conv1D)	(None, 118, 24)	5064
<hr/>		
dropout_62 (Dropout)	(None, 118, 24)	0
<hr/>		
max_pooling1d_62 (MaxPooling)	(None, 39, 24)	0

```

-----
flatten_62 (Flatten)          (None, 936)          0
-----
dense_123 (Dense)             (None, 64)           59968
-----
dense_124 (Dense)             (None, 6)            390
=====
Total params: 68,110
Trainable params: 68,110
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 5s - loss: 48.8714 - acc: 0.6624 - val_loss: 27.6073 - val_acc: 0.8364
Epoch 2/30
  - 2s - loss: 16.7984 - acc: 0.8972 - val_loss: 9.5414 - val_acc: 0.8853
Epoch 3/30
  - 2s - loss: 5.6073 - acc: 0.9221 - val_loss: 3.3938 - val_acc: 0.8768
Epoch 4/30
  - 2s - loss: 1.9049 - acc: 0.9268 - val_loss: 1.4708 - val_acc: 0.8694
Epoch 5/30
  - 2s - loss: 0.7797 - acc: 0.9310 - val_loss: 0.8697 - val_acc: 0.8711
Epoch 6/30
  - 2s - loss: 0.4685 - acc: 0.9275 - val_loss: 0.6930 - val_acc: 0.8782
Epoch 7/30
  - 2s - loss: 0.3873 - acc: 0.9305 - val_loss: 0.6478 - val_acc: 0.9046
Epoch 8/30
  - 2s - loss: 0.3268 - acc: 0.9368 - val_loss: 0.5983 - val_acc: 0.9053
Epoch 9/30
  - 2s - loss: 0.3140 - acc: 0.9348 - val_loss: 0.5803 - val_acc: 0.8894
Epoch 10/30
  - 2s - loss: 0.3050 - acc: 0.9323 - val_loss: 0.5903 - val_acc: 0.8901
Epoch 11/30
  - 2s - loss: 0.2910 - acc: 0.9385 - val_loss: 0.5271 - val_acc: 0.8918
Epoch 12/30
  - 2s - loss: 0.2688 - acc: 0.9441 - val_loss: 0.5027 - val_acc: 0.8968
Epoch 13/30
  - 2s - loss: 0.2691 - acc: 0.9393 - val_loss: 0.5169 - val_acc: 0.8941
Epoch 14/30
  - 2s - loss: 0.2542 - acc: 0.9415 - val_loss: 0.4986 - val_acc: 0.9016
Epoch 15/30
  - 2s - loss: 0.2475 - acc: 0.9434 - val_loss: 0.4838 - val_acc: 0.8955
Epoch 16/30
  - 2s - loss: 0.2497 - acc: 0.9419 - val_loss: 0.4614 - val_acc: 0.8985
Epoch 17/30
  - 2s - loss: 0.2488 - acc: 0.9392 - val_loss: 0.4339 - val_acc: 0.9128
Epoch 18/30

```

```

- 2s - loss: 0.2300 - acc: 0.9441 - val_loss: 0.4668 - val_acc: 0.8951
Epoch 19/30
- 2s - loss: 0.2301 - acc: 0.9457 - val_loss: 0.4250 - val_acc: 0.9087
Epoch 20/30
- 2s - loss: 0.2273 - acc: 0.9453 - val_loss: 0.4139 - val_acc: 0.9125
Epoch 21/30
- 2s - loss: 0.2198 - acc: 0.9444 - val_loss: 0.4311 - val_acc: 0.8996
Epoch 22/30
- 2s - loss: 0.2353 - acc: 0.9410 - val_loss: 0.4143 - val_acc: 0.9104
Epoch 23/30
- 2s - loss: 0.2480 - acc: 0.9355 - val_loss: 0.4795 - val_acc: 0.8833
Epoch 24/30
- 2s - loss: 0.2190 - acc: 0.9478 - val_loss: 0.4147 - val_acc: 0.9060
Epoch 25/30
- 2s - loss: 0.2066 - acc: 0.9486 - val_loss: 0.4049 - val_acc: 0.9084
Epoch 26/30
- 2s - loss: 0.2046 - acc: 0.9470 - val_loss: 0.3908 - val_acc: 0.9101
Epoch 27/30
- 2s - loss: 0.2176 - acc: 0.9411 - val_loss: 0.4208 - val_acc: 0.9043
Epoch 28/30
- 2s - loss: 0.2134 - acc: 0.9456 - val_loss: 0.3780 - val_acc: 0.9128
Epoch 29/30
- 2s - loss: 0.2012 - acc: 0.9459 - val_loss: 0.3973 - val_acc: 0.9019
Epoch 30/30
- 2s - loss: 0.2140 - acc: 0.9436 - val_loss: 0.3785 - val_acc: 0.9179
Train accuracy 0.9499455930359086 Test accuracy: 0.9178825924669155

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_125 (Conv1D)          (None, 122, 42)          2688
-----
conv1d_126 (Conv1D)          (None, 118, 24)          5064
-----
dropout_63 (Dropout)         (None, 118, 24)          0
-----
max_pooling1d_63 (MaxPooling (None, 39, 24)          0
-----
flatten_63 (Flatten)         (None, 936)              0
-----
dense_125 (Dense)            (None, 64)               59968
-----
dense_126 (Dense)            (None, 6)                390
=====
Total params: 68,110
Trainable params: 68,110
Non-trainable params: 0
-----

```

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 5s - loss: 17.3823 - acc: 0.7144 - val\_loss: 1.3445 - val\_acc: 0.6675

Epoch 2/30

- 2s - loss: 0.6146 - acc: 0.8607 - val\_loss: 0.6483 - val\_acc: 0.8622

Epoch 3/30

- 2s - loss: 0.4675 - acc: 0.8891 - val\_loss: 0.7659 - val\_acc: 0.7689

Epoch 4/30

- 2s - loss: 0.4013 - acc: 0.8998 - val\_loss: 0.5965 - val\_acc: 0.8354

Epoch 5/30

- 2s - loss: 0.3879 - acc: 0.9037 - val\_loss: 0.7299 - val\_acc: 0.7486

Epoch 6/30

- 2s - loss: 0.3623 - acc: 0.9095 - val\_loss: 0.5280 - val\_acc: 0.8670

Epoch 7/30

- 2s - loss: 0.3590 - acc: 0.9106 - val\_loss: 0.6155 - val\_acc: 0.7988

Epoch 8/30

- 2s - loss: 0.3565 - acc: 0.9087 - val\_loss: 0.5859 - val\_acc: 0.7967

Epoch 9/30

- 2s - loss: 0.3546 - acc: 0.9140 - val\_loss: 0.4361 - val\_acc: 0.8802

Epoch 10/30

- 2s - loss: 0.3319 - acc: 0.9225 - val\_loss: 0.4676 - val\_acc: 0.8544

Epoch 11/30

- 2s - loss: 0.3379 - acc: 0.9143 - val\_loss: 0.4439 - val\_acc: 0.8996

Epoch 12/30

- 2s - loss: 0.3215 - acc: 0.9206 - val\_loss: 0.4290 - val\_acc: 0.8694

Epoch 13/30

- 2s - loss: 0.3270 - acc: 0.9159 - val\_loss: 0.4299 - val\_acc: 0.8887

Epoch 14/30

- 2s - loss: 0.3173 - acc: 0.9166 - val\_loss: 0.5044 - val\_acc: 0.8656

Epoch 15/30

- 2s - loss: 0.3308 - acc: 0.9163 - val\_loss: 0.4358 - val\_acc: 0.8890

Epoch 16/30

- 2s - loss: 0.3168 - acc: 0.9184 - val\_loss: 0.4497 - val\_acc: 0.8819

Epoch 17/30

- 2s - loss: 0.3055 - acc: 0.9226 - val\_loss: 0.4123 - val\_acc: 0.8836

Epoch 18/30

- 2s - loss: 0.3059 - acc: 0.9210 - val\_loss: 0.4720 - val\_acc: 0.8487

Epoch 19/30

- 2s - loss: 0.3089 - acc: 0.9183 - val\_loss: 0.4604 - val\_acc: 0.8707

Epoch 20/30

- 2s - loss: 0.2968 - acc: 0.9176 - val\_loss: 0.6224 - val\_acc: 0.7991

Epoch 21/30

- 2s - loss: 0.3209 - acc: 0.9176 - val\_loss: 0.4251 - val\_acc: 0.8931

Epoch 22/30

- 2s - loss: 0.2925 - acc: 0.9252 - val\_loss: 0.7995 - val\_acc: 0.7713

Epoch 23/30

- 2s - loss: 0.2963 - acc: 0.9192 - val\_loss: 0.5472 - val\_acc: 0.8446

Epoch 24/30  
 - 2s - loss: 0.3154 - acc: 0.9144 - val\_loss: 0.4371 - val\_acc: 0.8951  
 Epoch 25/30  
 - 2s - loss: 0.3020 - acc: 0.9236 - val\_loss: 0.4852 - val\_acc: 0.8677  
 Epoch 26/30  
 - 2s - loss: 0.3015 - acc: 0.9197 - val\_loss: 0.4004 - val\_acc: 0.8897  
 Epoch 27/30  
 - 2s - loss: 0.3085 - acc: 0.9200 - val\_loss: 0.5358 - val\_acc: 0.8541  
 Epoch 28/30  
 - 2s - loss: 0.2895 - acc: 0.9229 - val\_loss: 0.4264 - val\_acc: 0.8761  
 Epoch 29/30  
 - 2s - loss: 0.2990 - acc: 0.9237 - val\_loss: 0.4062 - val\_acc: 0.9023  
 Epoch 30/30  
 - 2s - loss: 0.2972 - acc: 0.9238 - val\_loss: 0.3753 - val\_acc: 0.8935  
 Train accuracy 0.9510337323177367 Test accuracy: 0.8934509670851714

---

Layer (type)	Output Shape	Param #
conv1d_127 (Conv1D)	(None, 122, 42)	2688
conv1d_128 (Conv1D)	(None, 118, 24)	5064
dropout_64 (Dropout)	(None, 118, 24)	0
max_pooling1d_64 (MaxPooling)	(None, 39, 24)	0
flatten_64 (Flatten)	(None, 936)	0
dense_127 (Dense)	(None, 64)	59968
dense_128 (Dense)	(None, 6)	390

---

Total params: 68,110  
 Trainable params: 68,110  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 5s - loss: 50.6101 - acc: 0.7337 - val\_loss: 28.4510 - val\_acc: 0.8269  
 Epoch 2/30  
 - 2s - loss: 17.0244 - acc: 0.9115 - val\_loss: 9.3103 - val\_acc: 0.8690  
 Epoch 3/30  
 - 2s - loss: 5.2981 - acc: 0.9325 - val\_loss: 3.0019 - val\_acc: 0.8897  
 Epoch 4/30  
 - 2s - loss: 1.6300 - acc: 0.9327 - val\_loss: 1.2139 - val\_acc: 0.8884  
 Epoch 5/30

- 2s - loss: 0.6281 - acc: 0.9365 - val\_loss: 0.6987 - val\_acc: 0.8829  
 Epoch 6/30  
 - 2s - loss: 0.3841 - acc: 0.9359 - val\_loss: 0.5702 - val\_acc: 0.8962  
 Epoch 7/30  
 - 2s - loss: 0.3192 - acc: 0.9389 - val\_loss: 0.5314 - val\_acc: 0.9070  
 Epoch 8/30  
 - 2s - loss: 0.2997 - acc: 0.9373 - val\_loss: 0.5211 - val\_acc: 0.8850  
 Epoch 9/30  
 - 2s - loss: 0.2662 - acc: 0.9430 - val\_loss: 0.4786 - val\_acc: 0.8962  
 Epoch 10/30  
 - 2s - loss: 0.2582 - acc: 0.9422 - val\_loss: 0.4569 - val\_acc: 0.8972  
 Epoch 11/30  
 - 2s - loss: 0.2389 - acc: 0.9479 - val\_loss: 0.4533 - val\_acc: 0.9009  
 Epoch 12/30  
 - 2s - loss: 0.2679 - acc: 0.9353 - val\_loss: 0.4625 - val\_acc: 0.9016  
 Epoch 13/30  
 - 2s - loss: 0.2395 - acc: 0.9459 - val\_loss: 0.4290 - val\_acc: 0.8968  
 Epoch 14/30  
 - 2s - loss: 0.2274 - acc: 0.9471 - val\_loss: 0.4270 - val\_acc: 0.8921  
 Epoch 15/30  
 - 2s - loss: 0.2262 - acc: 0.9453 - val\_loss: 0.4322 - val\_acc: 0.9050  
 Epoch 16/30  
 - 2s - loss: 0.2233 - acc: 0.9412 - val\_loss: 0.4134 - val\_acc: 0.9006  
 Epoch 17/30  
 - 2s - loss: 0.2170 - acc: 0.9463 - val\_loss: 0.4244 - val\_acc: 0.9118  
 Epoch 18/30  
 - 2s - loss: 0.2194 - acc: 0.9433 - val\_loss: 0.3974 - val\_acc: 0.9240  
 Epoch 19/30  
 - 2s - loss: 0.2115 - acc: 0.9480 - val\_loss: 0.4025 - val\_acc: 0.9016  
 Epoch 20/30  
 - 2s - loss: 0.2032 - acc: 0.9480 - val\_loss: 0.3664 - val\_acc: 0.9053  
 Epoch 21/30  
 - 2s - loss: 0.2113 - acc: 0.9434 - val\_loss: 0.3845 - val\_acc: 0.9237  
 Epoch 22/30  
 - 2s - loss: 0.2006 - acc: 0.9476 - val\_loss: 0.4382 - val\_acc: 0.8853  
 Epoch 23/30  
 - 2s - loss: 0.1963 - acc: 0.9482 - val\_loss: 0.3699 - val\_acc: 0.9108  
 Epoch 24/30  
 - 2s - loss: 0.1915 - acc: 0.9465 - val\_loss: 0.3475 - val\_acc: 0.9216  
 Epoch 25/30  
 - 2s - loss: 0.1862 - acc: 0.9476 - val\_loss: 0.3768 - val\_acc: 0.8999  
 Epoch 26/30  
 - 2s - loss: 0.2347 - acc: 0.9365 - val\_loss: 0.3651 - val\_acc: 0.9141  
 Epoch 27/30  
 - 2s - loss: 0.1887 - acc: 0.9486 - val\_loss: 0.3818 - val\_acc: 0.9118  
 Epoch 28/30  
 - 2s - loss: 0.2066 - acc: 0.9434 - val\_loss: 0.3828 - val\_acc: 0.9111  
 Epoch 29/30

- 2s - loss: 0.1933 - acc: 0.9475 - val\_loss: 0.3741 - val\_acc: 0.8975  
Epoch 30/30  
- 2s - loss: 0.1845 - acc: 0.9459 - val\_loss: 0.3850 - val\_acc: 0.9030  
Train accuracy 0.9457290533188248 Test accuracy: 0.9029521547336274

---

Layer (type)	Output Shape	Param #
conv1d_129 (Conv1D)	(None, 122, 42)	2688
conv1d_130 (Conv1D)	(None, 118, 24)	5064
dropout_65 (Dropout)	(None, 118, 24)	0
max_pooling1d_65 (MaxPooling)	(None, 39, 24)	0
flatten_65 (Flatten)	(None, 936)	0
dense_129 (Dense)	(None, 64)	59968
dense_130 (Dense)	(None, 6)	390

---

Total params: 68,110  
Trainable params: 68,110  
Non-trainable params: 0

---

None  
Train on 7352 samples, validate on 2947 samples  
Epoch 1/30  
- 5s - loss: 75.6152 - acc: 0.6952 - val\_loss: 45.9681 - val\_acc: 0.7750  
Epoch 2/30  
- 2s - loss: 29.3537 - acc: 0.8867 - val\_loss: 17.2696 - val\_acc: 0.8300  
Epoch 3/30  
- 2s - loss: 10.5343 - acc: 0.9244 - val\_loss: 6.1212 - val\_acc: 0.8816  
Epoch 4/30  
- 2s - loss: 3.5535 - acc: 0.9350 - val\_loss: 2.2469 - val\_acc: 0.8819  
Epoch 5/30  
- 2s - loss: 1.2534 - acc: 0.9373 - val\_loss: 1.0839 - val\_acc: 0.9033  
Epoch 6/30  
- 2s - loss: 0.5805 - acc: 0.9384 - val\_loss: 0.7243 - val\_acc: 0.8972  
Epoch 7/30  
- 2s - loss: 0.3978 - acc: 0.9378 - val\_loss: 0.6027 - val\_acc: 0.9002  
Epoch 8/30  
- 2s - loss: 0.3298 - acc: 0.9400 - val\_loss: 0.5543 - val\_acc: 0.8979  
Epoch 9/30  
- 2s - loss: 0.3049 - acc: 0.9362 - val\_loss: 0.5385 - val\_acc: 0.9046  
Epoch 10/30  
- 2s - loss: 0.2950 - acc: 0.9406 - val\_loss: 0.5479 - val\_acc: 0.8941

```

Epoch 11/30
- 2s - loss: 0.2760 - acc: 0.9403 - val_loss: 0.4846 - val_acc: 0.8989
Epoch 12/30
- 2s - loss: 0.2573 - acc: 0.9425 - val_loss: 0.4912 - val_acc: 0.9053
Epoch 13/30
- 2s - loss: 0.2598 - acc: 0.9414 - val_loss: 0.4741 - val_acc: 0.8955
Epoch 14/30
- 2s - loss: 0.2438 - acc: 0.9461 - val_loss: 0.4556 - val_acc: 0.8979
Epoch 15/30
- 2s - loss: 0.2429 - acc: 0.9414 - val_loss: 0.4385 - val_acc: 0.9063
Epoch 16/30
- 2s - loss: 0.2349 - acc: 0.9442 - val_loss: 0.4254 - val_acc: 0.9030
Epoch 17/30
- 2s - loss: 0.2380 - acc: 0.9427 - val_loss: 0.4410 - val_acc: 0.8985
Epoch 18/30
- 2s - loss: 0.2252 - acc: 0.9476 - val_loss: 0.4381 - val_acc: 0.8877
Epoch 19/30
- 2s - loss: 0.2465 - acc: 0.9404 - val_loss: 0.4440 - val_acc: 0.9002
Epoch 20/30
- 2s - loss: 0.2148 - acc: 0.9448 - val_loss: 0.4240 - val_acc: 0.8884
Epoch 21/30
- 2s - loss: 0.2321 - acc: 0.9418 - val_loss: 0.4024 - val_acc: 0.8914
Epoch 22/30
- 2s - loss: 0.2122 - acc: 0.9474 - val_loss: 0.4108 - val_acc: 0.8958
Epoch 23/30
- 2s - loss: 0.2165 - acc: 0.9434 - val_loss: 0.4417 - val_acc: 0.9053
Epoch 24/30
- 2s - loss: 0.2108 - acc: 0.9489 - val_loss: 0.4565 - val_acc: 0.8785
Epoch 25/30
- 2s - loss: 0.2070 - acc: 0.9470 - val_loss: 0.3806 - val_acc: 0.9002
Epoch 26/30
- 2s - loss: 0.2096 - acc: 0.9470 - val_loss: 0.3741 - val_acc: 0.9046
Epoch 27/30
- 2s - loss: 0.1974 - acc: 0.9463 - val_loss: 0.3624 - val_acc: 0.9101
Epoch 28/30
- 2s - loss: 0.2164 - acc: 0.9437 - val_loss: 0.3966 - val_acc: 0.8985
Epoch 29/30
- 2s - loss: 0.2001 - acc: 0.9467 - val_loss: 0.3922 - val_acc: 0.8850
Epoch 30/30
- 2s - loss: 0.2130 - acc: 0.9452 - val_loss: 0.3927 - val_acc: 0.9006
Train accuracy 0.9483133841131665 Test accuracy: 0.9005768578215134

```

```

-----
Layer (type)                Output Shape                Param #
-----
conv1d_131 (Conv1D)         (None, 122, 42)            2688
-----
conv1d_132 (Conv1D)         (None, 118, 24)            5064
-----

```



```

-----
dropout_66 (Dropout)          (None, 118, 24)          0
-----
max_pooling1d_66 (MaxPooling (None, 39, 24)          0
-----
flatten_66 (Flatten)          (None, 936)              0
-----
dense_131 (Dense)              (None, 64)               59968
-----
dense_132 (Dense)              (None, 6)                390
=====
Total params: 68,110
Trainable params: 68,110
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 5s - loss: 9.8358 - acc: 0.7752 - val_loss: 3.4873 - val_acc: 0.8829
Epoch 2/30
  - 2s - loss: 1.6666 - acc: 0.9310 - val_loss: 1.1205 - val_acc: 0.8887
Epoch 3/30
  - 2s - loss: 0.5701 - acc: 0.9382 - val_loss: 0.6510 - val_acc: 0.9053
Epoch 4/30
  - 2s - loss: 0.3402 - acc: 0.9406 - val_loss: 0.5602 - val_acc: 0.9019
Epoch 5/30
  - 2s - loss: 0.2900 - acc: 0.9418 - val_loss: 0.4787 - val_acc: 0.8992
Epoch 6/30
  - 2s - loss: 0.2497 - acc: 0.9445 - val_loss: 0.4167 - val_acc: 0.9179
Epoch 7/30
  - 2s - loss: 0.2246 - acc: 0.9478 - val_loss: 0.4231 - val_acc: 0.9172
Epoch 8/30
  - 2s - loss: 0.2168 - acc: 0.9465 - val_loss: 0.4257 - val_acc: 0.9019
Epoch 9/30
  - 2s - loss: 0.2132 - acc: 0.9468 - val_loss: 0.3907 - val_acc: 0.9148
Epoch 10/30
  - 2s - loss: 0.2211 - acc: 0.9456 - val_loss: 0.3603 - val_acc: 0.9230
Epoch 11/30
  - 2s - loss: 0.2013 - acc: 0.9494 - val_loss: 0.4070 - val_acc: 0.9023
Epoch 12/30
  - 2s - loss: 0.1908 - acc: 0.9482 - val_loss: 0.3575 - val_acc: 0.9158
Epoch 13/30
  - 2s - loss: 0.1890 - acc: 0.9486 - val_loss: 0.3430 - val_acc: 0.9138
Epoch 14/30
  - 2s - loss: 0.1872 - acc: 0.9480 - val_loss: 0.3360 - val_acc: 0.9114
Epoch 15/30
  - 2s - loss: 0.2020 - acc: 0.9459 - val_loss: 0.3607 - val_acc: 0.9125
Epoch 16/30

```

```

- 2s - loss: 0.1848 - acc: 0.9487 - val_loss: 0.3718 - val_acc: 0.9131
Epoch 17/30
- 2s - loss: 0.1780 - acc: 0.9480 - val_loss: 0.3492 - val_acc: 0.9077
Epoch 18/30
- 2s - loss: 0.1795 - acc: 0.9476 - val_loss: 0.3367 - val_acc: 0.9175
Epoch 19/30
- 2s - loss: 0.1733 - acc: 0.9482 - val_loss: 0.3379 - val_acc: 0.9131
Epoch 20/30
- 2s - loss: 0.1718 - acc: 0.9482 - val_loss: 0.3264 - val_acc: 0.9084
Epoch 21/30
- 2s - loss: 0.1770 - acc: 0.9472 - val_loss: 0.3123 - val_acc: 0.9226
Epoch 22/30
- 2s - loss: 0.1857 - acc: 0.9478 - val_loss: 0.3252 - val_acc: 0.8996
Epoch 23/30
- 2s - loss: 0.1692 - acc: 0.9475 - val_loss: 0.3208 - val_acc: 0.9131
Epoch 24/30
- 2s - loss: 0.1672 - acc: 0.9528 - val_loss: 0.3090 - val_acc: 0.9148
Epoch 25/30
- 2s - loss: 0.1827 - acc: 0.9465 - val_loss: 0.3289 - val_acc: 0.9158
Epoch 26/30
- 2s - loss: 0.1814 - acc: 0.9475 - val_loss: 0.3128 - val_acc: 0.8999
Epoch 27/30
- 2s - loss: 0.1691 - acc: 0.9483 - val_loss: 0.3428 - val_acc: 0.9013
Epoch 28/30
- 2s - loss: 0.1641 - acc: 0.9490 - val_loss: 0.3360 - val_acc: 0.9097
Epoch 29/30
- 2s - loss: 0.1837 - acc: 0.9448 - val_loss: 0.3218 - val_acc: 0.9172
Epoch 30/30
- 2s - loss: 0.1594 - acc: 0.9514 - val_loss: 0.3166 - val_acc: 0.9063
Train accuracy 0.9511697497279652 Test accuracy: 0.9063454360366474

```

Layer (type)	Output Shape	Param #
conv1d_133 (Conv1D)	(None, 122, 42)	2688
conv1d_134 (Conv1D)	(None, 118, 24)	5064
dropout_67 (Dropout)	(None, 118, 24)	0
max_pooling1d_67 (MaxPooling)	(None, 39, 24)	0
flatten_67 (Flatten)	(None, 936)	0
dense_133 (Dense)	(None, 64)	59968
dense_134 (Dense)	(None, 6)	390

Total params: 68,110  
Trainable params: 68,110  
Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 5s - loss: 29.5171 - acc: 0.7307 - val\_loss: 9.1926 - val\_acc: 0.8324

Epoch 2/30

- 2s - loss: 3.8775 - acc: 0.9041 - val\_loss: 1.6253 - val\_acc: 0.8778

Epoch 3/30

- 2s - loss: 0.7419 - acc: 0.9215 - val\_loss: 0.7882 - val\_acc: 0.8904

Epoch 4/30

- 2s - loss: 0.4066 - acc: 0.9280 - val\_loss: 0.6613 - val\_acc: 0.8683

Epoch 5/30

- 2s - loss: 0.3569 - acc: 0.9283 - val\_loss: 0.5926 - val\_acc: 0.8975

Epoch 6/30

- 2s - loss: 0.3445 - acc: 0.9264 - val\_loss: 0.5981 - val\_acc: 0.8907

Epoch 7/30

- 2s - loss: 0.3012 - acc: 0.9373 - val\_loss: 0.5547 - val\_acc: 0.8775

Epoch 8/30

- 2s - loss: 0.2942 - acc: 0.9308 - val\_loss: 0.5063 - val\_acc: 0.8894

Epoch 9/30

- 2s - loss: 0.2903 - acc: 0.9314 - val\_loss: 0.4836 - val\_acc: 0.8924

Epoch 10/30

- 2s - loss: 0.2852 - acc: 0.9350 - val\_loss: 0.4911 - val\_acc: 0.8982

Epoch 11/30

- 2s - loss: 0.2793 - acc: 0.9327 - val\_loss: 0.5159 - val\_acc: 0.8772

Epoch 12/30

- 2s - loss: 0.2785 - acc: 0.9336 - val\_loss: 0.4482 - val\_acc: 0.8890

Epoch 13/30

- 2s - loss: 0.2623 - acc: 0.9369 - val\_loss: 0.4668 - val\_acc: 0.8911

Epoch 14/30

- 2s - loss: 0.2623 - acc: 0.9361 - val\_loss: 0.4482 - val\_acc: 0.8901

Epoch 15/30

- 2s - loss: 0.2557 - acc: 0.9377 - val\_loss: 0.4461 - val\_acc: 0.8938

Epoch 16/30

- 2s - loss: 0.2694 - acc: 0.9329 - val\_loss: 0.4687 - val\_acc: 0.8823

Epoch 17/30

- 2s - loss: 0.2367 - acc: 0.9433 - val\_loss: 0.4488 - val\_acc: 0.8918

Epoch 18/30

- 2s - loss: 0.2474 - acc: 0.9378 - val\_loss: 0.4090 - val\_acc: 0.8989

Epoch 19/30

- 2s - loss: 0.2393 - acc: 0.9403 - val\_loss: 0.4958 - val\_acc: 0.8687

Epoch 20/30

- 2s - loss: 0.2498 - acc: 0.9369 - val\_loss: 0.4526 - val\_acc: 0.8928

Epoch 21/30

- 2s - loss: 0.2361 - acc: 0.9388 - val\_loss: 0.4225 - val\_acc: 0.8870

Epoch 22/30  
 - 2s - loss: 0.2403 - acc: 0.9366 - val\_loss: 0.5166 - val\_acc: 0.8666  
 Epoch 23/30  
 - 2s - loss: 0.2404 - acc: 0.9403 - val\_loss: 0.4329 - val\_acc: 0.8850  
 Epoch 24/30  
 - 2s - loss: 0.2283 - acc: 0.9403 - val\_loss: 0.4088 - val\_acc: 0.8955  
 Epoch 25/30  
 - 2s - loss: 0.2335 - acc: 0.9395 - val\_loss: 0.4425 - val\_acc: 0.8639  
 Epoch 26/30  
 - 2s - loss: 0.2246 - acc: 0.9374 - val\_loss: 0.4459 - val\_acc: 0.8870  
 Epoch 27/30  
 - 2s - loss: 0.2145 - acc: 0.9430 - val\_loss: 0.4187 - val\_acc: 0.8860  
 Epoch 28/30  
 - 2s - loss: 0.2271 - acc: 0.9402 - val\_loss: 0.4269 - val\_acc: 0.8656  
 Epoch 29/30  
 - 2s - loss: 0.2235 - acc: 0.9403 - val\_loss: 0.4065 - val\_acc: 0.8968  
 Epoch 30/30  
 - 2s - loss: 0.2315 - acc: 0.9414 - val\_loss: 0.3931 - val\_acc: 0.8924  
 Train accuracy 0.9420565832426551 Test accuracy: 0.8924329826942654

Layer (type)	Output Shape	Param #
conv1d_135 (Conv1D)	(None, 122, 42)	2688
conv1d_136 (Conv1D)	(None, 118, 24)	5064
dropout_68 (Dropout)	(None, 118, 24)	0
max_pooling1d_68 (MaxPooling)	(None, 39, 24)	0
flatten_68 (Flatten)	(None, 936)	0
dense_135 (Dense)	(None, 64)	59968
dense_136 (Dense)	(None, 6)	390

Total params: 68,110  
 Trainable params: 68,110  
 Non-trainable params: 0

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 5s - loss: 92.7670 - acc: 0.7641 - val\_loss: 39.0706 - val\_acc: 0.7974  
 Epoch 2/30  
 - 2s - loss: 19.4374 - acc: 0.9094 - val\_loss: 7.9359 - val\_acc: 0.8660  
 Epoch 3/30

- 2s - loss: 3.7507 - acc: 0.9168 - val\_loss: 1.9581 - val\_acc: 0.8035  
Epoch 4/30  
- 2s - loss: 0.9449 - acc: 0.9123 - val\_loss: 0.9198 - val\_acc: 0.8446  
Epoch 5/30  
- 2s - loss: 0.5073 - acc: 0.9208 - val\_loss: 0.7195 - val\_acc: 0.8901  
Epoch 6/30  
- 2s - loss: 0.4332 - acc: 0.9184 - val\_loss: 0.6707 - val\_acc: 0.8911  
Epoch 7/30  
- 2s - loss: 0.3975 - acc: 0.9253 - val\_loss: 0.6230 - val\_acc: 0.8843  
Epoch 8/30  
- 2s - loss: 0.3860 - acc: 0.9207 - val\_loss: 0.6279 - val\_acc: 0.8907  
Epoch 9/30  
- 2s - loss: 0.3573 - acc: 0.9313 - val\_loss: 0.5995 - val\_acc: 0.8924  
Epoch 10/30  
- 2s - loss: 0.3411 - acc: 0.9320 - val\_loss: 0.5888 - val\_acc: 0.8904  
Epoch 11/30  
- 2s - loss: 0.3395 - acc: 0.9282 - val\_loss: 0.5476 - val\_acc: 0.9077  
Epoch 12/30  
- 2s - loss: 0.3151 - acc: 0.9300 - val\_loss: 0.5552 - val\_acc: 0.8853  
Epoch 13/30  
- 2s - loss: 0.3013 - acc: 0.9339 - val\_loss: 0.5454 - val\_acc: 0.9023  
Epoch 14/30  
- 2s - loss: 0.3146 - acc: 0.9289 - val\_loss: 0.5326 - val\_acc: 0.9019  
Epoch 15/30  
- 2s - loss: 0.2978 - acc: 0.9331 - val\_loss: 0.5256 - val\_acc: 0.8948  
Epoch 16/30  
- 2s - loss: 0.3063 - acc: 0.9323 - val\_loss: 0.5137 - val\_acc: 0.8829  
Epoch 17/30  
- 2s - loss: 0.3023 - acc: 0.9343 - val\_loss: 0.5029 - val\_acc: 0.8975  
Epoch 18/30  
- 2s - loss: 0.2842 - acc: 0.9332 - val\_loss: 0.4836 - val\_acc: 0.9006  
Epoch 19/30  
- 2s - loss: 0.2704 - acc: 0.9387 - val\_loss: 0.4692 - val\_acc: 0.8968  
Epoch 20/30  
- 2s - loss: 0.2799 - acc: 0.9344 - val\_loss: 0.4859 - val\_acc: 0.8972  
Epoch 21/30  
- 2s - loss: 0.2814 - acc: 0.9344 - val\_loss: 0.4948 - val\_acc: 0.8755  
Epoch 22/30  
- 2s - loss: 0.2672 - acc: 0.9381 - val\_loss: 0.4504 - val\_acc: 0.8968  
Epoch 23/30  
- 2s - loss: 0.2564 - acc: 0.9395 - val\_loss: 0.4577 - val\_acc: 0.8935  
Epoch 24/30  
- 2s - loss: 0.2830 - acc: 0.9316 - val\_loss: 0.4942 - val\_acc: 0.8785  
Epoch 25/30  
- 2s - loss: 0.2639 - acc: 0.9354 - val\_loss: 0.4717 - val\_acc: 0.8795  
Epoch 26/30  
- 2s - loss: 0.2492 - acc: 0.9369 - val\_loss: 0.4660 - val\_acc: 0.8880  
Epoch 27/30

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- 2s - loss: 0.2395 - acc: 0.9408 - val_loss: 0.4492 - val_acc: 0.8928
Epoch 28/30
- 2s - loss: 0.2478 - acc: 0.9353 - val_loss: 0.4508 - val_acc: 0.8928
Epoch 29/30
- 2s - loss: 0.2549 - acc: 0.9351 - val_loss: 0.4313 - val_acc: 0.9050
Epoch 30/30
- 2s - loss: 0.2472 - acc: 0.9388 - val_loss: 0.4157 - val_acc: 0.8924
Train accuracy 0.9423286180631121 Test accuracy: 0.8924329826942654
-----

```

Layer (type)	Output Shape	Param #
conv1d_137 (Conv1D)	(None, 122, 42)	2688
conv1d_138 (Conv1D)	(None, 118, 24)	5064
dropout_69 (Dropout)	(None, 118, 24)	0
max_pooling1d_69 (MaxPooling)	(None, 39, 24)	0
flatten_69 (Flatten)	(None, 936)	0
dense_137 (Dense)	(None, 64)	59968
dense_138 (Dense)	(None, 6)	390

```

=====
Total params: 68,110
Trainable params: 68,110
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 5s - loss: 29.0453 - acc: 0.7511 - val_loss: 13.1608 - val_acc: 0.8514
Epoch 2/30
- 2s - loss: 6.9638 - acc: 0.9128 - val_loss: 3.5920 - val_acc: 0.8897
Epoch 3/30
- 2s - loss: 1.8805 - acc: 0.9301 - val_loss: 1.3210 - val_acc: 0.8975
Epoch 4/30
- 2s - loss: 0.6821 - acc: 0.9355 - val_loss: 0.7726 - val_acc: 0.8955
Epoch 5/30
- 2s - loss: 0.4126 - acc: 0.9361 - val_loss: 0.6183 - val_acc: 0.8982
Epoch 6/30
- 2s - loss: 0.3370 - acc: 0.9397 - val_loss: 0.5280 - val_acc: 0.9182
Epoch 7/30
- 2s - loss: 0.3102 - acc: 0.9348 - val_loss: 0.5408 - val_acc: 0.9043
Epoch 8/30
- 2s - loss: 0.2801 - acc: 0.9396 - val_loss: 0.5202 - val_acc: 0.8958

```

```

Epoch 9/30
  - 2s - loss: 0.2709 - acc: 0.9391 - val_loss: 0.4887 - val_acc: 0.9111
Epoch 10/30
  - 2s - loss: 0.2675 - acc: 0.9378 - val_loss: 0.4514 - val_acc: 0.9114
Epoch 11/30
  - 2s - loss: 0.2620 - acc: 0.9372 - val_loss: 0.4769 - val_acc: 0.8873
Epoch 12/30
  - 2s - loss: 0.2606 - acc: 0.9376 - val_loss: 0.4476 - val_acc: 0.9053
Epoch 13/30
  - 2s - loss: 0.2486 - acc: 0.9410 - val_loss: 0.4487 - val_acc: 0.9040
Epoch 14/30
  - 2s - loss: 0.2293 - acc: 0.9455 - val_loss: 0.4811 - val_acc: 0.8856
Epoch 15/30
  - 2s - loss: 0.2293 - acc: 0.9437 - val_loss: 0.4151 - val_acc: 0.9019
Epoch 16/30
  - 2s - loss: 0.2244 - acc: 0.9446 - val_loss: 0.4569 - val_acc: 0.8877
Epoch 17/30
  - 2s - loss: 0.2293 - acc: 0.9404 - val_loss: 0.3932 - val_acc: 0.9125
Epoch 18/30
  - 2s - loss: 0.2202 - acc: 0.9431 - val_loss: 0.4416 - val_acc: 0.8778
Epoch 19/30
  - 2s - loss: 0.2229 - acc: 0.9423 - val_loss: 0.4611 - val_acc: 0.8870
Epoch 20/30
  - 2s - loss: 0.2167 - acc: 0.9434 - val_loss: 0.3924 - val_acc: 0.8941
Epoch 21/30
  - 2s - loss: 0.2459 - acc: 0.9355 - val_loss: 0.4056 - val_acc: 0.9019
Epoch 22/30
  - 2s - loss: 0.2239 - acc: 0.9415 - val_loss: 0.4165 - val_acc: 0.8918
Epoch 23/30
  - 2s - loss: 0.1976 - acc: 0.9459 - val_loss: 0.3863 - val_acc: 0.9006
Epoch 24/30
  - 2s - loss: 0.1961 - acc: 0.9474 - val_loss: 0.3605 - val_acc: 0.9053
Epoch 25/30
  - 2s - loss: 0.2142 - acc: 0.9388 - val_loss: 0.4033 - val_acc: 0.8850
Epoch 26/30
  - 2s - loss: 0.1952 - acc: 0.9483 - val_loss: 0.3589 - val_acc: 0.9023
Epoch 27/30
  - 2s - loss: 0.2327 - acc: 0.9368 - val_loss: 0.3625 - val_acc: 0.9104
Epoch 28/30
  - 2s - loss: 0.1893 - acc: 0.9504 - val_loss: 0.3898 - val_acc: 0.8887
Epoch 29/30
  - 2s - loss: 0.1947 - acc: 0.9429 - val_loss: 0.3832 - val_acc: 0.9067
Epoch 30/30
  - 2s - loss: 0.1856 - acc: 0.9506 - val_loss: 0.3595 - val_acc: 0.9114
Train accuracy 0.9544341675734495 Test accuracy: 0.9114353579911775
-----

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Layer (type)                Output Shape                Param #

```

```

=====
conv1d_139 (Conv1D)          (None, 122, 42)          2688
-----
conv1d_140 (Conv1D)          (None, 118, 24)          5064
-----
dropout_70 (Dropout)         (None, 118, 24)          0
-----
max_pooling1d_70 (MaxPooling (None, 39, 24)          0
-----
flatten_70 (Flatten)         (None, 936)              0
-----
dense_139 (Dense)            (None, 64)               59968
-----
dense_140 (Dense)            (None, 6)                390
=====
Total params: 68,110
Trainable params: 68,110
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 6s - loss: 67.8996 - acc: 0.7432 - val_loss: 24.4306 - val_acc: 0.8188
Epoch 2/30
  - 2s - loss: 10.9655 - acc: 0.8953 - val_loss: 3.9665 - val_acc: 0.8649
Epoch 3/30
  - 2s - loss: 1.7413 - acc: 0.9237 - val_loss: 1.0921 - val_acc: 0.8870
Epoch 4/30
  - 2s - loss: 0.5724 - acc: 0.9257 - val_loss: 0.7842 - val_acc: 0.8880
Epoch 5/30
  - 2s - loss: 0.4326 - acc: 0.9298 - val_loss: 0.6701 - val_acc: 0.8782
Epoch 6/30
  - 2s - loss: 0.4042 - acc: 0.9278 - val_loss: 0.6308 - val_acc: 0.8785
Epoch 7/30
  - 2s - loss: 0.3742 - acc: 0.9295 - val_loss: 0.5984 - val_acc: 0.8972
Epoch 8/30
  - 2s - loss: 0.3513 - acc: 0.9321 - val_loss: 0.5696 - val_acc: 0.8843
Epoch 9/30
  - 2s - loss: 0.3320 - acc: 0.9313 - val_loss: 0.5557 - val_acc: 0.9057
Epoch 10/30
  - 2s - loss: 0.3324 - acc: 0.9310 - val_loss: 0.5364 - val_acc: 0.9009
Epoch 11/30
  - 2s - loss: 0.3244 - acc: 0.9301 - val_loss: 0.5411 - val_acc: 0.9023
Epoch 12/30
  - 2s - loss: 0.3305 - acc: 0.9294 - val_loss: 0.5092 - val_acc: 0.9152
Epoch 13/30
  - 2s - loss: 0.2984 - acc: 0.9385 - val_loss: 0.4965 - val_acc: 0.8965
Epoch 14/30

```



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- 2s - loss: 0.2830 - acc: 0.9382 - val_loss: 0.4861 - val_acc: 0.8856
Epoch 15/30
- 2s - loss: 0.2737 - acc: 0.9404 - val_loss: 0.4907 - val_acc: 0.8853
Epoch 16/30
- 2s - loss: 0.3046 - acc: 0.9324 - val_loss: 0.4850 - val_acc: 0.8829
Epoch 17/30
- 2s - loss: 0.2844 - acc: 0.9323 - val_loss: 0.4600 - val_acc: 0.8992
Epoch 18/30
- 2s - loss: 0.2738 - acc: 0.9362 - val_loss: 0.4696 - val_acc: 0.8816
Epoch 19/30
- 2s - loss: 0.2674 - acc: 0.9389 - val_loss: 0.4743 - val_acc: 0.8968
Epoch 20/30
- 2s - loss: 0.2862 - acc: 0.9324 - val_loss: 0.4601 - val_acc: 0.9023
Epoch 21/30
- 2s - loss: 0.2418 - acc: 0.9448 - val_loss: 0.4581 - val_acc: 0.8870
Epoch 22/30
- 2s - loss: 0.2558 - acc: 0.9373 - val_loss: 0.5145 - val_acc: 0.8578
Epoch 23/30
- 2s - loss: 0.2639 - acc: 0.9374 - val_loss: 0.4366 - val_acc: 0.8945
Epoch 24/30
- 2s - loss: 0.2462 - acc: 0.9400 - val_loss: 0.4139 - val_acc: 0.9013
Epoch 25/30
- 2s - loss: 0.2413 - acc: 0.9419 - val_loss: 0.4236 - val_acc: 0.8965
Epoch 26/30
- 2s - loss: 0.2530 - acc: 0.9373 - val_loss: 0.4354 - val_acc: 0.8982
Epoch 27/30
- 2s - loss: 0.2452 - acc: 0.9377 - val_loss: 0.4397 - val_acc: 0.8856
Epoch 28/30
- 2s - loss: 0.2346 - acc: 0.9407 - val_loss: 0.4121 - val_acc: 0.8999
Epoch 29/30
- 2s - loss: 0.2428 - acc: 0.9396 - val_loss: 0.4186 - val_acc: 0.8894
Epoch 30/30
- 2s - loss: 0.2467 - acc: 0.9366 - val_loss: 0.4019 - val_acc: 0.9040
Train accuracy 0.9462731229597389 Test accuracy: 0.9039701391245334

```

Layer (type)	Output Shape	Param #
conv1d_141 (Conv1D)	(None, 122, 32)	2048
conv1d_142 (Conv1D)	(None, 118, 24)	3864
dropout_71 (Dropout)	(None, 118, 24)	0
max_pooling1d_71 (MaxPooling)	(None, 39, 24)	0
flatten_71 (Flatten)	(None, 936)	0

dense_141 (Dense)	(None, 64)	59968
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dense_142 (Dense)	(None, 6)	390
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Total params: 66,270  
 Trainable params: 66,270  
 Non-trainable params: 0

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None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 6s - loss: 15.5199 - acc: 0.7844 - val\_loss: 2.4015 - val\_acc: 0.8880

Epoch 2/25

- 3s - loss: 0.9192 - acc: 0.9115 - val\_loss: 0.7775 - val\_acc: 0.8683

Epoch 3/25

- 2s - loss: 0.4096 - acc: 0.9202 - val\_loss: 0.6144 - val\_acc: 0.8877

Epoch 4/25

- 3s - loss: 0.3681 - acc: 0.9196 - val\_loss: 0.5921 - val\_acc: 0.9043

Epoch 5/25

- 3s - loss: 0.3259 - acc: 0.9316 - val\_loss: 0.5209 - val\_acc: 0.8836

Epoch 6/25

- 3s - loss: 0.3377 - acc: 0.9272 - val\_loss: 0.5020 - val\_acc: 0.8894

Epoch 7/25

- 3s - loss: 0.2968 - acc: 0.9329 - val\_loss: 0.5164 - val\_acc: 0.8772

Epoch 8/25

- 3s - loss: 0.2822 - acc: 0.9350 - val\_loss: 0.4769 - val\_acc: 0.8802

Epoch 9/25

- 3s - loss: 0.2743 - acc: 0.9351 - val\_loss: 0.4823 - val\_acc: 0.8758

Epoch 10/25

- 3s - loss: 0.2813 - acc: 0.9348 - val\_loss: 0.4356 - val\_acc: 0.8826

Epoch 11/25

- 3s - loss: 0.2667 - acc: 0.9351 - val\_loss: 0.4359 - val\_acc: 0.9087

Epoch 12/25

- 3s - loss: 0.3117 - acc: 0.9257 - val\_loss: 0.4691 - val\_acc: 0.8911

Epoch 13/25

- 3s - loss: 0.2724 - acc: 0.9314 - val\_loss: 0.5162 - val\_acc: 0.8697

Epoch 14/25

- 3s - loss: 0.2854 - acc: 0.9347 - val\_loss: 0.4723 - val\_acc: 0.8890

Epoch 15/25

- 3s - loss: 0.2510 - acc: 0.9381 - val\_loss: 0.4187 - val\_acc: 0.8945

Epoch 16/25

- 3s - loss: 0.2441 - acc: 0.9378 - val\_loss: 0.4044 - val\_acc: 0.8904

Epoch 17/25

- 2s - loss: 0.2425 - acc: 0.9362 - val\_loss: 0.4547 - val\_acc: 0.8884

Epoch 18/25

- 3s - loss: 0.2552 - acc: 0.9354 - val\_loss: 0.4103 - val\_acc: 0.8975

Epoch 19/25

- 3s - loss: 0.2460 - acc: 0.9327 - val\_loss: 0.6146 - val\_acc: 0.8385

Epoch 20/25  
 - 3s - loss: 0.2429 - acc: 0.9400 - val\_loss: 0.4179 - val\_acc: 0.8938  
 Epoch 21/25  
 - 3s - loss: 0.2237 - acc: 0.9391 - val\_loss: 0.4486 - val\_acc: 0.8707  
 Epoch 22/25  
 - 2s - loss: 0.2403 - acc: 0.9381 - val\_loss: 0.3819 - val\_acc: 0.8935  
 Epoch 23/25  
 - 3s - loss: 0.2235 - acc: 0.9423 - val\_loss: 0.3933 - val\_acc: 0.8924  
 Epoch 24/25  
 - 3s - loss: 0.2319 - acc: 0.9406 - val\_loss: 0.4706 - val\_acc: 0.8636  
 Epoch 25/25  
 - 2s - loss: 0.2130 - acc: 0.9475 - val\_loss: 0.3838 - val\_acc: 0.8955  
 Train accuracy 0.9533460282916213 Test accuracy: 0.8954869358669834

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Layer (type)	Output Shape	Param #
=====		
conv1d_143 (Conv1D)	(None, 122, 42)	2688
-----		
conv1d_144 (Conv1D)	(None, 116, 24)	7080
-----		
dropout_72 (Dropout)	(None, 116, 24)	0
-----		
max_pooling1d_72 (MaxPooling)	(None, 38, 24)	0
-----		
flatten_72 (Flatten)	(None, 912)	0
-----		
dense_143 (Dense)	(None, 64)	58432
-----		
dense_144 (Dense)	(None, 6)	390
=====		

Total params: 68,590  
 Trainable params: 68,590  
 Non-trainable params: 0

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None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/35  
 - 5s - loss: 27.2431 - acc: 0.7874 - val\_loss: 3.7998 - val\_acc: 0.7923  
 Epoch 2/35  
 - 2s - loss: 1.2754 - acc: 0.9078 - val\_loss: 0.7984 - val\_acc: 0.8870  
 Epoch 3/35  
 - 2s - loss: 0.4591 - acc: 0.9127 - val\_loss: 0.6392 - val\_acc: 0.8856  
 Epoch 4/35  
 - 2s - loss: 0.3798 - acc: 0.9219 - val\_loss: 0.6127 - val\_acc: 0.8544  
 Epoch 5/35  
 - 2s - loss: 0.3484 - acc: 0.9282 - val\_loss: 0.5440 - val\_acc: 0.9033  
 Epoch 6/35

- 2s - loss: 0.3507 - acc: 0.9275 - val\_loss: 0.4836 - val\_acc: 0.8935  
 Epoch 7/35  
 - 2s - loss: 0.3274 - acc: 0.9294 - val\_loss: 0.4867 - val\_acc: 0.9030  
 Epoch 8/35  
 - 2s - loss: 0.2922 - acc: 0.9346 - val\_loss: 0.4747 - val\_acc: 0.8924  
 Epoch 9/35  
 - 2s - loss: 0.2849 - acc: 0.9363 - val\_loss: 0.4774 - val\_acc: 0.8850  
 Epoch 10/35  
 - 2s - loss: 0.2943 - acc: 0.9283 - val\_loss: 0.5930 - val\_acc: 0.8504  
 Epoch 11/35  
 - 2s - loss: 0.2843 - acc: 0.9362 - val\_loss: 0.4536 - val\_acc: 0.8938  
 Epoch 12/35  
 - 2s - loss: 0.2734 - acc: 0.9361 - val\_loss: 0.5401 - val\_acc: 0.8385  
 Epoch 13/35  
 - 2s - loss: 0.2774 - acc: 0.9334 - val\_loss: 0.4452 - val\_acc: 0.9006  
 Epoch 14/35  
 - 2s - loss: 0.3009 - acc: 0.9302 - val\_loss: 0.4144 - val\_acc: 0.9016  
 Epoch 15/35  
 - 2s - loss: 0.2690 - acc: 0.9346 - val\_loss: 0.4409 - val\_acc: 0.8941  
 Epoch 16/35  
 - 2s - loss: 0.2630 - acc: 0.9384 - val\_loss: 0.4487 - val\_acc: 0.8996  
 Epoch 17/35  
 - 2s - loss: 0.3041 - acc: 0.9259 - val\_loss: 0.4295 - val\_acc: 0.9060  
 Epoch 18/35  
 - 2s - loss: 0.2521 - acc: 0.9389 - val\_loss: 0.4089 - val\_acc: 0.8948  
 Epoch 19/35  
 - 2s - loss: 0.2532 - acc: 0.9340 - val\_loss: 0.4498 - val\_acc: 0.8897  
 Epoch 20/35  
 - 2s - loss: 0.2550 - acc: 0.9377 - val\_loss: 0.3967 - val\_acc: 0.8962  
 Epoch 21/35  
 - 2s - loss: 0.2706 - acc: 0.9334 - val\_loss: 0.3973 - val\_acc: 0.9030  
 Epoch 22/35  
 - 2s - loss: 0.2388 - acc: 0.9395 - val\_loss: 0.3989 - val\_acc: 0.8890  
 Epoch 23/35  
 - 2s - loss: 0.2490 - acc: 0.9359 - val\_loss: 0.3506 - val\_acc: 0.9080  
 Epoch 24/35  
 - 2s - loss: 0.3043 - acc: 0.9272 - val\_loss: 0.4080 - val\_acc: 0.8948  
 Epoch 25/35  
 - 2s - loss: 0.2515 - acc: 0.9366 - val\_loss: 0.4404 - val\_acc: 0.8823  
 Epoch 26/35  
 - 2s - loss: 0.2451 - acc: 0.9372 - val\_loss: 0.4079 - val\_acc: 0.8924  
 Epoch 27/35  
 - 2s - loss: 0.2366 - acc: 0.9353 - val\_loss: 0.3978 - val\_acc: 0.8931  
 Epoch 28/35  
 - 2s - loss: 0.2492 - acc: 0.9366 - val\_loss: 0.3909 - val\_acc: 0.8921  
 Epoch 29/35  
 - 2s - loss: 0.2677 - acc: 0.9305 - val\_loss: 0.4165 - val\_acc: 0.8992  
 Epoch 30/35

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- 2s - loss: 0.2637 - acc: 0.9305 - val_loss: 0.4102 - val_acc: 0.9019
Epoch 31/35
- 2s - loss: 0.2502 - acc: 0.9377 - val_loss: 0.3708 - val_acc: 0.8948
Epoch 32/35
- 2s - loss: 0.2598 - acc: 0.9325 - val_loss: 0.3991 - val_acc: 0.8948
Epoch 33/35
- 2s - loss: 0.2349 - acc: 0.9399 - val_loss: 0.3973 - val_acc: 0.8829
Epoch 34/35
- 2s - loss: 0.2256 - acc: 0.9418 - val_loss: 0.3926 - val_acc: 0.8846
Epoch 35/35
- 2s - loss: 0.2524 - acc: 0.9368 - val_loss: 0.3700 - val_acc: 0.8958
Train accuracy 0.9503536452665942 Test accuracy: 0.8958262639972854

```

Layer (type)	Output Shape	Param #
conv1d_145 (Conv1D)	(None, 122, 32)	2048
conv1d_146 (Conv1D)	(None, 118, 24)	3864
dropout_73 (Dropout)	(None, 118, 24)	0
max_pooling1d_73 (MaxPooling)	(None, 39, 24)	0
flatten_73 (Flatten)	(None, 936)	0
dense_145 (Dense)	(None, 64)	59968
dense_146 (Dense)	(None, 6)	390

```

Total params: 66,270
Trainable params: 66,270
Non-trainable params: 0

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 6s - loss: 34.0518 - acc: 0.7050 - val_loss: 17.5698 - val_acc: 0.8300
Epoch 2/30
- 3s - loss: 10.0857 - acc: 0.9032 - val_loss: 5.4524 - val_acc: 0.8890
Epoch 3/30
- 3s - loss: 3.1206 - acc: 0.9195 - val_loss: 1.9977 - val_acc: 0.8897
Epoch 4/30
- 3s - loss: 1.1367 - acc: 0.9270 - val_loss: 0.9758 - val_acc: 0.8945
Epoch 5/30
- 3s - loss: 0.5683 - acc: 0.9332 - val_loss: 0.6821 - val_acc: 0.8962
Epoch 6/30
- 3s - loss: 0.4013 - acc: 0.9347 - val_loss: 0.6074 - val_acc: 0.8955

```

Epoch 7/30  
- 2s - loss: 0.3439 - acc: 0.9399 - val\_loss: 0.5377 - val\_acc: 0.8958

Epoch 8/30  
- 3s - loss: 0.3169 - acc: 0.9373 - val\_loss: 0.4940 - val\_acc: 0.9138

Epoch 9/30  
- 3s - loss: 0.3115 - acc: 0.9392 - val\_loss: 0.4829 - val\_acc: 0.9114

Epoch 10/30  
- 3s - loss: 0.3061 - acc: 0.9348 - val\_loss: 0.4744 - val\_acc: 0.8982

Epoch 11/30  
- 3s - loss: 0.2746 - acc: 0.9427 - val\_loss: 0.4870 - val\_acc: 0.8856

Epoch 12/30  
- 3s - loss: 0.2723 - acc: 0.9416 - val\_loss: 0.4525 - val\_acc: 0.9141

Epoch 13/30  
- 3s - loss: 0.2656 - acc: 0.9422 - val\_loss: 0.4502 - val\_acc: 0.9009

Epoch 14/30  
- 3s - loss: 0.2523 - acc: 0.9422 - val\_loss: 0.4230 - val\_acc: 0.9046

Epoch 15/30  
- 3s - loss: 0.2580 - acc: 0.9381 - val\_loss: 0.4662 - val\_acc: 0.9019

Epoch 16/30  
- 3s - loss: 0.2454 - acc: 0.9423 - val\_loss: 0.4090 - val\_acc: 0.9019

Epoch 17/30  
- 3s - loss: 0.2395 - acc: 0.9450 - val\_loss: 0.4077 - val\_acc: 0.9013

Epoch 18/30  
- 3s - loss: 0.2290 - acc: 0.9463 - val\_loss: 0.4243 - val\_acc: 0.8979

Epoch 19/30  
- 3s - loss: 0.2375 - acc: 0.9431 - val\_loss: 0.4058 - val\_acc: 0.9040

Epoch 20/30  
- 3s - loss: 0.2209 - acc: 0.9471 - val\_loss: 0.4012 - val\_acc: 0.9125

Epoch 21/30  
- 3s - loss: 0.2193 - acc: 0.9453 - val\_loss: 0.4056 - val\_acc: 0.9087

Epoch 22/30  
- 3s - loss: 0.2138 - acc: 0.9479 - val\_loss: 0.3649 - val\_acc: 0.9104

Epoch 23/30  
- 3s - loss: 0.2122 - acc: 0.9498 - val\_loss: 0.3880 - val\_acc: 0.9053

Epoch 24/30  
- 3s - loss: 0.2126 - acc: 0.9449 - val\_loss: 0.3859 - val\_acc: 0.9023

Epoch 25/30  
- 3s - loss: 0.2083 - acc: 0.9452 - val\_loss: 0.3560 - val\_acc: 0.9063

Epoch 26/30  
- 3s - loss: 0.2042 - acc: 0.9474 - val\_loss: 0.3859 - val\_acc: 0.9080

Epoch 27/30  
- 3s - loss: 0.2128 - acc: 0.9446 - val\_loss: 0.4133 - val\_acc: 0.8860

Epoch 28/30  
- 3s - loss: 0.1976 - acc: 0.9508 - val\_loss: 0.3645 - val\_acc: 0.8904

Epoch 29/30  
- 3s - loss: 0.2048 - acc: 0.9434 - val\_loss: 0.3408 - val\_acc: 0.9094

Epoch 30/30  
- 3s - loss: 0.1974 - acc: 0.9494 - val\_loss: 0.3706 - val\_acc: 0.8955

Train accuracy 0.941784548422198 Test accuracy: 0.8954869358669834

Layer (type)	Output Shape	Param #
conv1d_147 (Conv1D)	(None, 122, 32)	2048
conv1d_148 (Conv1D)	(None, 116, 24)	5400
dropout_74 (Dropout)	(None, 116, 24)	0
max_pooling1d_74 (MaxPooling)	(None, 38, 24)	0
flatten_74 (Flatten)	(None, 912)	0
dense_147 (Dense)	(None, 64)	58432
dense_148 (Dense)	(None, 6)	390

Total params: 66,270

Trainable params: 66,270

Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 6s - loss: 61.7130 - acc: 0.7163 - val\_loss: 39.9502 - val\_acc: 0.8235

Epoch 2/25

- 2s - loss: 26.9145 - acc: 0.9070 - val\_loss: 17.1180 - val\_acc: 0.8626

Epoch 3/25

- 2s - loss: 11.1822 - acc: 0.9323 - val\_loss: 7.0526 - val\_acc: 0.8816

Epoch 4/25

- 2s - loss: 4.4350 - acc: 0.9410 - val\_loss: 2.8886 - val\_acc: 0.8985

Epoch 5/25

- 3s - loss: 1.7589 - acc: 0.9382 - val\_loss: 1.3239 - val\_acc: 0.9002

Epoch 6/25

- 2s - loss: 0.7859 - acc: 0.9387 - val\_loss: 0.7564 - val\_acc: 0.9019

Epoch 7/25

- 2s - loss: 0.4622 - acc: 0.9396 - val\_loss: 0.5795 - val\_acc: 0.9030

Epoch 8/25

- 2s - loss: 0.3608 - acc: 0.9373 - val\_loss: 0.5102 - val\_acc: 0.9070

Epoch 9/25

- 2s - loss: 0.3236 - acc: 0.9338 - val\_loss: 0.4910 - val\_acc: 0.8982

Epoch 10/25

- 3s - loss: 0.2973 - acc: 0.9416 - val\_loss: 0.4474 - val\_acc: 0.9158

Epoch 11/25

- 2s - loss: 0.2789 - acc: 0.9400 - val\_loss: 0.5258 - val\_acc: 0.8951

Epoch 12/25

```

- 2s - loss: 0.2746 - acc: 0.9426 - val_loss: 0.4475 - val_acc: 0.9030
Epoch 13/25
- 2s - loss: 0.2661 - acc: 0.9382 - val_loss: 0.4392 - val_acc: 0.8968
Epoch 14/25
- 2s - loss: 0.2473 - acc: 0.9470 - val_loss: 0.4180 - val_acc: 0.9101
Epoch 15/25
- 2s - loss: 0.2365 - acc: 0.9457 - val_loss: 0.4201 - val_acc: 0.9148
Epoch 16/25
- 3s - loss: 0.2591 - acc: 0.9425 - val_loss: 0.4360 - val_acc: 0.9033
Epoch 17/25
- 2s - loss: 0.2344 - acc: 0.9453 - val_loss: 0.4177 - val_acc: 0.9135
Epoch 18/25
- 2s - loss: 0.2348 - acc: 0.9430 - val_loss: 0.3853 - val_acc: 0.9148
Epoch 19/25
- 2s - loss: 0.2208 - acc: 0.9463 - val_loss: 0.3782 - val_acc: 0.9036
Epoch 20/25
- 2s - loss: 0.2236 - acc: 0.9464 - val_loss: 0.3845 - val_acc: 0.9070
Epoch 21/25
- 3s - loss: 0.2154 - acc: 0.9474 - val_loss: 0.3696 - val_acc: 0.9016
Epoch 22/25
- 2s - loss: 0.2106 - acc: 0.9468 - val_loss: 0.3782 - val_acc: 0.9009
Epoch 23/25
- 2s - loss: 0.2072 - acc: 0.9489 - val_loss: 0.3639 - val_acc: 0.9138
Epoch 24/25
- 2s - loss: 0.2161 - acc: 0.9450 - val_loss: 0.3698 - val_acc: 0.9050
Epoch 25/25
- 2s - loss: 0.2052 - acc: 0.9471 - val_loss: 0.3836 - val_acc: 0.8979
Train accuracy 0.9472252448313384 Test accuracy: 0.8978622327790974

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_149 (Conv1D)	(None, 122, 42)	2688
-----		
conv1d_150 (Conv1D)	(None, 120, 24)	3048
-----		
dropout_75 (Dropout)	(None, 120, 24)	0
-----		
max_pooling1d_75 (MaxPooling)	(None, 60, 24)	0
-----		
flatten_75 (Flatten)	(None, 1440)	0
-----		
dense_149 (Dense)	(None, 64)	92224
-----		
dense_150 (Dense)	(None, 6)	390
=====		

```

Total params: 98,350
Trainable params: 98,350

```



Non-trainable params: 0

-----  
None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 6s - loss: 7.9329 - acc: 0.8075 - val\_loss: 2.5448 - val\_acc: 0.8931

Epoch 2/25

- 2s - loss: 1.1475 - acc: 0.9348 - val\_loss: 0.7381 - val\_acc: 0.8880

Epoch 3/25

- 2s - loss: 0.3857 - acc: 0.9406 - val\_loss: 0.4919 - val\_acc: 0.8951

Epoch 4/25

- 2s - loss: 0.2934 - acc: 0.9363 - val\_loss: 0.4240 - val\_acc: 0.8955

Epoch 5/25

- 2s - loss: 0.2481 - acc: 0.9425 - val\_loss: 0.3938 - val\_acc: 0.9050

Epoch 6/25

- 2s - loss: 0.2314 - acc: 0.9455 - val\_loss: 0.4483 - val\_acc: 0.8884

Epoch 7/25

- 2s - loss: 0.2300 - acc: 0.9415 - val\_loss: 0.3637 - val\_acc: 0.9023

Epoch 8/25

- 2s - loss: 0.2179 - acc: 0.9433 - val\_loss: 0.3187 - val\_acc: 0.9135

Epoch 9/25

- 2s - loss: 0.1921 - acc: 0.9480 - val\_loss: 0.3382 - val\_acc: 0.9080

Epoch 10/25

- 2s - loss: 0.1996 - acc: 0.9441 - val\_loss: 0.3417 - val\_acc: 0.9135

Epoch 11/25

- 2s - loss: 0.2079 - acc: 0.9457 - val\_loss: 0.3683 - val\_acc: 0.8846

Epoch 12/25

- 2s - loss: 0.1995 - acc: 0.9455 - val\_loss: 0.3114 - val\_acc: 0.9121

Epoch 13/25

- 2s - loss: 0.1842 - acc: 0.9468 - val\_loss: 0.3759 - val\_acc: 0.8863

Epoch 14/25

- 2s - loss: 0.2015 - acc: 0.9415 - val\_loss: 0.3607 - val\_acc: 0.8836

Epoch 15/25

- 2s - loss: 0.1890 - acc: 0.9476 - val\_loss: 0.3487 - val\_acc: 0.8941

Epoch 16/25

- 2s - loss: 0.1825 - acc: 0.9467 - val\_loss: 0.3341 - val\_acc: 0.8914

Epoch 17/25

- 2s - loss: 0.1778 - acc: 0.9474 - val\_loss: 0.3169 - val\_acc: 0.9094

Epoch 18/25

- 2s - loss: 0.1637 - acc: 0.9524 - val\_loss: 0.3113 - val\_acc: 0.8958

Epoch 19/25

- 2s - loss: 0.1932 - acc: 0.9438 - val\_loss: 0.3447 - val\_acc: 0.9043

Epoch 20/25

- 2s - loss: 0.1698 - acc: 0.9512 - val\_loss: 0.3818 - val\_acc: 0.8901

Epoch 21/25

- 2s - loss: 0.1862 - acc: 0.9449 - val\_loss: 0.3214 - val\_acc: 0.9104

Epoch 22/25

- 2s - loss: 0.1752 - acc: 0.9487 - val\_loss: 0.2967 - val\_acc: 0.9148

Epoch 23/25  
 - 2s - loss: 0.1763 - acc: 0.9464 - val\_loss: 0.3132 - val\_acc: 0.9074  
 Epoch 24/25  
 - 2s - loss: 0.1923 - acc: 0.9436 - val\_loss: 0.2900 - val\_acc: 0.9125  
 Epoch 25/25  
 - 2s - loss: 0.1629 - acc: 0.9540 - val\_loss: 0.2942 - val\_acc: 0.9040  
 Train accuracy 0.9571545157780196 Test accuracy: 0.9039701391245334

Layer (type)	Output Shape	Param #
conv1d_151 (Conv1D)	(None, 122, 32)	2048
conv1d_152 (Conv1D)	(None, 116, 24)	5400
dropout_76 (Dropout)	(None, 116, 24)	0
max_pooling1d_76 (MaxPooling)	(None, 38, 24)	0
flatten_76 (Flatten)	(None, 912)	0
dense_151 (Dense)	(None, 64)	58432
dense_152 (Dense)	(None, 6)	390

Total params: 66,270  
 Trainable params: 66,270  
 Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30  
 - 6s - loss: 53.3607 - acc: 0.7465 - val\_loss: 26.5124 - val\_acc: 0.8476  
 Epoch 2/30  
 - 2s - loss: 14.5229 - acc: 0.9174 - val\_loss: 6.8551 - val\_acc: 0.8846  
 Epoch 3/30  
 - 2s - loss: 3.5500 - acc: 0.9382 - val\_loss: 1.8605 - val\_acc: 0.8751  
 Epoch 4/30  
 - 2s - loss: 0.9814 - acc: 0.9340 - val\_loss: 0.8247 - val\_acc: 0.8846  
 Epoch 5/30  
 - 3s - loss: 0.4950 - acc: 0.9377 - val\_loss: 0.6401 - val\_acc: 0.8850  
 Epoch 6/30  
 - 2s - loss: 0.3723 - acc: 0.9423 - val\_loss: 0.5275 - val\_acc: 0.8924  
 Epoch 7/30  
 - 2s - loss: 0.3221 - acc: 0.9460 - val\_loss: 0.5195 - val\_acc: 0.8880  
 Epoch 8/30  
 - 2s - loss: 0.3207 - acc: 0.9414 - val\_loss: 0.4919 - val\_acc: 0.8914  
 Epoch 9/30

```

- 2s - loss: 0.2809 - acc: 0.9453 - val_loss: 0.5103 - val_acc: 0.8744
Epoch 10/30
- 2s - loss: 0.2699 - acc: 0.9449 - val_loss: 0.4766 - val_acc: 0.8853
Epoch 11/30
- 3s - loss: 0.2495 - acc: 0.9467 - val_loss: 0.4222 - val_acc: 0.8968
Epoch 12/30
- 2s - loss: 0.2303 - acc: 0.9471 - val_loss: 0.4444 - val_acc: 0.8748
Epoch 13/30
- 2s - loss: 0.2331 - acc: 0.9461 - val_loss: 0.4088 - val_acc: 0.8999
Epoch 14/30
- 2s - loss: 0.2339 - acc: 0.9444 - val_loss: 0.4471 - val_acc: 0.8968
Epoch 15/30
- 2s - loss: 0.2299 - acc: 0.9452 - val_loss: 0.3831 - val_acc: 0.8979
Epoch 16/30
- 3s - loss: 0.2065 - acc: 0.9486 - val_loss: 0.3892 - val_acc: 0.8904
Epoch 17/30
- 2s - loss: 0.2369 - acc: 0.9425 - val_loss: 0.3354 - val_acc: 0.9019
Epoch 18/30
- 2s - loss: 0.1894 - acc: 0.9486 - val_loss: 0.3434 - val_acc: 0.9002
Epoch 19/30
- 2s - loss: 0.1980 - acc: 0.9490 - val_loss: 0.3589 - val_acc: 0.8989
Epoch 20/30
- 2s - loss: 0.1857 - acc: 0.9474 - val_loss: 0.3341 - val_acc: 0.9046
Epoch 21/30
- 2s - loss: 0.2183 - acc: 0.9461 - val_loss: 0.3572 - val_acc: 0.9125
Epoch 22/30
- 2s - loss: 0.1856 - acc: 0.9476 - val_loss: 0.3455 - val_acc: 0.9016
Epoch 23/30
- 2s - loss: 0.1858 - acc: 0.9491 - val_loss: 0.3610 - val_acc: 0.8979
Epoch 24/30
- 2s - loss: 0.1733 - acc: 0.9505 - val_loss: 0.3228 - val_acc: 0.9006
Epoch 25/30
- 2s - loss: 0.1759 - acc: 0.9495 - val_loss: 0.3542 - val_acc: 0.8836
Epoch 26/30
- 2s - loss: 0.1773 - acc: 0.9498 - val_loss: 0.3418 - val_acc: 0.9026
Epoch 27/30
- 3s - loss: 0.1743 - acc: 0.9479 - val_loss: 0.3195 - val_acc: 0.8907
Epoch 28/30
- 2s - loss: 0.1678 - acc: 0.9489 - val_loss: 0.3111 - val_acc: 0.8938
Epoch 29/30
- 2s - loss: 0.1645 - acc: 0.9516 - val_loss: 0.3460 - val_acc: 0.8941
Epoch 30/30
- 2s - loss: 0.1944 - acc: 0.9472 - val_loss: 0.3964 - val_acc: 0.8700
Train accuracy 0.9476332970620239 Test accuracy: 0.8700373260943333

```

```

-----
Layer (type)                Output Shape                Param #
=====

```

conv1d_153 (Conv1D)	(None, 122, 42)	2688
conv1d_154 (Conv1D)	(None, 118, 24)	5064
dropout_77 (Dropout)	(None, 118, 24)	0
max_pooling1d_77 (MaxPooling)	(None, 59, 24)	0
flatten_77 (Flatten)	(None, 1416)	0
dense_153 (Dense)	(None, 64)	90688
dense_154 (Dense)	(None, 6)	390

=====

Total params: 98,830  
Trainable params: 98,830  
Non-trainable params: 0

-----

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25  
- 6s - loss: 39.3390 - acc: 0.7852 - val\_loss: 9.5518 - val\_acc: 0.8683

Epoch 2/25  
- 2s - loss: 3.4300 - acc: 0.9215 - val\_loss: 1.0761 - val\_acc: 0.8870

Epoch 3/25  
- 2s - loss: 0.5285 - acc: 0.9211 - val\_loss: 0.5803 - val\_acc: 0.8938

Epoch 4/25  
- 2s - loss: 0.3491 - acc: 0.9294 - val\_loss: 0.5586 - val\_acc: 0.8521

Epoch 5/25  
- 2s - loss: 0.3307 - acc: 0.9270 - val\_loss: 0.4401 - val\_acc: 0.9043

Epoch 6/25  
- 2s - loss: 0.3070 - acc: 0.9285 - val\_loss: 0.4785 - val\_acc: 0.8823

Epoch 7/25  
- 2s - loss: 0.2950 - acc: 0.9368 - val\_loss: 0.4164 - val\_acc: 0.8989

Epoch 8/25  
- 2s - loss: 0.2775 - acc: 0.9339 - val\_loss: 0.4677 - val\_acc: 0.9036

Epoch 9/25  
- 2s - loss: 0.2881 - acc: 0.9350 - val\_loss: 0.4089 - val\_acc: 0.9013

Epoch 10/25  
- 2s - loss: 0.2454 - acc: 0.9427 - val\_loss: 0.3907 - val\_acc: 0.9006

Epoch 11/25  
- 2s - loss: 0.2743 - acc: 0.9357 - val\_loss: 0.4031 - val\_acc: 0.8975

Epoch 12/25  
- 2s - loss: 0.2679 - acc: 0.9313 - val\_loss: 0.4272 - val\_acc: 0.9043

Epoch 13/25  
- 2s - loss: 0.2445 - acc: 0.9426 - val\_loss: 0.4798 - val\_acc: 0.8565

Epoch 14/25  
- 2s - loss: 0.2356 - acc: 0.9433 - val\_loss: 0.3808 - val\_acc: 0.8880

```

Epoch 15/25
  - 2s - loss: 0.2688 - acc: 0.9338 - val_loss: 0.3623 - val_acc: 0.9043
Epoch 16/25
  - 2s - loss: 0.2403 - acc: 0.9369 - val_loss: 0.3779 - val_acc: 0.8955
Epoch 17/25
  - 2s - loss: 0.2883 - acc: 0.9314 - val_loss: 0.4009 - val_acc: 0.9043
Epoch 18/25
  - 2s - loss: 0.2402 - acc: 0.9403 - val_loss: 0.3530 - val_acc: 0.9118
Epoch 19/25
  - 2s - loss: 0.2194 - acc: 0.9440 - val_loss: 0.5464 - val_acc: 0.8358
Epoch 20/25
  - 2s - loss: 0.2556 - acc: 0.9365 - val_loss: 0.3419 - val_acc: 0.9040
Epoch 21/25
  - 2s - loss: 0.2263 - acc: 0.9381 - val_loss: 0.3149 - val_acc: 0.9067
Epoch 22/25
  - 2s - loss: 0.2205 - acc: 0.9423 - val_loss: 0.3553 - val_acc: 0.8982
Epoch 23/25
  - 2s - loss: 0.2432 - acc: 0.9391 - val_loss: 0.3634 - val_acc: 0.9033
Epoch 24/25
  - 2s - loss: 0.2298 - acc: 0.9389 - val_loss: 0.3635 - val_acc: 0.8938
Epoch 25/25
  - 2s - loss: 0.2275 - acc: 0.9415 - val_loss: 0.3519 - val_acc: 0.9094
Train accuracy 0.9416485310119695 Test accuracy: 0.9093993892093655

```

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Layer (type)	Output Shape	Param #
conv1d_155 (Conv1D)	(None, 124, 32)	1472
conv1d_156 (Conv1D)	(None, 122, 32)	3104
dropout_78 (Dropout)	(None, 122, 32)	0
max_pooling1d_78 (MaxPooling)	(None, 40, 32)	0
flatten_78 (Flatten)	(None, 1280)	0
dense_155 (Dense)	(None, 64)	81984
dense_156 (Dense)	(None, 6)	390

---

```

Total params: 86,950
Trainable params: 86,950
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35

```

- 6s - loss: 23.8866 - acc: 0.8035 - val\_loss: 3.8662 - val\_acc: 0.8398  
Epoch 2/35  
- 2s - loss: 1.3297 - acc: 0.9025 - val\_loss: 0.8660 - val\_acc: 0.7883  
Epoch 3/35  
- 2s - loss: 0.4738 - acc: 0.9055 - val\_loss: 0.6646 - val\_acc: 0.8544  
Epoch 4/35  
- 2s - loss: 0.4083 - acc: 0.9108 - val\_loss: 0.5563 - val\_acc: 0.8853  
Epoch 5/35  
- 3s - loss: 0.3635 - acc: 0.9210 - val\_loss: 0.5511 - val\_acc: 0.8697  
Epoch 6/35  
- 2s - loss: 0.3423 - acc: 0.9217 - val\_loss: 0.5860 - val\_acc: 0.8514  
Epoch 7/35  
- 2s - loss: 0.3352 - acc: 0.9242 - val\_loss: 0.5352 - val\_acc: 0.8870  
Epoch 8/35  
- 2s - loss: 0.3175 - acc: 0.9237 - val\_loss: 0.4922 - val\_acc: 0.8833  
Epoch 9/35  
- 2s - loss: 0.3438 - acc: 0.9208 - val\_loss: 0.5470 - val\_acc: 0.8799  
Epoch 10/35  
- 3s - loss: 0.2848 - acc: 0.9342 - val\_loss: 0.4420 - val\_acc: 0.8880  
Epoch 11/35  
- 2s - loss: 0.3094 - acc: 0.9259 - val\_loss: 0.4420 - val\_acc: 0.8982  
Epoch 12/35  
- 2s - loss: 0.2784 - acc: 0.9362 - val\_loss: 0.4529 - val\_acc: 0.8744  
Epoch 13/35  
- 2s - loss: 0.2875 - acc: 0.9302 - val\_loss: 0.4532 - val\_acc: 0.8700  
Epoch 14/35  
- 3s - loss: 0.2624 - acc: 0.9368 - val\_loss: 0.4088 - val\_acc: 0.8806  
Epoch 15/35  
- 3s - loss: 0.2661 - acc: 0.9297 - val\_loss: 0.4723 - val\_acc: 0.8938  
Epoch 16/35  
- 2s - loss: 0.2745 - acc: 0.9300 - val\_loss: 0.3850 - val\_acc: 0.8935  
Epoch 17/35  
- 2s - loss: 0.2456 - acc: 0.9414 - val\_loss: 0.4002 - val\_acc: 0.8843  
Epoch 18/35  
- 2s - loss: 0.2683 - acc: 0.9270 - val\_loss: 0.4058 - val\_acc: 0.9165  
Epoch 19/35  
- 2s - loss: 0.2894 - acc: 0.9241 - val\_loss: 0.5452 - val\_acc: 0.8415  
Epoch 20/35  
- 3s - loss: 0.2852 - acc: 0.9327 - val\_loss: 0.3998 - val\_acc: 0.8806  
Epoch 21/35  
- 2s - loss: 0.2867 - acc: 0.9266 - val\_loss: 0.4374 - val\_acc: 0.8975  
Epoch 22/35  
- 2s - loss: 0.2513 - acc: 0.9381 - val\_loss: 0.4121 - val\_acc: 0.8931  
Epoch 23/35  
- 2s - loss: 0.2891 - acc: 0.9266 - val\_loss: 0.5593 - val\_acc: 0.8514  
Epoch 24/35  
- 2s - loss: 0.2608 - acc: 0.9391 - val\_loss: 0.4083 - val\_acc: 0.8829  
Epoch 25/35

```

- 3s - loss: 0.2454 - acc: 0.9377 - val_loss: 0.3833 - val_acc: 0.9016
Epoch 26/35
- 2s - loss: 0.2512 - acc: 0.9377 - val_loss: 0.3716 - val_acc: 0.9019
Epoch 27/35
- 2s - loss: 0.2449 - acc: 0.9355 - val_loss: 0.4336 - val_acc: 0.8931
Epoch 28/35
- 2s - loss: 0.3009 - acc: 0.9251 - val_loss: 0.4719 - val_acc: 0.8897
Epoch 29/35
- 3s - loss: 0.2597 - acc: 0.9374 - val_loss: 0.3644 - val_acc: 0.9013
Epoch 30/35
- 3s - loss: 0.2248 - acc: 0.9425 - val_loss: 0.4016 - val_acc: 0.8856
Epoch 31/35
- 2s - loss: 0.2568 - acc: 0.9372 - val_loss: 0.3657 - val_acc: 0.8921
Epoch 32/35
- 2s - loss: 0.2493 - acc: 0.9340 - val_loss: 0.3931 - val_acc: 0.8935
Epoch 33/35
- 2s - loss: 0.2489 - acc: 0.9328 - val_loss: 0.4019 - val_acc: 0.8887
Epoch 34/35
- 2s - loss: 0.2609 - acc: 0.9344 - val_loss: 0.3853 - val_acc: 0.9043
Epoch 35/35
- 3s - loss: 0.2520 - acc: 0.9320 - val_loss: 0.3945 - val_acc: 0.8819
Train accuracy 0.9269586507072906 Test accuracy: 0.8819138106549033
-----

```

Layer (type)	Output Shape	Param #
conv1d_157 (Conv1D)	(None, 122, 32)	2048
conv1d_158 (Conv1D)	(None, 116, 24)	5400
dropout_79 (Dropout)	(None, 116, 24)	0
max_pooling1d_79 (MaxPooling)	(None, 58, 24)	0
flatten_79 (Flatten)	(None, 1392)	0
dense_157 (Dense)	(None, 64)	89152
dense_158 (Dense)	(None, 6)	390

Total params: 96,990

Trainable params: 96,990

Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

```

- 11s - loss: 3.1010 - acc: 0.8369 - val_loss: 0.6432 - val_acc: 0.8697

```

Epoch 2/25  
- 7s - loss: 0.4064 - acc: 0.9317 - val\_loss: 0.4303 - val\_acc: 0.8982

Epoch 3/25  
- 7s - loss: 0.3341 - acc: 0.9339 - val\_loss: 0.4220 - val\_acc: 0.9006

Epoch 4/25  
- 7s - loss: 0.2637 - acc: 0.9450 - val\_loss: 0.4492 - val\_acc: 0.8795

Epoch 5/25  
- 7s - loss: 0.2329 - acc: 0.9448 - val\_loss: 0.4092 - val\_acc: 0.8806

Epoch 6/25  
- 7s - loss: 0.2239 - acc: 0.9486 - val\_loss: 0.3333 - val\_acc: 0.9080

Epoch 7/25  
- 7s - loss: 0.2249 - acc: 0.9463 - val\_loss: 0.3599 - val\_acc: 0.9050

Epoch 8/25  
- 7s - loss: 0.1811 - acc: 0.9514 - val\_loss: 0.3340 - val\_acc: 0.9101

Epoch 9/25  
- 6s - loss: 0.2069 - acc: 0.9474 - val\_loss: 0.3517 - val\_acc: 0.9162

Epoch 10/25  
- 7s - loss: 0.1801 - acc: 0.9527 - val\_loss: 0.2969 - val\_acc: 0.9257

Epoch 11/25  
- 7s - loss: 0.1775 - acc: 0.9512 - val\_loss: 0.2882 - val\_acc: 0.9128

Epoch 12/25  
- 7s - loss: 0.1835 - acc: 0.9502 - val\_loss: 0.3008 - val\_acc: 0.9247

Epoch 13/25  
- 7s - loss: 0.2148 - acc: 0.9468 - val\_loss: 0.4361 - val\_acc: 0.8955

Epoch 14/25  
- 7s - loss: 0.2154 - acc: 0.9494 - val\_loss: 0.2789 - val\_acc: 0.9125

Epoch 15/25  
- 6s - loss: 0.1705 - acc: 0.9512 - val\_loss: 0.3123 - val\_acc: 0.9226

Epoch 16/25  
- 7s - loss: 0.1715 - acc: 0.9521 - val\_loss: 0.2865 - val\_acc: 0.9145

Epoch 17/25  
- 7s - loss: 0.1718 - acc: 0.9513 - val\_loss: 0.3066 - val\_acc: 0.9237

Epoch 18/25  
- 7s - loss: 0.1798 - acc: 0.9527 - val\_loss: 0.2820 - val\_acc: 0.9237

Epoch 19/25  
- 7s - loss: 0.1514 - acc: 0.9555 - val\_loss: 0.2843 - val\_acc: 0.9040

Epoch 20/25  
- 7s - loss: 0.1531 - acc: 0.9533 - val\_loss: 0.2990 - val\_acc: 0.9114

Epoch 21/25  
- 7s - loss: 0.1976 - acc: 0.9498 - val\_loss: 0.2903 - val\_acc: 0.9155

Epoch 22/25  
- 7s - loss: 0.1678 - acc: 0.9514 - val\_loss: 0.2984 - val\_acc: 0.9158

Epoch 23/25  
- 7s - loss: 0.1502 - acc: 0.9540 - val\_loss: 0.2735 - val\_acc: 0.9145

Epoch 24/25  
- 7s - loss: 0.1489 - acc: 0.9551 - val\_loss: 0.3228 - val\_acc: 0.9036

Epoch 25/25  
- 7s - loss: 0.1572 - acc: 0.9531 - val\_loss: 0.3068 - val\_acc: 0.8999



Train accuracy 0.9600108813928183 Test accuracy: 0.8998982015609094

Layer (type)	Output Shape	Param #
conv1d_159 (Conv1D)	(None, 124, 42)	1932
conv1d_160 (Conv1D)	(None, 120, 24)	5064
dropout_80 (Dropout)	(None, 120, 24)	0
max_pooling1d_80 (MaxPooling)	(None, 40, 24)	0
flatten_80 (Flatten)	(None, 960)	0
dense_159 (Dense)	(None, 64)	61504
dense_160 (Dense)	(None, 6)	390

Total params: 68,890

Trainable params: 68,890

Non-trainable params: 0

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 6s - loss: 7.7646 - acc: 0.7401 - val\_loss: 0.8961 - val\_acc: 0.8314

Epoch 2/30

- 2s - loss: 0.5973 - acc: 0.8629 - val\_loss: 0.5856 - val\_acc: 0.8636

Epoch 3/30

- 2s - loss: 0.4353 - acc: 0.8972 - val\_loss: 0.5480 - val\_acc: 0.8931

Epoch 4/30

- 2s - loss: 0.3756 - acc: 0.9066 - val\_loss: 0.5384 - val\_acc: 0.8575

Epoch 5/30

- 2s - loss: 0.3465 - acc: 0.9121 - val\_loss: 0.4354 - val\_acc: 0.8789

Epoch 6/30

- 2s - loss: 0.3132 - acc: 0.9249 - val\_loss: 0.4131 - val\_acc: 0.9019

Epoch 7/30

- 2s - loss: 0.3039 - acc: 0.9248 - val\_loss: 0.3844 - val\_acc: 0.8951

Epoch 8/30

- 2s - loss: 0.2837 - acc: 0.9306 - val\_loss: 0.4228 - val\_acc: 0.8836

Epoch 9/30

- 2s - loss: 0.2798 - acc: 0.9291 - val\_loss: 0.4317 - val\_acc: 0.8704

Epoch 10/30

- 2s - loss: 0.2724 - acc: 0.9300 - val\_loss: 0.3784 - val\_acc: 0.9026

Epoch 11/30

- 2s - loss: 0.2678 - acc: 0.9306 - val\_loss: 0.3656 - val\_acc: 0.9070

Epoch 12/30

```

- 2s - loss: 0.2641 - acc: 0.9313 - val_loss: 0.4314 - val_acc: 0.8605
Epoch 13/30
- 2s - loss: 0.2490 - acc: 0.9348 - val_loss: 0.4047 - val_acc: 0.8802
Epoch 14/30
- 2s - loss: 0.2505 - acc: 0.9324 - val_loss: 0.4241 - val_acc: 0.8473
Epoch 15/30
- 2s - loss: 0.2669 - acc: 0.9309 - val_loss: 0.3784 - val_acc: 0.8853
Epoch 16/30
- 2s - loss: 0.2618 - acc: 0.9327 - val_loss: 0.3582 - val_acc: 0.8951
Epoch 17/30
- 2s - loss: 0.2440 - acc: 0.9359 - val_loss: 0.6121 - val_acc: 0.7682
Epoch 18/30
- 2s - loss: 0.2506 - acc: 0.9323 - val_loss: 0.3583 - val_acc: 0.8999
Epoch 19/30
- 2s - loss: 0.2377 - acc: 0.9354 - val_loss: 0.3620 - val_acc: 0.8918
Epoch 20/30
- 2s - loss: 0.2462 - acc: 0.9321 - val_loss: 0.4097 - val_acc: 0.8724
Epoch 21/30
- 2s - loss: 0.2380 - acc: 0.9361 - val_loss: 0.4164 - val_acc: 0.8738
Epoch 22/30
- 2s - loss: 0.2316 - acc: 0.9365 - val_loss: 0.3966 - val_acc: 0.8744
Epoch 23/30
- 2s - loss: 0.2278 - acc: 0.9381 - val_loss: 0.3601 - val_acc: 0.8972
Epoch 24/30
- 2s - loss: 0.2386 - acc: 0.9332 - val_loss: 0.3854 - val_acc: 0.8880
Epoch 25/30
- 2s - loss: 0.2288 - acc: 0.9377 - val_loss: 0.4876 - val_acc: 0.8738
Epoch 26/30
- 2s - loss: 0.2292 - acc: 0.9370 - val_loss: 0.4004 - val_acc: 0.8704
Epoch 27/30
- 2s - loss: 0.2274 - acc: 0.9399 - val_loss: 0.5994 - val_acc: 0.8290
Epoch 28/30
- 2s - loss: 0.2203 - acc: 0.9366 - val_loss: 0.5852 - val_acc: 0.7913
Epoch 29/30
- 2s - loss: 0.2245 - acc: 0.9351 - val_loss: 0.3735 - val_acc: 0.8785
Epoch 30/30
- 2s - loss: 0.2303 - acc: 0.9355 - val_loss: 0.3740 - val_acc: 0.8734
Train accuracy 0.9394722524483133 Test accuracy: 0.8734306073973532
-----

```

Layer (type)	Output Shape	Param #
conv1d_161 (Conv1D)	(None, 122, 32)	2048
conv1d_162 (Conv1D)	(None, 116, 24)	5400
dropout_81 (Dropout)	(None, 116, 24)	0

```

max_pooling1d_81 (MaxPooling (None, 58, 24))          0
-----
flatten_81 (Flatten)          (None, 1392)          0
-----
dense_161 (Dense)              (None, 64)          89152
-----
dense_162 (Dense)              (None, 6)          390
=====
Total params: 96,990
Trainable params: 96,990
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 6s - loss: 54.8862 - acc: 0.6699 - val_loss: 32.6824 - val_acc: 0.7981
Epoch 2/25
  - 3s - loss: 20.6442 - acc: 0.8885 - val_loss: 12.1397 - val_acc: 0.8426
Epoch 3/25
  - 3s - loss: 7.3965 - acc: 0.9223 - val_loss: 4.4355 - val_acc: 0.8721
Epoch 4/25
  - 3s - loss: 2.5925 - acc: 0.9280 - val_loss: 1.7582 - val_acc: 0.8870
Epoch 5/25
  - 3s - loss: 1.0096 - acc: 0.9335 - val_loss: 0.9414 - val_acc: 0.8918
Epoch 6/25
  - 3s - loss: 0.5349 - acc: 0.9329 - val_loss: 0.6835 - val_acc: 0.8856
Epoch 7/25
  - 3s - loss: 0.3866 - acc: 0.9365 - val_loss: 0.5878 - val_acc: 0.8887
Epoch 8/25
  - 3s - loss: 0.3497 - acc: 0.9295 - val_loss: 0.6214 - val_acc: 0.8402
Epoch 9/25
  - 3s - loss: 0.3301 - acc: 0.9362 - val_loss: 0.5042 - val_acc: 0.9040
Epoch 10/25
  - 2s - loss: 0.2959 - acc: 0.9363 - val_loss: 0.5160 - val_acc: 0.8965
Epoch 11/25
  - 3s - loss: 0.2742 - acc: 0.9450 - val_loss: 0.4609 - val_acc: 0.8951
Epoch 12/25
  - 3s - loss: 0.2778 - acc: 0.9378 - val_loss: 0.4558 - val_acc: 0.9080
Epoch 13/25
  - 3s - loss: 0.2655 - acc: 0.9406 - val_loss: 0.4475 - val_acc: 0.9138
Epoch 14/25
  - 3s - loss: 0.2585 - acc: 0.9396 - val_loss: 0.4531 - val_acc: 0.8938
Epoch 15/25
  - 3s - loss: 0.2537 - acc: 0.9408 - val_loss: 0.4117 - val_acc: 0.9057
Epoch 16/25
  - 3s - loss: 0.2452 - acc: 0.9426 - val_loss: 0.4380 - val_acc: 0.9091
Epoch 17/25
  - 3s - loss: 0.2468 - acc: 0.9403 - val_loss: 0.4145 - val_acc: 0.8985

```

Epoch 18/25  
 - 3s - loss: 0.2364 - acc: 0.9442 - val\_loss: 0.3822 - val\_acc: 0.9121  
 Epoch 19/25  
 - 3s - loss: 0.2501 - acc: 0.9381 - val\_loss: 0.3974 - val\_acc: 0.9111  
 Epoch 20/25  
 - 3s - loss: 0.2307 - acc: 0.9441 - val\_loss: 0.3797 - val\_acc: 0.8975  
 Epoch 21/25  
 - 3s - loss: 0.2393 - acc: 0.9400 - val\_loss: 0.3906 - val\_acc: 0.9084  
 Epoch 22/25  
 - 3s - loss: 0.2132 - acc: 0.9460 - val\_loss: 0.4179 - val\_acc: 0.8758  
 Epoch 23/25  
 - 3s - loss: 0.2261 - acc: 0.9430 - val\_loss: 0.3617 - val\_acc: 0.9114  
 Epoch 24/25  
 - 3s - loss: 0.2299 - acc: 0.9400 - val\_loss: 0.3604 - val\_acc: 0.9006  
 Epoch 25/25  
 - 3s - loss: 0.2330 - acc: 0.9404 - val\_loss: 0.3658 - val\_acc: 0.9080  
 Train accuracy 0.948721436343852 Test accuracy: 0.9080420766881574

Layer (type)	Output Shape	Param #
conv1d_163 (Conv1D)	(None, 124, 32)	1472
conv1d_164 (Conv1D)	(None, 122, 32)	3104
dropout_82 (Dropout)	(None, 122, 32)	0
max_pooling1d_82 (MaxPooling)	(None, 40, 32)	0
flatten_82 (Flatten)	(None, 1280)	0
dense_163 (Dense)	(None, 64)	81984
dense_164 (Dense)	(None, 6)	390

Total params: 86,950  
 Trainable params: 86,950  
 Non-trainable params: 0

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 12s - loss: 4.6894 - acc: 0.8033 - val\_loss: 0.7175 - val\_acc: 0.7815  
 Epoch 2/25  
 - 8s - loss: 0.5004 - acc: 0.8723 - val\_loss: 0.7488 - val\_acc: 0.8005  
 Epoch 3/25  
 - 8s - loss: 0.4297 - acc: 0.8897 - val\_loss: 0.5473 - val\_acc: 0.8765  
 Epoch 4/25

```

- 8s - loss: 0.3929 - acc: 0.8985 - val_loss: 0.5836 - val_acc: 0.8622
Epoch 5/25
- 8s - loss: 0.3985 - acc: 0.8992 - val_loss: 0.5505 - val_acc: 0.8385
Epoch 6/25
- 8s - loss: 0.3735 - acc: 0.9094 - val_loss: 0.4442 - val_acc: 0.8962
Epoch 7/25
- 8s - loss: 0.3496 - acc: 0.9144 - val_loss: 0.5137 - val_acc: 0.8711
Epoch 8/25
- 8s - loss: 0.3579 - acc: 0.9100 - val_loss: 0.4600 - val_acc: 0.8856
Epoch 9/25
- 8s - loss: 0.3408 - acc: 0.9158 - val_loss: 0.4608 - val_acc: 0.8880
Epoch 10/25
- 8s - loss: 0.3392 - acc: 0.9149 - val_loss: 0.4807 - val_acc: 0.8487
Epoch 11/25
- 8s - loss: 0.3717 - acc: 0.9098 - val_loss: 0.4334 - val_acc: 0.8924
Epoch 12/25
- 8s - loss: 0.3276 - acc: 0.9159 - val_loss: 0.4134 - val_acc: 0.8884
Epoch 13/25
- 8s - loss: 0.2905 - acc: 0.9253 - val_loss: 0.4337 - val_acc: 0.8680
Epoch 14/25
- 8s - loss: 0.3297 - acc: 0.9172 - val_loss: 0.4380 - val_acc: 0.8772
Epoch 15/25
- 8s - loss: 0.3198 - acc: 0.9204 - val_loss: 0.5433 - val_acc: 0.8483
Epoch 16/25
- 8s - loss: 0.3140 - acc: 0.9240 - val_loss: 0.4682 - val_acc: 0.8884
Epoch 17/25
- 8s - loss: 0.3221 - acc: 0.9200 - val_loss: 0.4319 - val_acc: 0.8901
Epoch 18/25
- 8s - loss: 0.3039 - acc: 0.9218 - val_loss: 0.4138 - val_acc: 0.8873
Epoch 19/25
- 8s - loss: 0.3235 - acc: 0.9196 - val_loss: 0.4169 - val_acc: 0.8918
Epoch 20/25
- 8s - loss: 0.3038 - acc: 0.9229 - val_loss: 0.3826 - val_acc: 0.8992
Epoch 21/25
- 8s - loss: 0.3186 - acc: 0.9215 - val_loss: 0.4471 - val_acc: 0.8673
Epoch 22/25
- 8s - loss: 0.3037 - acc: 0.9257 - val_loss: 0.4678 - val_acc: 0.8694
Epoch 23/25
- 8s - loss: 0.3028 - acc: 0.9237 - val_loss: 0.4534 - val_acc: 0.8741
Epoch 24/25
- 8s - loss: 0.3120 - acc: 0.9222 - val_loss: 0.5698 - val_acc: 0.8269
Epoch 25/25
- 8s - loss: 0.2912 - acc: 0.9283 - val_loss: 0.5051 - val_acc: 0.8286
Train accuracy 0.8926822633945644 Test accuracy: 0.8286392941974889

```

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-----
Layer (type)                Output Shape                Param #
=====

```

conv1d_165 (Conv1D)	(None, 122, 28)	1792
conv1d_166 (Conv1D)	(None, 116, 24)	4728
dropout_83 (Dropout)	(None, 116, 24)	0
max_pooling1d_83 (MaxPooling)	(None, 58, 24)	0
flatten_83 (Flatten)	(None, 1392)	0
dense_165 (Dense)	(None, 64)	89152
dense_166 (Dense)	(None, 6)	390

=====

Total params: 96,062  
Trainable params: 96,062  
Non-trainable params: 0

-----

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/35  
- 6s - loss: 12.5170 - acc: 0.7654 - val\_loss: 0.9312 - val\_acc: 0.7292

Epoch 2/35  
- 2s - loss: 0.5538 - acc: 0.8720 - val\_loss: 0.8257 - val\_acc: 0.7170

Epoch 3/35  
- 2s - loss: 0.4872 - acc: 0.8890 - val\_loss: 0.6864 - val\_acc: 0.7991

Epoch 4/35  
- 2s - loss: 0.4289 - acc: 0.8984 - val\_loss: 0.6905 - val\_acc: 0.7801

Epoch 5/35  
- 2s - loss: 0.4279 - acc: 0.8969 - val\_loss: 0.7220 - val\_acc: 0.8147

Epoch 6/35  
- 2s - loss: 0.4583 - acc: 0.8961 - val\_loss: 0.5878 - val\_acc: 0.8602

Epoch 7/35  
- 2s - loss: 0.4092 - acc: 0.9014 - val\_loss: 0.6632 - val\_acc: 0.8802

Epoch 8/35  
- 2s - loss: 0.3901 - acc: 0.9056 - val\_loss: 0.5972 - val\_acc: 0.8602

Epoch 9/35  
- 2s - loss: 0.3616 - acc: 0.9165 - val\_loss: 0.5125 - val\_acc: 0.8863

Epoch 10/35  
- 2s - loss: 0.3666 - acc: 0.9076 - val\_loss: 0.5473 - val\_acc: 0.8812

Epoch 11/35  
- 2s - loss: 0.3384 - acc: 0.9197 - val\_loss: 0.5089 - val\_acc: 0.8911

Epoch 12/35  
- 2s - loss: 0.3157 - acc: 0.9234 - val\_loss: 0.5284 - val\_acc: 0.8683

Epoch 13/35  
- 2s - loss: 0.3310 - acc: 0.9225 - val\_loss: 0.4528 - val\_acc: 0.8551

Epoch 14/35  
- 2s - loss: 0.3199 - acc: 0.9159 - val\_loss: 0.4809 - val\_acc: 0.8799

```

Epoch 15/35
- 2s - loss: 0.2836 - acc: 0.9295 - val_loss: 0.4308 - val_acc: 0.8853
Epoch 16/35
- 2s - loss: 0.3236 - acc: 0.9195 - val_loss: 0.4061 - val_acc: 0.9006
Epoch 17/35
- 2s - loss: 0.2850 - acc: 0.9293 - val_loss: 0.4001 - val_acc: 0.8972
Epoch 18/35
- 2s - loss: 0.2738 - acc: 0.9310 - val_loss: 0.4429 - val_acc: 0.8999
Epoch 19/35
- 2s - loss: 0.3175 - acc: 0.9233 - val_loss: 0.4394 - val_acc: 0.8887
Epoch 20/35
- 2s - loss: 0.2712 - acc: 0.9310 - val_loss: 0.4083 - val_acc: 0.8748
Epoch 21/35
- 2s - loss: 0.2806 - acc: 0.9293 - val_loss: 0.4338 - val_acc: 0.8823
Epoch 22/35
- 2s - loss: 0.2759 - acc: 0.9285 - val_loss: 0.5863 - val_acc: 0.8242
Epoch 23/35
- 2s - loss: 0.2662 - acc: 0.9348 - val_loss: 0.3891 - val_acc: 0.8972
Epoch 24/35
- 2s - loss: 0.3477 - acc: 0.9207 - val_loss: 0.4052 - val_acc: 0.9009
Epoch 25/35
- 2s - loss: 0.2614 - acc: 0.9336 - val_loss: 0.4465 - val_acc: 0.8707
Epoch 26/35
- 2s - loss: 0.2644 - acc: 0.9319 - val_loss: 0.4639 - val_acc: 0.8649
Epoch 27/35
- 2s - loss: 0.2664 - acc: 0.9325 - val_loss: 0.4462 - val_acc: 0.8592
Epoch 28/35
- 2s - loss: 0.2705 - acc: 0.9297 - val_loss: 0.4355 - val_acc: 0.8717
Epoch 29/35
- 2s - loss: 0.2654 - acc: 0.9317 - val_loss: 0.3970 - val_acc: 0.8979
Epoch 30/35
- 2s - loss: 0.2656 - acc: 0.9317 - val_loss: 0.4432 - val_acc: 0.8867
Epoch 31/35
- 2s - loss: 0.2974 - acc: 0.9278 - val_loss: 0.3796 - val_acc: 0.8894
Epoch 32/35
- 2s - loss: 0.2556 - acc: 0.9324 - val_loss: 0.3961 - val_acc: 0.8975
Epoch 33/35
- 2s - loss: 0.2822 - acc: 0.9291 - val_loss: 0.4347 - val_acc: 0.8853
Epoch 34/35
- 2s - loss: 0.2478 - acc: 0.9381 - val_loss: 0.3841 - val_acc: 0.8951
Epoch 35/35
- 2s - loss: 0.2735 - acc: 0.9283 - val_loss: 0.4508 - val_acc: 0.8510
Train accuracy 0.919885745375408 Test accuracy: 0.8510349507974211

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_167 (Conv1D)          (None, 124, 42)            1932

```

```

-----
conv1d_168 (Conv1D)                (None, 122, 24)                3048
-----
dropout_84 (Dropout)              (None, 122, 24)                0
-----
max_pooling1d_84 (MaxPooling)     (None, 40, 24)                0
-----
flatten_84 (Flatten)              (None, 960)                    0
-----
dense_167 (Dense)                 (None, 64)                     61504
-----
dense_168 (Dense)                 (None, 6)                      390
=====
Total params: 66,874
Trainable params: 66,874
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 6s - loss: 14.9023 - acc: 0.7428 - val_loss: 1.7944 - val_acc: 0.7350
Epoch 2/25
  - 2s - loss: 0.7719 - acc: 0.8549 - val_loss: 0.6923 - val_acc: 0.8375
Epoch 3/25
  - 2s - loss: 0.4564 - acc: 0.8913 - val_loss: 0.6011 - val_acc: 0.8789
Epoch 4/25
  - 2s - loss: 0.3951 - acc: 0.9021 - val_loss: 0.5297 - val_acc: 0.8819
Epoch 5/25
  - 2s - loss: 0.3669 - acc: 0.9090 - val_loss: 0.5020 - val_acc: 0.8802
Epoch 6/25
  - 2s - loss: 0.3349 - acc: 0.9173 - val_loss: 0.4600 - val_acc: 0.8799
Epoch 7/25
  - 2s - loss: 0.3227 - acc: 0.9183 - val_loss: 0.4454 - val_acc: 0.8829
Epoch 8/25
  - 2s - loss: 0.3061 - acc: 0.9192 - val_loss: 0.4239 - val_acc: 0.8744
Epoch 9/25
  - 2s - loss: 0.2907 - acc: 0.9208 - val_loss: 0.5619 - val_acc: 0.8168
Epoch 10/25
  - 2s - loss: 0.2821 - acc: 0.9238 - val_loss: 0.4140 - val_acc: 0.8853
Epoch 11/25
  - 2s - loss: 0.2773 - acc: 0.9282 - val_loss: 0.4211 - val_acc: 0.8795
Epoch 12/25
  - 2s - loss: 0.2723 - acc: 0.9272 - val_loss: 0.4598 - val_acc: 0.8721
Epoch 13/25
  - 2s - loss: 0.2641 - acc: 0.9302 - val_loss: 0.4977 - val_acc: 0.8320
Epoch 14/25
  - 2s - loss: 0.2656 - acc: 0.9286 - val_loss: 0.4492 - val_acc: 0.8744
Epoch 15/25

```



```

- 2s - loss: 0.2545 - acc: 0.9340 - val_loss: 0.3560 - val_acc: 0.9057
Epoch 16/25
- 2s - loss: 0.2544 - acc: 0.9304 - val_loss: 0.4466 - val_acc: 0.8867
Epoch 17/25
- 2s - loss: 0.2561 - acc: 0.9295 - val_loss: 0.3536 - val_acc: 0.9070
Epoch 18/25
- 2s - loss: 0.2553 - acc: 0.9297 - val_loss: 0.3867 - val_acc: 0.9002
Epoch 19/25
- 2s - loss: 0.2501 - acc: 0.9366 - val_loss: 0.4176 - val_acc: 0.8724
Epoch 20/25
- 2s - loss: 0.2461 - acc: 0.9317 - val_loss: 0.3663 - val_acc: 0.8965
Epoch 21/25
- 2s - loss: 0.2415 - acc: 0.9344 - val_loss: 0.3721 - val_acc: 0.8877
Epoch 22/25
- 2s - loss: 0.2360 - acc: 0.9357 - val_loss: 0.5405 - val_acc: 0.7978
Epoch 23/25
- 2s - loss: 0.2358 - acc: 0.9350 - val_loss: 0.3713 - val_acc: 0.9060
Epoch 24/25
- 2s - loss: 0.2462 - acc: 0.9327 - val_loss: 0.3475 - val_acc: 0.9013
Epoch 25/25
- 2s - loss: 0.2335 - acc: 0.9339 - val_loss: 0.3673 - val_acc: 0.8931
Train accuracy 0.9468171926006529 Test accuracy: 0.8931116389548693
-----

```

Layer (type)	Output Shape	Param #
conv1d_169 (Conv1D)	(None, 122, 32)	2048
conv1d_170 (Conv1D)	(None, 118, 32)	5152
dropout_85 (Dropout)	(None, 118, 32)	0
max_pooling1d_85 (MaxPooling)	(None, 39, 32)	0
flatten_85 (Flatten)	(None, 1248)	0
dense_169 (Dense)	(None, 64)	79936
dense_170 (Dense)	(None, 6)	390

```

=====
Total params: 87,526
Trainable params: 87,526
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
- 9s - loss: 6.8475 - acc: 0.8289 - val_loss: 0.7355 - val_acc: 0.8456

```

Epoch 2/30  
- 6s - loss: 0.4122 - acc: 0.9070 - val\_loss: 0.5736 - val\_acc: 0.8843

Epoch 3/30  
- 6s - loss: 0.3670 - acc: 0.9120 - val\_loss: 0.4935 - val\_acc: 0.8941

Epoch 4/30  
- 6s - loss: 0.3390 - acc: 0.9166 - val\_loss: 0.4949 - val\_acc: 0.8914

Epoch 5/30  
- 6s - loss: 0.3328 - acc: 0.9170 - val\_loss: 0.5045 - val\_acc: 0.8806

Epoch 6/30  
- 6s - loss: 0.3056 - acc: 0.9278 - val\_loss: 0.4981 - val\_acc: 0.8829

Epoch 7/30  
- 6s - loss: 0.3170 - acc: 0.9215 - val\_loss: 0.4750 - val\_acc: 0.8914

Epoch 8/30  
- 5s - loss: 0.2997 - acc: 0.9241 - val\_loss: 0.4037 - val\_acc: 0.9023

Epoch 9/30  
- 6s - loss: 0.2868 - acc: 0.9270 - val\_loss: 0.4186 - val\_acc: 0.8931

Epoch 10/30  
- 5s - loss: 0.2933 - acc: 0.9255 - val\_loss: 0.3863 - val\_acc: 0.8938

Epoch 11/30  
- 6s - loss: 0.2903 - acc: 0.9274 - val\_loss: 0.4444 - val\_acc: 0.8850

Epoch 12/30  
- 6s - loss: 0.2851 - acc: 0.9276 - val\_loss: 0.4318 - val\_acc: 0.8741

Epoch 13/30  
- 6s - loss: 0.2883 - acc: 0.9276 - val\_loss: 0.4381 - val\_acc: 0.9033

Epoch 14/30  
- 6s - loss: 0.2857 - acc: 0.9283 - val\_loss: 0.4467 - val\_acc: 0.8588

Epoch 15/30  
- 6s - loss: 0.2770 - acc: 0.9317 - val\_loss: 0.3837 - val\_acc: 0.8755

Epoch 16/30  
- 6s - loss: 0.2766 - acc: 0.9290 - val\_loss: 0.4049 - val\_acc: 0.8887

Epoch 17/30  
- 6s - loss: 0.2685 - acc: 0.9294 - val\_loss: 0.4797 - val\_acc: 0.8490

Epoch 18/30  
- 6s - loss: 0.2815 - acc: 0.9280 - val\_loss: 0.4360 - val\_acc: 0.8846

Epoch 19/30  
- 5s - loss: 0.2594 - acc: 0.9323 - val\_loss: 0.4327 - val\_acc: 0.8839

Epoch 20/30  
- 6s - loss: 0.2658 - acc: 0.9313 - val\_loss: 0.4685 - val\_acc: 0.8337

Epoch 21/30  
- 6s - loss: 0.2836 - acc: 0.9259 - val\_loss: 0.4454 - val\_acc: 0.8660

Epoch 22/30  
- 6s - loss: 0.2625 - acc: 0.9339 - val\_loss: 0.4459 - val\_acc: 0.8989

Epoch 23/30  
- 6s - loss: 0.3047 - acc: 0.9253 - val\_loss: 0.4848 - val\_acc: 0.8473

Epoch 24/30  
- 6s - loss: 0.2576 - acc: 0.9361 - val\_loss: 0.3768 - val\_acc: 0.8975

Epoch 25/30  
- 6s - loss: 0.2795 - acc: 0.9286 - val\_loss: 0.3878 - val\_acc: 0.8945

```

Epoch 26/30
- 6s - loss: 0.2721 - acc: 0.9279 - val_loss: 0.3652 - val_acc: 0.8812
Epoch 27/30
- 5s - loss: 0.2715 - acc: 0.9328 - val_loss: 0.3949 - val_acc: 0.8918
Epoch 28/30
- 6s - loss: 0.2571 - acc: 0.9331 - val_loss: 0.4221 - val_acc: 0.8761
Epoch 29/30
- 6s - loss: 0.2488 - acc: 0.9353 - val_loss: 0.3859 - val_acc: 0.8704
Epoch 30/30
- 5s - loss: 0.2507 - acc: 0.9334 - val_loss: 0.4119 - val_acc: 0.8612
Train accuracy 0.905467899891186 Test accuracy: 0.8612147947064812
-----

```

Layer (type)	Output Shape	Param #
conv1d_171 (Conv1D)	(None, 124, 32)	1472
conv1d_172 (Conv1D)	(None, 118, 24)	5400
dropout_86 (Dropout)	(None, 118, 24)	0
max_pooling1d_86 (MaxPooling)	(None, 59, 24)	0
flatten_86 (Flatten)	(None, 1416)	0
dense_171 (Dense)	(None, 64)	90688
dense_172 (Dense)	(None, 6)	390

```

=====
Total params: 97,950
Trainable params: 97,950
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 6s - loss: 15.9475 - acc: 0.8440 - val_loss: 1.1642 - val_acc: 0.8975
Epoch 2/25
- 3s - loss: 0.5140 - acc: 0.9172 - val_loss: 0.5033 - val_acc: 0.8941
Epoch 3/25
- 3s - loss: 0.3759 - acc: 0.9236 - val_loss: 0.4970 - val_acc: 0.8629
Epoch 4/25
- 3s - loss: 0.3284 - acc: 0.9274 - val_loss: 0.4429 - val_acc: 0.8924
Epoch 5/25
- 3s - loss: 0.3142 - acc: 0.9290 - val_loss: 0.4180 - val_acc: 0.9080
Epoch 6/25
- 3s - loss: 0.2808 - acc: 0.9332 - val_loss: 0.4399 - val_acc: 0.8951
Epoch 7/25

```

```

- 3s - loss: 0.2997 - acc: 0.9268 - val_loss: 0.5484 - val_acc: 0.8521
Epoch 8/25
- 3s - loss: 0.2535 - acc: 0.9403 - val_loss: 0.3941 - val_acc: 0.9023
Epoch 9/25
- 3s - loss: 0.2595 - acc: 0.9334 - val_loss: 0.3872 - val_acc: 0.8921
Epoch 10/25
- 3s - loss: 0.3227 - acc: 0.9226 - val_loss: 0.5766 - val_acc: 0.9043
Epoch 11/25
- 3s - loss: 0.3140 - acc: 0.9331 - val_loss: 0.3889 - val_acc: 0.8985
Epoch 12/25
- 3s - loss: 0.2310 - acc: 0.9422 - val_loss: 0.3395 - val_acc: 0.9097
Epoch 13/25
- 3s - loss: 0.2589 - acc: 0.9340 - val_loss: 0.3660 - val_acc: 0.8928
Epoch 14/25
- 3s - loss: 0.2451 - acc: 0.9389 - val_loss: 0.4025 - val_acc: 0.8850
Epoch 15/25
- 3s - loss: 0.3124 - acc: 0.9294 - val_loss: 0.4006 - val_acc: 0.8846
Epoch 16/25
- 3s - loss: 0.2450 - acc: 0.9374 - val_loss: 0.3918 - val_acc: 0.9013
Epoch 17/25
- 3s - loss: 0.2356 - acc: 0.9410 - val_loss: 0.3284 - val_acc: 0.8975
Epoch 18/25
- 3s - loss: 0.2434 - acc: 0.9376 - val_loss: 0.4164 - val_acc: 0.8965
Epoch 19/25
- 3s - loss: 0.2499 - acc: 0.9389 - val_loss: 0.3804 - val_acc: 0.8894
Epoch 20/25
- 3s - loss: 0.2785 - acc: 0.9362 - val_loss: 0.3768 - val_acc: 0.8772
Epoch 21/25
- 3s - loss: 0.2298 - acc: 0.9425 - val_loss: 0.3490 - val_acc: 0.9084
Epoch 22/25
- 3s - loss: 0.2165 - acc: 0.9414 - val_loss: 0.3712 - val_acc: 0.8962
Epoch 23/25
- 3s - loss: 0.2380 - acc: 0.9406 - val_loss: 0.3505 - val_acc: 0.9006
Epoch 24/25
- 3s - loss: 0.2295 - acc: 0.9412 - val_loss: 0.3346 - val_acc: 0.8989
Epoch 25/25
- 3s - loss: 0.2549 - acc: 0.9343 - val_loss: 0.4912 - val_acc: 0.8761
Train accuracy 0.9477693144722524 Test accuracy: 0.8761452324397693

```

---

Layer (type)	Output Shape	Param #
conv1d_173 (Conv1D)	(None, 122, 42)	2688
conv1d_174 (Conv1D)	(None, 120, 24)	3048
dropout_87 (Dropout)	(None, 120, 24)	0

---

```

max_pooling1d_87 (MaxPooling (None, 40, 24))          0
-----
flatten_87 (Flatten)          (None, 960)          0
-----
dense_173 (Dense)              (None, 64)          61504
-----
dense_174 (Dense)              (None, 6)           390
=====
Total params: 67,630
Trainable params: 67,630
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 7s - loss: 6.4041 - acc: 0.7979 - val_loss: 0.7415 - val_acc: 0.8646
Epoch 2/30
  - 3s - loss: 0.4519 - acc: 0.8988 - val_loss: 0.6598 - val_acc: 0.8541
Epoch 3/30
  - 3s - loss: 0.3949 - acc: 0.9063 - val_loss: 0.5617 - val_acc: 0.8568
Epoch 4/30
  - 3s - loss: 0.3700 - acc: 0.9094 - val_loss: 0.5769 - val_acc: 0.8738
Epoch 5/30
  - 3s - loss: 0.3228 - acc: 0.9202 - val_loss: 0.4916 - val_acc: 0.8965
Epoch 6/30
  - 3s - loss: 0.3155 - acc: 0.9189 - val_loss: 0.5600 - val_acc: 0.8524
Epoch 7/30
  - 3s - loss: 0.3133 - acc: 0.9177 - val_loss: 0.4715 - val_acc: 0.8802
Epoch 8/30
  - 3s - loss: 0.3089 - acc: 0.9219 - val_loss: 0.4474 - val_acc: 0.8938
Epoch 9/30
  - 3s - loss: 0.2975 - acc: 0.9208 - val_loss: 0.4962 - val_acc: 0.8880
Epoch 10/30
  - 3s - loss: 0.2819 - acc: 0.9293 - val_loss: 0.4874 - val_acc: 0.8524
Epoch 11/30
  - 3s - loss: 0.2846 - acc: 0.9242 - val_loss: 0.4823 - val_acc: 0.8554
Epoch 12/30
  - 3s - loss: 0.2776 - acc: 0.9294 - val_loss: 0.4660 - val_acc: 0.8982
Epoch 13/30
  - 3s - loss: 0.2513 - acc: 0.9312 - val_loss: 0.4275 - val_acc: 0.8843
Epoch 14/30
  - 3s - loss: 0.2539 - acc: 0.9319 - val_loss: 0.4575 - val_acc: 0.8738
Epoch 15/30
  - 3s - loss: 0.2619 - acc: 0.9327 - val_loss: 0.5884 - val_acc: 0.7743
Epoch 16/30
  - 3s - loss: 0.2529 - acc: 0.9339 - val_loss: 0.4617 - val_acc: 0.8446
Epoch 17/30
  - 3s - loss: 0.2438 - acc: 0.9343 - val_loss: 0.4071 - val_acc: 0.9030

```

```

Epoch 18/30
- 3s - loss: 0.2294 - acc: 0.9396 - val_loss: 0.4409 - val_acc: 0.8561
Epoch 19/30
- 3s - loss: 0.2393 - acc: 0.9342 - val_loss: 0.4331 - val_acc: 0.8660
Epoch 20/30
- 3s - loss: 0.2593 - acc: 0.9334 - val_loss: 0.4077 - val_acc: 0.8887
Epoch 21/30
- 3s - loss: 0.2261 - acc: 0.9385 - val_loss: 0.5520 - val_acc: 0.7978
Epoch 22/30
- 3s - loss: 0.2192 - acc: 0.9400 - val_loss: 0.5806 - val_acc: 0.7584
Epoch 23/30
- 3s - loss: 0.2232 - acc: 0.9389 - val_loss: 0.4462 - val_acc: 0.8965
Epoch 24/30
- 3s - loss: 0.2285 - acc: 0.9414 - val_loss: 0.3967 - val_acc: 0.8856
Epoch 25/30
- 3s - loss: 0.2349 - acc: 0.9388 - val_loss: 0.3968 - val_acc: 0.8853
Epoch 26/30
- 3s - loss: 0.2248 - acc: 0.9393 - val_loss: 0.4679 - val_acc: 0.8751
Epoch 27/30
- 3s - loss: 0.2454 - acc: 0.9380 - val_loss: 0.4199 - val_acc: 0.8941
Epoch 28/30
- 3s - loss: 0.2097 - acc: 0.9418 - val_loss: 0.4381 - val_acc: 0.8442
Epoch 29/30
- 3s - loss: 0.2247 - acc: 0.9385 - val_loss: 0.4897 - val_acc: 0.8548
Epoch 30/30
- 3s - loss: 0.2471 - acc: 0.9351 - val_loss: 0.4025 - val_acc: 0.8843
Train accuracy 0.9313112078346029 Test accuracy: 0.8842891075670173

```

---

Layer (type)	Output Shape	Param #
conv1d_175 (Conv1D)	(None, 124, 28)	1288
conv1d_176 (Conv1D)	(None, 120, 32)	4512
dropout_88 (Dropout)	(None, 120, 32)	0
max_pooling1d_88 (MaxPooling)	(None, 60, 32)	0
flatten_88 (Flatten)	(None, 1920)	0
dense_175 (Dense)	(None, 64)	122944
dense_176 (Dense)	(None, 6)	390

---

```

Total params: 129,134
Trainable params: 129,134
Non-trainable params: 0

```

```

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
  - 7s - loss: 47.0935 - acc: 0.7297 - val_loss: 7.2658 - val_acc: 0.6956
Epoch 2/25
  - 3s - loss: 2.5430 - acc: 0.8290 - val_loss: 1.1666 - val_acc: 0.7004
Epoch 3/25
  - 3s - loss: 0.6609 - acc: 0.8626 - val_loss: 0.7725 - val_acc: 0.8439
Epoch 4/25
  - 3s - loss: 0.5659 - acc: 0.8773 - val_loss: 0.7246 - val_acc: 0.8324
Epoch 5/25
  - 3s - loss: 0.5049 - acc: 0.8885 - val_loss: 0.7236 - val_acc: 0.8093
Epoch 6/25
  - 3s - loss: 0.5300 - acc: 0.8726 - val_loss: 0.7429 - val_acc: 0.8191
Epoch 7/25
  - 3s - loss: 0.4973 - acc: 0.8856 - val_loss: 0.6963 - val_acc: 0.8497
Epoch 8/25
  - 3s - loss: 0.4534 - acc: 0.8893 - val_loss: 0.6538 - val_acc: 0.8649
Epoch 9/25
  - 3s - loss: 0.4438 - acc: 0.8928 - val_loss: 0.7178 - val_acc: 0.8059
Epoch 10/25
  - 3s - loss: 0.4176 - acc: 0.9019 - val_loss: 0.5815 - val_acc: 0.8741
Epoch 11/25
  - 3s - loss: 0.4012 - acc: 0.9045 - val_loss: 0.6130 - val_acc: 0.8544
Epoch 12/25
  - 3s - loss: 0.4266 - acc: 0.8961 - val_loss: 0.5841 - val_acc: 0.8802
Epoch 13/25
  - 3s - loss: 0.4083 - acc: 0.9010 - val_loss: 0.5891 - val_acc: 0.8544
Epoch 14/25
  - 3s - loss: 0.3928 - acc: 0.9026 - val_loss: 0.5575 - val_acc: 0.8687
Epoch 15/25
  - 3s - loss: 0.3791 - acc: 0.9070 - val_loss: 0.6087 - val_acc: 0.8361
Epoch 16/25
  - 3s - loss: 0.3757 - acc: 0.9064 - val_loss: 0.5359 - val_acc: 0.8548
Epoch 17/25
  - 3s - loss: 0.3535 - acc: 0.9094 - val_loss: 0.5105 - val_acc: 0.8799
Epoch 18/25
  - 3s - loss: 0.3697 - acc: 0.9094 - val_loss: 0.6789 - val_acc: 0.8198
Epoch 19/25
  - 3s - loss: 0.3585 - acc: 0.9100 - val_loss: 0.4999 - val_acc: 0.8836
Epoch 20/25
  - 3s - loss: 0.3670 - acc: 0.9059 - val_loss: 0.4836 - val_acc: 0.8816
Epoch 21/25
  - 3s - loss: 0.4010 - acc: 0.8980 - val_loss: 0.5057 - val_acc: 0.8683
Epoch 22/25
  - 3s - loss: 0.3616 - acc: 0.9071 - val_loss: 0.5459 - val_acc: 0.8677
Epoch 23/25

```

```

- 3s - loss: 0.3730 - acc: 0.9087 - val_loss: 0.5147 - val_acc: 0.8690
Epoch 24/25
- 3s - loss: 0.3451 - acc: 0.9129 - val_loss: 0.5736 - val_acc: 0.8643
Epoch 25/25
- 3s - loss: 0.3576 - acc: 0.9100 - val_loss: 0.5336 - val_acc: 0.8599
Train accuracy 0.9292709466811752 Test accuracy: 0.8598574821852731

```

---

Layer (type)	Output Shape	Param #
<hr/>		
conv1d_177 (Conv1D)	(None, 122, 32)	2048
<hr/>		
conv1d_178 (Conv1D)	(None, 116, 24)	5400
<hr/>		
dropout_89 (Dropout)	(None, 116, 24)	0
<hr/>		
max_pooling1d_89 (MaxPooling)	(None, 38, 24)	0
<hr/>		
flatten_89 (Flatten)	(None, 912)	0
<hr/>		
dense_177 (Dense)	(None, 32)	29216
<hr/>		
dense_178 (Dense)	(None, 6)	198
<hr/>		

```

Total params: 36,862
Trainable params: 36,862
Non-trainable params: 0

```

---

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
- 8s - loss: 3.5413 - acc: 0.7752 - val_loss: 0.5786 - val_acc: 0.8965
Epoch 2/35
- 4s - loss: 0.4774 - acc: 0.8917 - val_loss: 0.5546 - val_acc: 0.8602
Epoch 3/35
- 4s - loss: 0.3988 - acc: 0.8979 - val_loss: 0.6636 - val_acc: 0.7628
Epoch 4/35
- 4s - loss: 0.3867 - acc: 0.8989 - val_loss: 0.4883 - val_acc: 0.8731
Epoch 5/35
- 4s - loss: 0.3563 - acc: 0.9087 - val_loss: 0.5667 - val_acc: 0.8354
Epoch 6/35
- 4s - loss: 0.3477 - acc: 0.9076 - val_loss: 0.6794 - val_acc: 0.7995
Epoch 7/35
- 4s - loss: 0.3332 - acc: 0.9151 - val_loss: 0.4841 - val_acc: 0.8602
Epoch 8/35
- 4s - loss: 0.3369 - acc: 0.9115 - val_loss: 0.9915 - val_acc: 0.7122
Epoch 9/35
- 4s - loss: 0.3366 - acc: 0.9119 - val_loss: 0.4709 - val_acc: 0.8639

```



Epoch 10/35  
- 4s - loss: 0.3364 - acc: 0.9087 - val\_loss: 0.4429 - val\_acc: 0.8873

Epoch 11/35  
- 4s - loss: 0.3399 - acc: 0.9101 - val\_loss: 0.4360 - val\_acc: 0.8697

Epoch 12/35  
- 4s - loss: 0.3455 - acc: 0.9101 - val\_loss: 0.3995 - val\_acc: 0.8826

Epoch 13/35  
- 4s - loss: 0.3320 - acc: 0.9157 - val\_loss: 0.4001 - val\_acc: 0.8880

Epoch 14/35  
- 4s - loss: 0.3362 - acc: 0.9083 - val\_loss: 0.4408 - val\_acc: 0.8711

Epoch 15/35  
- 4s - loss: 0.3263 - acc: 0.9153 - val\_loss: 0.4200 - val\_acc: 0.8911

Epoch 16/35  
- 4s - loss: 0.3398 - acc: 0.9117 - val\_loss: 0.5621 - val\_acc: 0.7838

Epoch 17/35  
- 4s - loss: 0.3224 - acc: 0.9117 - val\_loss: 0.6668 - val\_acc: 0.8130

Epoch 18/35  
- 4s - loss: 0.3120 - acc: 0.9193 - val\_loss: 0.3908 - val\_acc: 0.8907

Epoch 19/35  
- 4s - loss: 0.3382 - acc: 0.9098 - val\_loss: 0.4669 - val\_acc: 0.8537

Epoch 20/35  
- 4s - loss: 0.3083 - acc: 0.9195 - val\_loss: 0.3803 - val\_acc: 0.8829

Epoch 21/35  
- 4s - loss: 0.3204 - acc: 0.9154 - val\_loss: 0.5205 - val\_acc: 0.8327

Epoch 22/35  
- 4s - loss: 0.3271 - acc: 0.9112 - val\_loss: 0.4133 - val\_acc: 0.8714

Epoch 23/35  
- 4s - loss: 0.3307 - acc: 0.9163 - val\_loss: 0.6200 - val\_acc: 0.8337

Epoch 24/35  
- 4s - loss: 0.3266 - acc: 0.9123 - val\_loss: 1.5387 - val\_acc: 0.7044

Epoch 25/35  
- 4s - loss: 0.3280 - acc: 0.9168 - val\_loss: 0.4148 - val\_acc: 0.8894

Epoch 26/35  
- 4s - loss: 0.3205 - acc: 0.9169 - val\_loss: 0.4315 - val\_acc: 0.8697

Epoch 27/35  
- 4s - loss: 0.3192 - acc: 0.9136 - val\_loss: 0.5011 - val\_acc: 0.8429

Epoch 28/35  
- 4s - loss: 0.3146 - acc: 0.9153 - val\_loss: 0.4253 - val\_acc: 0.8731

Epoch 29/35  
- 4s - loss: 0.3095 - acc: 0.9189 - val\_loss: 0.4554 - val\_acc: 0.8734

Epoch 30/35  
- 4s - loss: 0.3188 - acc: 0.9177 - val\_loss: 0.4661 - val\_acc: 0.8887

Epoch 31/35  
- 4s - loss: 0.3238 - acc: 0.9125 - val\_loss: 0.4434 - val\_acc: 0.8694

Epoch 32/35  
- 4s - loss: 0.3187 - acc: 0.9157 - val\_loss: 0.4362 - val\_acc: 0.8551

Epoch 33/35  
- 4s - loss: 0.3326 - acc: 0.9166 - val\_loss: 0.4552 - val\_acc: 0.8751

Epoch 34/35

- 4s - loss: 0.3079 - acc: 0.9232 - val\_loss: 0.5428 - val\_acc: 0.8599

Epoch 35/35

- 4s - loss: 0.3287 - acc: 0.9157 - val\_loss: 0.3991 - val\_acc: 0.8826

Train accuracy 0.9396082698585418 Test accuracy: 0.8825924669155073

---

Layer (type)	Output Shape	Param #
=====		
conv1d_179 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_180 (Conv1D)	(None, 122, 16)	1552
-----		
dropout_90 (Dropout)	(None, 122, 16)	0
-----		
max_pooling1d_90 (MaxPooling)	(None, 61, 16)	0
-----		
flatten_90 (Flatten)	(None, 976)	0
-----		
dense_179 (Dense)	(None, 64)	62528
-----		
dense_180 (Dense)	(None, 6)	390
=====		

Total params: 65,942

Trainable params: 65,942

Non-trainable params: 0

---

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 10s - loss: 11.4304 - acc: 0.8188 - val\_loss: 1.3101 - val\_acc: 0.8307

Epoch 2/25

- 6s - loss: 0.5970 - acc: 0.9011 - val\_loss: 0.6391 - val\_acc: 0.8592

Epoch 3/25

- 6s - loss: 0.4156 - acc: 0.9037 - val\_loss: 0.5854 - val\_acc: 0.8690

Epoch 4/25

- 6s - loss: 0.3665 - acc: 0.9138 - val\_loss: 0.5236 - val\_acc: 0.8629

Epoch 5/25

- 5s - loss: 0.3455 - acc: 0.9157 - val\_loss: 0.5405 - val\_acc: 0.8785

Epoch 6/25

- 6s - loss: 0.3174 - acc: 0.9266 - val\_loss: 0.4695 - val\_acc: 0.8744

Epoch 7/25

- 5s - loss: 0.2955 - acc: 0.9291 - val\_loss: 0.4959 - val\_acc: 0.8670

Epoch 8/25

- 6s - loss: 0.2852 - acc: 0.9282 - val\_loss: 0.5324 - val\_acc: 0.8683

Epoch 9/25

- 5s - loss: 0.2830 - acc: 0.9295 - val\_loss: 0.4038 - val\_acc: 0.8938

Epoch 10/25

```

- 6s - loss: 0.2774 - acc: 0.9314 - val_loss: 0.4562 - val_acc: 0.8870
Epoch 11/25
- 6s - loss: 0.2708 - acc: 0.9323 - val_loss: 0.4688 - val_acc: 0.8666
Epoch 12/25
- 5s - loss: 0.2675 - acc: 0.9304 - val_loss: 0.4663 - val_acc: 0.8928
Epoch 13/25
- 6s - loss: 0.2492 - acc: 0.9357 - val_loss: 0.4438 - val_acc: 0.8945
Epoch 14/25
- 6s - loss: 0.2438 - acc: 0.9363 - val_loss: 0.5148 - val_acc: 0.8558
Epoch 15/25
- 6s - loss: 0.2394 - acc: 0.9368 - val_loss: 0.4394 - val_acc: 0.8646
Epoch 16/25
- 6s - loss: 0.2444 - acc: 0.9346 - val_loss: 0.4269 - val_acc: 0.8680
Epoch 17/25
- 6s - loss: 0.2381 - acc: 0.9361 - val_loss: 0.3736 - val_acc: 0.8965
Epoch 18/25
- 5s - loss: 0.2403 - acc: 0.9369 - val_loss: 0.4352 - val_acc: 0.8958
Epoch 19/25
- 6s - loss: 0.2276 - acc: 0.9396 - val_loss: 0.5363 - val_acc: 0.8582
Epoch 20/25
- 6s - loss: 0.2253 - acc: 0.9392 - val_loss: 0.4209 - val_acc: 0.8979
Epoch 21/25
- 6s - loss: 0.2287 - acc: 0.9391 - val_loss: 0.4006 - val_acc: 0.8880
Epoch 22/25
- 5s - loss: 0.2349 - acc: 0.9355 - val_loss: 0.4229 - val_acc: 0.8711
Epoch 23/25
- 6s - loss: 0.2156 - acc: 0.9412 - val_loss: 0.4436 - val_acc: 0.8829
Epoch 24/25
- 6s - loss: 0.2235 - acc: 0.9416 - val_loss: 0.4468 - val_acc: 0.8846
Epoch 25/25
- 5s - loss: 0.2299 - acc: 0.9382 - val_loss: 0.4252 - val_acc: 0.8812
Train accuracy 0.9428726877040261 Test accuracy: 0.8812351543942993

```

Layer (type)	Output Shape	Param #
conv1d_181 (Conv1D)	(None, 122, 42)	2688
conv1d_182 (Conv1D)	(None, 116, 24)	7080
dropout_91 (Dropout)	(None, 116, 24)	0
max_pooling1d_91 (MaxPooling)	(None, 38, 24)	0
flatten_91 (Flatten)	(None, 912)	0
dense_181 (Dense)	(None, 32)	29216

```

dense_182 (Dense)                (None, 6)                198
=====
Total params: 39,182
Trainable params: 39,182
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 6s - loss: 65.4656 - acc: 0.7164 - val_loss: 20.4675 - val_acc: 0.8402
Epoch 2/30
  - 2s - loss: 8.9991 - acc: 0.8847 - val_loss: 3.2005 - val_acc: 0.8361
Epoch 3/30
  - 2s - loss: 1.4730 - acc: 0.8987 - val_loss: 1.0053 - val_acc: 0.8775
Epoch 4/30
  - 2s - loss: 0.5934 - acc: 0.9066 - val_loss: 0.7331 - val_acc: 0.8812
Epoch 5/30
  - 2s - loss: 0.4703 - acc: 0.9187 - val_loss: 0.7268 - val_acc: 0.8561
Epoch 6/30
  - 2s - loss: 0.4237 - acc: 0.9225 - val_loss: 0.6516 - val_acc: 0.8483
Epoch 7/30
  - 2s - loss: 0.3930 - acc: 0.9289 - val_loss: 0.6226 - val_acc: 0.8666
Epoch 8/30
  - 2s - loss: 0.3979 - acc: 0.9207 - val_loss: 0.7269 - val_acc: 0.7581
Epoch 9/30
  - 2s - loss: 0.3837 - acc: 0.9257 - val_loss: 0.5610 - val_acc: 0.8792
Epoch 10/30
  - 2s - loss: 0.3744 - acc: 0.9200 - val_loss: 0.5664 - val_acc: 0.8595
Epoch 11/30
  - 2s - loss: 0.3401 - acc: 0.9285 - val_loss: 0.5123 - val_acc: 0.8918
Epoch 12/30
  - 2s - loss: 0.3287 - acc: 0.9319 - val_loss: 0.5590 - val_acc: 0.8680
Epoch 13/30
  - 2s - loss: 0.3257 - acc: 0.9314 - val_loss: 0.5358 - val_acc: 0.8677
Epoch 14/30
  - 2s - loss: 0.3241 - acc: 0.9276 - val_loss: 0.4924 - val_acc: 0.8948
Epoch 15/30
  - 2s - loss: 0.3021 - acc: 0.9348 - val_loss: 0.4895 - val_acc: 0.8744
Epoch 16/30
  - 2s - loss: 0.3010 - acc: 0.9351 - val_loss: 0.4600 - val_acc: 0.8884
Epoch 17/30
  - 2s - loss: 0.3016 - acc: 0.9334 - val_loss: 0.4862 - val_acc: 0.8792
Epoch 18/30
  - 2s - loss: 0.2983 - acc: 0.9343 - val_loss: 0.4652 - val_acc: 0.8897
Epoch 19/30
  - 2s - loss: 0.3004 - acc: 0.9317 - val_loss: 0.4425 - val_acc: 0.8911
Epoch 20/30
  - 2s - loss: 0.3095 - acc: 0.9310 - val_loss: 0.4278 - val_acc: 0.8955

```

Epoch 21/30  
 - 2s - loss: 0.2788 - acc: 0.9365 - val\_loss: 0.4826 - val\_acc: 0.8734  
 Epoch 22/30  
 - 2s - loss: 0.2768 - acc: 0.9347 - val\_loss: 0.4380 - val\_acc: 0.8873  
 Epoch 23/30  
 - 2s - loss: 0.2662 - acc: 0.9381 - val\_loss: 0.4024 - val\_acc: 0.8918  
 Epoch 24/30  
 - 2s - loss: 0.2836 - acc: 0.9327 - val\_loss: 0.4422 - val\_acc: 0.8884  
 Epoch 25/30  
 - 2s - loss: 0.2571 - acc: 0.9392 - val\_loss: 0.4019 - val\_acc: 0.8890  
 Epoch 26/30  
 - 2s - loss: 0.2722 - acc: 0.9346 - val\_loss: 0.4365 - val\_acc: 0.8931  
 Epoch 27/30  
 - 2s - loss: 0.2709 - acc: 0.9348 - val\_loss: 0.4078 - val\_acc: 0.8948  
 Epoch 28/30  
 - 2s - loss: 0.2534 - acc: 0.9412 - val\_loss: 0.4307 - val\_acc: 0.8836  
 Epoch 29/30  
 - 2s - loss: 0.2928 - acc: 0.9316 - val\_loss: 0.4136 - val\_acc: 0.8880  
 Epoch 30/30  
 - 2s - loss: 0.2472 - acc: 0.9412 - val\_loss: 0.3809 - val\_acc: 0.8989  
 Train accuracy 0.9503536452665942 Test accuracy: 0.8988802171700034

---

Layer (type)	Output Shape	Param #
=====		
conv1d_183 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_184 (Conv1D)	(None, 120, 16)	2576
-----		
dropout_92 (Dropout)	(None, 120, 16)	0
-----		
max_pooling1d_92 (MaxPooling)	(None, 60, 16)	0
-----		
flatten_92 (Flatten)	(None, 960)	0
-----		
dense_183 (Dense)	(None, 64)	61504
-----		
dense_184 (Dense)	(None, 6)	390
=====		

Total params: 65,942  
 Trainable params: 65,942  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 8s - loss: 14.0002 - acc: 0.7871 - val\_loss: 0.8703 - val\_acc: 0.8347  
 Epoch 2/25

```

- 4s - loss: 0.5291 - acc: 0.8794 - val_loss: 0.6603 - val_acc: 0.8531
Epoch 3/25
- 3s - loss: 0.4731 - acc: 0.8837 - val_loss: 0.6648 - val_acc: 0.8242
Epoch 4/25
- 3s - loss: 0.4438 - acc: 0.8921 - val_loss: 0.6187 - val_acc: 0.8592
Epoch 5/25
- 3s - loss: 0.4142 - acc: 0.8979 - val_loss: 0.5915 - val_acc: 0.8480
Epoch 6/25
- 3s - loss: 0.3833 - acc: 0.9047 - val_loss: 0.5314 - val_acc: 0.8680
Epoch 7/25
- 3s - loss: 0.3656 - acc: 0.9078 - val_loss: 0.4996 - val_acc: 0.8717
Epoch 8/25
- 3s - loss: 0.3702 - acc: 0.9076 - val_loss: 0.4927 - val_acc: 0.8768
Epoch 9/25
- 3s - loss: 0.3383 - acc: 0.9155 - val_loss: 0.4732 - val_acc: 0.8717
Epoch 10/25
- 3s - loss: 0.3192 - acc: 0.9191 - val_loss: 0.5551 - val_acc: 0.8334
Epoch 11/25
- 3s - loss: 0.3342 - acc: 0.9123 - val_loss: 0.4763 - val_acc: 0.8816
Epoch 12/25
- 3s - loss: 0.3134 - acc: 0.9184 - val_loss: 0.4811 - val_acc: 0.8748
Epoch 13/25
- 3s - loss: 0.3011 - acc: 0.9218 - val_loss: 0.5402 - val_acc: 0.8185
Epoch 14/25
- 3s - loss: 0.3200 - acc: 0.9178 - val_loss: 0.4299 - val_acc: 0.8904
Epoch 15/25
- 4s - loss: 0.2990 - acc: 0.9236 - val_loss: 0.4294 - val_acc: 0.8873
Epoch 16/25
- 3s - loss: 0.2887 - acc: 0.9264 - val_loss: 0.5242 - val_acc: 0.8453
Epoch 17/25
- 3s - loss: 0.2784 - acc: 0.9274 - val_loss: 0.4284 - val_acc: 0.8758
Epoch 18/25
- 3s - loss: 0.2831 - acc: 0.9270 - val_loss: 0.5076 - val_acc: 0.8724
Epoch 19/25
- 3s - loss: 0.3172 - acc: 0.9193 - val_loss: 0.4167 - val_acc: 0.8982
Epoch 20/25
- 3s - loss: 0.2692 - acc: 0.9313 - val_loss: 0.3854 - val_acc: 0.8870
Epoch 21/25
- 3s - loss: 0.2656 - acc: 0.9263 - val_loss: 0.3891 - val_acc: 0.8867
Epoch 22/25
- 3s - loss: 0.2806 - acc: 0.9259 - val_loss: 0.4880 - val_acc: 0.8683
Epoch 23/25
- 3s - loss: 0.3071 - acc: 0.9192 - val_loss: 0.3980 - val_acc: 0.8938
Epoch 24/25
- 3s - loss: 0.2985 - acc: 0.9229 - val_loss: 0.4830 - val_acc: 0.8459
Epoch 25/25
- 3s - loss: 0.2700 - acc: 0.9298 - val_loss: 0.4018 - val_acc: 0.8938
Train accuracy 0.9440968443960827 Test accuracy: 0.8937902952154734

```

---

Layer (type)	Output Shape	Param #
conv1d_185 (Conv1D)	(None, 122, 28)	1792
conv1d_186 (Conv1D)	(None, 120, 24)	2040
dropout_93 (Dropout)	(None, 120, 24)	0
max_pooling1d_93 (MaxPooling)	(None, 40, 24)	0
flatten_93 (Flatten)	(None, 960)	0
dense_185 (Dense)	(None, 32)	30752
dense_186 (Dense)	(None, 6)	198

---

Total params: 34,782

Trainable params: 34,782

Non-trainable params: 0

---

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/25

- 6s - loss: 45.0374 - acc: 0.6583 - val\_loss: 3.7365 - val\_acc: 0.6742

Epoch 2/25

- 2s - loss: 1.1796 - acc: 0.7501 - val\_loss: 0.9649 - val\_acc: 0.7353

Epoch 3/25

- 2s - loss: 0.6859 - acc: 0.8123 - val\_loss: 0.9124 - val\_acc: 0.6837

Epoch 4/25

- 2s - loss: 0.6300 - acc: 0.8271 - val\_loss: 0.8109 - val\_acc: 0.7950

Epoch 5/25

- 2s - loss: 0.5839 - acc: 0.8406 - val\_loss: 0.6856 - val\_acc: 0.8446

Epoch 6/25

- 2s - loss: 0.5430 - acc: 0.8504 - val\_loss: 0.6407 - val\_acc: 0.8544

Epoch 7/25

- 2s - loss: 0.5274 - acc: 0.8547 - val\_loss: 0.6374 - val\_acc: 0.8463

Epoch 8/25

- 2s - loss: 0.5008 - acc: 0.8652 - val\_loss: 0.8488 - val\_acc: 0.7465

Epoch 9/25

- 2s - loss: 0.4984 - acc: 0.8602 - val\_loss: 0.6576 - val\_acc: 0.8446

Epoch 10/25

- 2s - loss: 0.4782 - acc: 0.8652 - val\_loss: 0.6564 - val\_acc: 0.8151

Epoch 11/25

- 2s - loss: 0.4433 - acc: 0.8799 - val\_loss: 0.5606 - val\_acc: 0.8660

Epoch 12/25

- 2s - loss: 0.4360 - acc: 0.8784 - val\_loss: 0.5541 - val\_acc: 0.8575

```

Epoch 13/25
- 2s - loss: 0.4313 - acc: 0.8825 - val_loss: 0.5527 - val_acc: 0.8480
Epoch 14/25
- 2s - loss: 0.4226 - acc: 0.8856 - val_loss: 0.5068 - val_acc: 0.8636
Epoch 15/25
- 2s - loss: 0.4041 - acc: 0.8898 - val_loss: 0.6078 - val_acc: 0.8551
Epoch 16/25
- 2s - loss: 0.4050 - acc: 0.8936 - val_loss: 0.5353 - val_acc: 0.8670
Epoch 17/25
- 2s - loss: 0.3961 - acc: 0.8951 - val_loss: 0.4961 - val_acc: 0.8568
Epoch 18/25
- 2s - loss: 0.3962 - acc: 0.8908 - val_loss: 0.5917 - val_acc: 0.8646
Epoch 19/25
- 2s - loss: 0.3949 - acc: 0.8946 - val_loss: 0.5251 - val_acc: 0.8463
Epoch 20/25
- 2s - loss: 0.3806 - acc: 0.8955 - val_loss: 0.4659 - val_acc: 0.8823
Epoch 21/25
- 2s - loss: 0.3818 - acc: 0.8988 - val_loss: 0.5506 - val_acc: 0.8188
Epoch 22/25
- 2s - loss: 0.3927 - acc: 0.8939 - val_loss: 0.7946 - val_acc: 0.7801
Epoch 23/25
- 2s - loss: 0.3684 - acc: 0.9022 - val_loss: 0.4481 - val_acc: 0.8792
Epoch 24/25
- 2s - loss: 0.3731 - acc: 0.9006 - val_loss: 0.4714 - val_acc: 0.8748
Epoch 25/25
- 2s - loss: 0.3646 - acc: 0.9027 - val_loss: 0.5423 - val_acc: 0.8286
Train accuracy 0.8978509249183896 Test accuracy: 0.8286392941974889

```

Layer (type)	Output Shape	Param #
conv1d_187 (Conv1D)	(None, 122, 32)	2048
conv1d_188 (Conv1D)	(None, 116, 32)	7200
dropout_94 (Dropout)	(None, 116, 32)	0
max_pooling1d_94 (MaxPooling)	(None, 38, 32)	0
flatten_94 (Flatten)	(None, 1216)	0
dense_187 (Dense)	(None, 64)	77888
dense_188 (Dense)	(None, 6)	390

```

Total params: 87,526
Trainable params: 87,526
Non-trainable params: 0

```



```

-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/35
  - 8s - loss: 13.5111 - acc: 0.8187 - val_loss: 1.4059 - val_acc: 0.8809
Epoch 2/35
  - 4s - loss: 0.5501 - acc: 0.9223 - val_loss: 0.6292 - val_acc: 0.8948
Epoch 3/35
  - 4s - loss: 0.3531 - acc: 0.9261 - val_loss: 0.6608 - val_acc: 0.8755
Epoch 4/35
  - 4s - loss: 0.3272 - acc: 0.9283 - val_loss: 0.5381 - val_acc: 0.8904
Epoch 5/35
  - 4s - loss: 0.2936 - acc: 0.9350 - val_loss: 0.4766 - val_acc: 0.8901
Epoch 6/35
  - 4s - loss: 0.2925 - acc: 0.9350 - val_loss: 0.4680 - val_acc: 0.8901
Epoch 7/35
  - 4s - loss: 0.2739 - acc: 0.9373 - val_loss: 0.4565 - val_acc: 0.8887
Epoch 8/35
  - 4s - loss: 0.2658 - acc: 0.9363 - val_loss: 0.4758 - val_acc: 0.8806
Epoch 9/35
  - 4s - loss: 0.2597 - acc: 0.9376 - val_loss: 0.4578 - val_acc: 0.8921
Epoch 10/35
  - 4s - loss: 0.2468 - acc: 0.9389 - val_loss: 0.4329 - val_acc: 0.8924
Epoch 11/35
  - 4s - loss: 0.2795 - acc: 0.9329 - val_loss: 0.4237 - val_acc: 0.8935
Epoch 12/35
  - 4s - loss: 0.2208 - acc: 0.9472 - val_loss: 0.3750 - val_acc: 0.9006
Epoch 13/35
  - 4s - loss: 0.2418 - acc: 0.9402 - val_loss: 0.3963 - val_acc: 0.8962
Epoch 14/35
  - 4s - loss: 0.2316 - acc: 0.9388 - val_loss: 0.3783 - val_acc: 0.8918
Epoch 15/35
  - 4s - loss: 0.2376 - acc: 0.9372 - val_loss: 0.4122 - val_acc: 0.9053
Epoch 16/35
  - 4s - loss: 0.2361 - acc: 0.9368 - val_loss: 0.4057 - val_acc: 0.8717
Epoch 17/35
  - 4s - loss: 0.2291 - acc: 0.9387 - val_loss: 0.3826 - val_acc: 0.8962
Epoch 18/35
  - 4s - loss: 0.2250 - acc: 0.9402 - val_loss: 0.3872 - val_acc: 0.8985
Epoch 19/35
  - 4s - loss: 0.2309 - acc: 0.9382 - val_loss: 0.3794 - val_acc: 0.8911
Epoch 20/35
  - 4s - loss: 0.2487 - acc: 0.9317 - val_loss: 0.4265 - val_acc: 0.8958
Epoch 21/35
  - 4s - loss: 0.2346 - acc: 0.9410 - val_loss: 0.4008 - val_acc: 0.8867
Epoch 22/35
  - 4s - loss: 0.2187 - acc: 0.9427 - val_loss: 0.3837 - val_acc: 0.9002
Epoch 23/35

```

```

- 4s - loss: 0.2490 - acc: 0.9357 - val_loss: 0.3745 - val_acc: 0.8928
Epoch 24/35
- 4s - loss: 0.2001 - acc: 0.9468 - val_loss: 0.3740 - val_acc: 0.8894
Epoch 25/35
- 4s - loss: 0.2365 - acc: 0.9369 - val_loss: 0.3419 - val_acc: 0.8985
Epoch 26/35
- 4s - loss: 0.2291 - acc: 0.9381 - val_loss: 0.3988 - val_acc: 0.8965
Epoch 27/35
- 4s - loss: 0.2247 - acc: 0.9388 - val_loss: 0.3955 - val_acc: 0.8945
Epoch 28/35
- 4s - loss: 0.2240 - acc: 0.9395 - val_loss: 0.4063 - val_acc: 0.8785
Epoch 29/35
- 4s - loss: 0.2066 - acc: 0.9440 - val_loss: 0.3714 - val_acc: 0.8884
Epoch 30/35
- 4s - loss: 0.2121 - acc: 0.9395 - val_loss: 0.3521 - val_acc: 0.8911
Epoch 31/35
- 4s - loss: 0.2124 - acc: 0.9436 - val_loss: 0.3807 - val_acc: 0.8819
Epoch 32/35
- 4s - loss: 0.2256 - acc: 0.9377 - val_loss: 0.4341 - val_acc: 0.8734
Epoch 33/35
- 4s - loss: 0.2252 - acc: 0.9418 - val_loss: 0.4033 - val_acc: 0.8870
Epoch 34/35
- 4s - loss: 0.2067 - acc: 0.9452 - val_loss: 0.3971 - val_acc: 0.8945
Epoch 35/35
- 4s - loss: 0.2113 - acc: 0.9431 - val_loss: 0.3885 - val_acc: 0.8751
Train accuracy 0.9287268770402611 Test accuracy: 0.8751272480488632

```

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-----
Layer (type)                 Output Shape              Param #
-----
conv1d_189 (Conv1D)          (None, 124, 42)          1932
-----
conv1d_190 (Conv1D)          (None, 122, 16)          2032
-----
dropout_95 (Dropout)         (None, 122, 16)          0
-----
max_pooling1d_95 (MaxPooling (None, 61, 16)          0
-----
flatten_95 (Flatten)         (None, 976)              0
-----
dense_189 (Dense)            (None, 32)               31264
-----
dense_190 (Dense)            (None, 6)                198
=====
Total params: 35,426
Trainable params: 35,426
Non-trainable params: 0
-----

```

None

Train on 7352 samples, validate on 2947 samples

Epoch 1/30

- 6s - loss: 101.5560 - acc: 0.6560 - val\_loss: 44.9517 - val\_acc: 0.7720

Epoch 2/30

- 2s - loss: 23.1844 - acc: 0.8052 - val\_loss: 9.8165 - val\_acc: 0.7431

Epoch 3/30

- 2s - loss: 4.8652 - acc: 0.8617 - val\_loss: 2.3456 - val\_acc: 0.8297

Epoch 4/30

- 2s - loss: 1.2572 - acc: 0.8746 - val\_loss: 1.0283 - val\_acc: 0.8392

Epoch 5/30

- 2s - loss: 0.6465 - acc: 0.8881 - val\_loss: 0.7658 - val\_acc: 0.8463

Epoch 6/30

- 2s - loss: 0.5241 - acc: 0.8946 - val\_loss: 0.7202 - val\_acc: 0.8422

Epoch 7/30

- 2s - loss: 0.4840 - acc: 0.8951 - val\_loss: 0.6374 - val\_acc: 0.8734

Epoch 8/30

- 2s - loss: 0.4620 - acc: 0.8965 - val\_loss: 0.7188 - val\_acc: 0.8117

Epoch 9/30

- 2s - loss: 0.4430 - acc: 0.8984 - val\_loss: 0.6645 - val\_acc: 0.8378

Epoch 10/30

- 2s - loss: 0.4339 - acc: 0.9007 - val\_loss: 0.6147 - val\_acc: 0.8565

Epoch 11/30

- 2s - loss: 0.4076 - acc: 0.9056 - val\_loss: 0.5563 - val\_acc: 0.8778

Epoch 12/30

- 2s - loss: 0.4180 - acc: 0.9025 - val\_loss: 0.5621 - val\_acc: 0.8799

Epoch 13/30

- 2s - loss: 0.3738 - acc: 0.9127 - val\_loss: 0.5695 - val\_acc: 0.8320

Epoch 14/30

- 2s - loss: 0.3912 - acc: 0.9032 - val\_loss: 0.5305 - val\_acc: 0.8799

Epoch 15/30

- 2s - loss: 0.3719 - acc: 0.9106 - val\_loss: 0.5372 - val\_acc: 0.8765

Epoch 16/30

- 2s - loss: 0.3717 - acc: 0.9098 - val\_loss: 0.5217 - val\_acc: 0.8846

Epoch 17/30

- 2s - loss: 0.3756 - acc: 0.9110 - val\_loss: 0.5204 - val\_acc: 0.8609

Epoch 18/30

- 2s - loss: 0.3356 - acc: 0.9219 - val\_loss: 0.4466 - val\_acc: 0.8850

Epoch 19/30

- 2s - loss: 0.3470 - acc: 0.9134 - val\_loss: 0.4731 - val\_acc: 0.8741

Epoch 20/30

- 2s - loss: 0.3342 - acc: 0.9184 - val\_loss: 0.4912 - val\_acc: 0.8860

Epoch 21/30

- 2s - loss: 0.3280 - acc: 0.9208 - val\_loss: 0.4896 - val\_acc: 0.8914

Epoch 22/30

- 2s - loss: 0.3140 - acc: 0.9222 - val\_loss: 0.4720 - val\_acc: 0.8802

Epoch 23/30

- 2s - loss: 0.3299 - acc: 0.9163 - val\_loss: 0.4775 - val\_acc: 0.8904

Epoch 24/30  
 - 2s - loss: 0.3059 - acc: 0.9274 - val\_loss: 0.5021 - val\_acc: 0.8660  
 Epoch 25/30  
 - 2s - loss: 0.2991 - acc: 0.9253 - val\_loss: 0.4421 - val\_acc: 0.9009  
 Epoch 26/30  
 - 2s - loss: 0.3073 - acc: 0.9253 - val\_loss: 0.4416 - val\_acc: 0.8907  
 Epoch 27/30  
 - 2s - loss: 0.3129 - acc: 0.9202 - val\_loss: 0.5320 - val\_acc: 0.8558  
 Epoch 28/30  
 - 2s - loss: 0.3017 - acc: 0.9290 - val\_loss: 0.4403 - val\_acc: 0.8996  
 Epoch 29/30  
 - 2s - loss: 0.3007 - acc: 0.9267 - val\_loss: 0.4520 - val\_acc: 0.8979  
 Epoch 30/30  
 - 2s - loss: 0.2998 - acc: 0.9270 - val\_loss: 0.4421 - val\_acc: 0.8823  
 Train accuracy 0.9393362350380848 Test accuracy: 0.8822531387852053

---

Layer (type)	Output Shape	Param #
conv1d_191 (Conv1D)	(None, 122, 32)	2048
conv1d_192 (Conv1D)	(None, 118, 24)	3864
dropout_96 (Dropout)	(None, 118, 24)	0
max_pooling1d_96 (MaxPooling)	(None, 39, 24)	0
flatten_96 (Flatten)	(None, 936)	0
dense_191 (Dense)	(None, 64)	59968
dense_192 (Dense)	(None, 6)	390

---

Total params: 66,270  
 Trainable params: 66,270  
 Non-trainable params: 0

---

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/25  
 - 11s - loss: 4.9231 - acc: 0.8377 - val\_loss: 0.8762 - val\_acc: 0.8985  
 Epoch 2/25  
 - 6s - loss: 0.4481 - acc: 0.9313 - val\_loss: 0.5428 - val\_acc: 0.8507  
 Epoch 3/25  
 - 7s - loss: 0.3025 - acc: 0.9295 - val\_loss: 0.4260 - val\_acc: 0.9006  
 Epoch 4/25  
 - 7s - loss: 0.2469 - acc: 0.9410 - val\_loss: 0.3910 - val\_acc: 0.8931  
 Epoch 5/25

```

- 7s - loss: 0.2328 - acc: 0.9426 - val_loss: 0.3538 - val_acc: 0.9074
Epoch 6/25
- 7s - loss: 0.2245 - acc: 0.9408 - val_loss: 0.3913 - val_acc: 0.8867
Epoch 7/25
- 7s - loss: 0.2118 - acc: 0.9434 - val_loss: 0.3481 - val_acc: 0.8972
Epoch 8/25
- 7s - loss: 0.2128 - acc: 0.9418 - val_loss: 0.3904 - val_acc: 0.8731
Epoch 9/25
- 7s - loss: 0.2049 - acc: 0.9429 - val_loss: 0.3794 - val_acc: 0.8877
Epoch 10/25
- 7s - loss: 0.2063 - acc: 0.9400 - val_loss: 0.3409 - val_acc: 0.9121
Epoch 11/25
- 7s - loss: 0.1903 - acc: 0.9431 - val_loss: 0.3484 - val_acc: 0.8924
Epoch 12/25
- 7s - loss: 0.1928 - acc: 0.9436 - val_loss: 0.3431 - val_acc: 0.8884
Epoch 13/25
- 7s - loss: 0.1965 - acc: 0.9434 - val_loss: 0.3697 - val_acc: 0.8948
Epoch 14/25
- 7s - loss: 0.1908 - acc: 0.9457 - val_loss: 0.3354 - val_acc: 0.8914
Epoch 15/25
- 7s - loss: 0.1900 - acc: 0.9467 - val_loss: 0.3377 - val_acc: 0.8873
Epoch 16/25
- 6s - loss: 0.1932 - acc: 0.9421 - val_loss: 0.3192 - val_acc: 0.8962
Epoch 17/25
- 7s - loss: 0.1807 - acc: 0.9457 - val_loss: 0.3560 - val_acc: 0.8839
Epoch 18/25
- 7s - loss: 0.2014 - acc: 0.9444 - val_loss: 0.4726 - val_acc: 0.8619
Epoch 19/25
- 7s - loss: 0.1910 - acc: 0.9456 - val_loss: 0.3210 - val_acc: 0.9097
Epoch 20/25
- 7s - loss: 0.1807 - acc: 0.9463 - val_loss: 0.3456 - val_acc: 0.9026
Epoch 21/25
- 7s - loss: 0.1802 - acc: 0.9470 - val_loss: 0.4341 - val_acc: 0.8935
Epoch 22/25
- 7s - loss: 0.1832 - acc: 0.9484 - val_loss: 0.3219 - val_acc: 0.8924
Epoch 23/25
- 7s - loss: 0.1814 - acc: 0.9489 - val_loss: 0.3298 - val_acc: 0.8975
Epoch 24/25
- 7s - loss: 0.1912 - acc: 0.9437 - val_loss: 0.3173 - val_acc: 0.9101
Epoch 25/25
- 7s - loss: 0.1712 - acc: 0.9514 - val_loss: 0.3109 - val_acc: 0.9030
Train accuracy 0.9502176278563657 Test accuracy: 0.9029521547336274

```

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-----
Layer (type)                Output Shape                Param #
=====
conv1d_193 (Conv1D)         (None, 124, 42)            1932
-----

```

conv1d_194 (Conv1D)	(None, 118, 16)	4720
-----		
dropout_97 (Dropout)	(None, 118, 16)	0
-----		
max_pooling1d_97 (MaxPooling)	(None, 59, 16)	0
-----		
flatten_97 (Flatten)	(None, 944)	0
-----		
dense_193 (Dense)	(None, 32)	30240
-----		
dense_194 (Dense)	(None, 6)	198
=====		
Total params: 37,090		
Trainable params: 37,090		
Non-trainable params: 0		
-----		
None		
Train on 7352 samples, validate on 2947 samples		
Epoch 1/25		
- 7s - loss: 20.0633 - acc: 0.7391 - val_loss: 2.1763 - val_acc: 0.8130		
Epoch 2/25		
- 3s - loss: 0.8582 - acc: 0.8762 - val_loss: 0.7603 - val_acc: 0.8293		
Epoch 3/25		
- 3s - loss: 0.4883 - acc: 0.8893 - val_loss: 0.6756 - val_acc: 0.8171		
Epoch 4/25		
- 3s - loss: 0.4394 - acc: 0.8945 - val_loss: 0.5831 - val_acc: 0.8656		
Epoch 5/25		
- 3s - loss: 0.4184 - acc: 0.9032 - val_loss: 0.5638 - val_acc: 0.8741		
Epoch 6/25		
- 3s - loss: 0.3750 - acc: 0.9139 - val_loss: 0.6264 - val_acc: 0.8575		
Epoch 7/25		
- 3s - loss: 0.3726 - acc: 0.9121 - val_loss: 0.5143 - val_acc: 0.8765		
Epoch 8/25		
- 3s - loss: 0.3521 - acc: 0.9165 - val_loss: 0.5094 - val_acc: 0.8724		
Epoch 9/25		
- 3s - loss: 0.3458 - acc: 0.9158 - val_loss: 0.4961 - val_acc: 0.8734		
Epoch 10/25		
- 3s - loss: 0.3458 - acc: 0.9146 - val_loss: 0.5334 - val_acc: 0.8697		
Epoch 11/25		
- 3s - loss: 0.3104 - acc: 0.9229 - val_loss: 0.5088 - val_acc: 0.8778		
Epoch 12/25		
- 3s - loss: 0.3058 - acc: 0.9242 - val_loss: 0.4776 - val_acc: 0.8704		
Epoch 13/25		
- 3s - loss: 0.3059 - acc: 0.9252 - val_loss: 0.4857 - val_acc: 0.8639		
Epoch 14/25		
- 3s - loss: 0.3034 - acc: 0.9293 - val_loss: 0.4869 - val_acc: 0.8751		
Epoch 15/25		
- 3s - loss: 0.3074 - acc: 0.9226 - val_loss: 0.4195 - val_acc: 0.8884		

Epoch 16/25  
 - 3s - loss: 0.2977 - acc: 0.9253 - val\_loss: 0.4551 - val\_acc: 0.8826  
 Epoch 17/25  
 - 3s - loss: 0.2872 - acc: 0.9302 - val\_loss: 0.4481 - val\_acc: 0.9030  
 Epoch 18/25  
 - 3s - loss: 0.2909 - acc: 0.9286 - val\_loss: 0.5166 - val\_acc: 0.8646  
 Epoch 19/25  
 - 3s - loss: 0.2792 - acc: 0.9308 - val\_loss: 0.4778 - val\_acc: 0.8670  
 Epoch 20/25  
 - 3s - loss: 0.2778 - acc: 0.9286 - val\_loss: 0.4626 - val\_acc: 0.8782  
 Epoch 21/25  
 - 3s - loss: 0.2897 - acc: 0.9279 - val\_loss: 0.5614 - val\_acc: 0.8310  
 Epoch 22/25  
 - 3s - loss: 0.2848 - acc: 0.9266 - val\_loss: 0.4592 - val\_acc: 0.8548  
 Epoch 23/25  
 - 3s - loss: 0.2725 - acc: 0.9323 - val\_loss: 0.4801 - val\_acc: 0.8392  
 Epoch 24/25  
 - 3s - loss: 0.2913 - acc: 0.9271 - val\_loss: 0.4791 - val\_acc: 0.8856  
 Epoch 25/25  
 - 3s - loss: 0.2956 - acc: 0.9301 - val\_loss: 0.4798 - val\_acc: 0.8649  
 Train accuracy 0.9468171926006529 Test accuracy: 0.8649474041398032

Layer (type)	Output Shape	Param #
conv1d_195 (Conv1D)	(None, 122, 28)	1792
conv1d_196 (Conv1D)	(None, 120, 24)	2040
dropout_98 (Dropout)	(None, 120, 24)	0
max_pooling1d_98 (MaxPooling)	(None, 40, 24)	0
flatten_98 (Flatten)	(None, 960)	0
dense_195 (Dense)	(None, 64)	61504
dense_196 (Dense)	(None, 6)	390

Total params: 65,726  
 Trainable params: 65,726  
 Non-trainable params: 0

None  
 Train on 7352 samples, validate on 2947 samples  
 Epoch 1/30  
 - 6s - loss: 8.3842 - acc: 0.7356 - val\_loss: 1.2760 - val\_acc: 0.8602  
 Epoch 2/30

- 2s - loss: 0.6686 - acc: 0.8787 - val\_loss: 0.6373 - val\_acc: 0.8907  
 Epoch 3/30  
 - 2s - loss: 0.4356 - acc: 0.9079 - val\_loss: 0.5604 - val\_acc: 0.8649  
 Epoch 4/30  
 - 2s - loss: 0.3612 - acc: 0.9134 - val\_loss: 0.4945 - val\_acc: 0.8755  
 Epoch 5/30  
 - 2s - loss: 0.3316 - acc: 0.9169 - val\_loss: 0.3994 - val\_acc: 0.9053  
 Epoch 6/30  
 - 2s - loss: 0.3078 - acc: 0.9223 - val\_loss: 0.3707 - val\_acc: 0.9104  
 Epoch 7/30  
 - 2s - loss: 0.2969 - acc: 0.9257 - val\_loss: 0.4432 - val\_acc: 0.8707  
 Epoch 8/30  
 - 2s - loss: 0.2853 - acc: 0.9271 - val\_loss: 0.3801 - val\_acc: 0.8924  
 Epoch 9/30  
 - 2s - loss: 0.2797 - acc: 0.9272 - val\_loss: 0.4271 - val\_acc: 0.8744  
 Epoch 10/30  
 - 2s - loss: 0.2716 - acc: 0.9282 - val\_loss: 0.4296 - val\_acc: 0.8670  
 Epoch 11/30  
 - 2s - loss: 0.2632 - acc: 0.9334 - val\_loss: 0.5736 - val\_acc: 0.8327  
 Epoch 12/30  
 - 2s - loss: 0.2748 - acc: 0.9286 - val\_loss: 0.3467 - val\_acc: 0.9186  
 Epoch 13/30  
 - 2s - loss: 0.2599 - acc: 0.9310 - val\_loss: 0.3441 - val\_acc: 0.8992  
 Epoch 14/30  
 - 2s - loss: 0.2646 - acc: 0.9295 - val\_loss: 0.3369 - val\_acc: 0.9203  
 Epoch 15/30  
 - 2s - loss: 0.2677 - acc: 0.9298 - val\_loss: 0.3484 - val\_acc: 0.9040  
 Epoch 16/30  
 - 2s - loss: 0.2497 - acc: 0.9336 - val\_loss: 0.3331 - val\_acc: 0.9019  
 Epoch 17/30  
 - 2s - loss: 0.2481 - acc: 0.9327 - val\_loss: 0.3384 - val\_acc: 0.8941  
 Epoch 18/30  
 - 2s - loss: 0.2477 - acc: 0.9335 - val\_loss: 0.3527 - val\_acc: 0.9040  
 Epoch 19/30  
 - 2s - loss: 0.2343 - acc: 0.9366 - val\_loss: 0.3344 - val\_acc: 0.9036  
 Epoch 20/30  
 - 2s - loss: 0.2463 - acc: 0.9359 - val\_loss: 0.3297 - val\_acc: 0.8982  
 Epoch 21/30  
 - 2s - loss: 0.2494 - acc: 0.9347 - val\_loss: 0.3404 - val\_acc: 0.9057  
 Epoch 22/30  
 - 2s - loss: 0.2552 - acc: 0.9304 - val\_loss: 0.3234 - val\_acc: 0.9087  
 Epoch 23/30  
 - 2s - loss: 0.2522 - acc: 0.9353 - val\_loss: 0.3195 - val\_acc: 0.8962  
 Epoch 24/30  
 - 2s - loss: 0.2428 - acc: 0.9331 - val\_loss: 0.3441 - val\_acc: 0.8914  
 Epoch 25/30  
 - 2s - loss: 0.2451 - acc: 0.9323 - val\_loss: 0.4233 - val\_acc: 0.8639  
 Epoch 26/30



```

- 2s - loss: 0.2443 - acc: 0.9325 - val_loss: 0.3649 - val_acc: 0.8901
Epoch 27/30
- 2s - loss: 0.2268 - acc: 0.9385 - val_loss: 0.3710 - val_acc: 0.8728
Epoch 28/30
- 2s - loss: 0.2675 - acc: 0.9327 - val_loss: 0.3127 - val_acc: 0.9019
Epoch 29/30
- 2s - loss: 0.2410 - acc: 0.9368 - val_loss: 0.3636 - val_acc: 0.8897
Epoch 30/30
- 2s - loss: 0.2271 - acc: 0.9384 - val_loss: 0.3242 - val_acc: 0.9013
Train accuracy 0.9357997823721437 Test accuracy: 0.9012555140821175
-----

```

Layer (type)	Output Shape	Param #
conv1d_197 (Conv1D)	(None, 124, 32)	1472
conv1d_198 (Conv1D)	(None, 120, 16)	2576
dropout_99 (Dropout)	(None, 120, 16)	0
max_pooling1d_99 (MaxPooling)	(None, 40, 16)	0
flatten_99 (Flatten)	(None, 640)	0
dense_197 (Dense)	(None, 32)	20512
dense_198 (Dense)	(None, 6)	198

```

=====
Total params: 24,758
Trainable params: 24,758
Non-trainable params: 0
-----

```

```

None
Train on 7352 samples, validate on 2947 samples
Epoch 1/25
- 9s - loss: 4.5669 - acc: 0.7935 - val_loss: 0.8646 - val_acc: 0.8656
Epoch 2/25
- 4s - loss: 0.4426 - acc: 0.9064 - val_loss: 0.5971 - val_acc: 0.8748
Epoch 3/25
- 5s - loss: 0.3473 - acc: 0.9214 - val_loss: 0.5384 - val_acc: 0.8819
Epoch 4/25
- 5s - loss: 0.3153 - acc: 0.9227 - val_loss: 0.5751 - val_acc: 0.8578
Epoch 5/25
- 4s - loss: 0.2910 - acc: 0.9291 - val_loss: 0.5726 - val_acc: 0.8276
Epoch 6/25
- 4s - loss: 0.2886 - acc: 0.9325 - val_loss: 0.4760 - val_acc: 0.8853
Epoch 7/25
- 5s - loss: 0.2862 - acc: 0.9293 - val_loss: 0.4660 - val_acc: 0.8918

```

Epoch 8/25  
 - 4s - loss: 0.2534 - acc: 0.9365 - val\_loss: 0.4801 - val\_acc: 0.8714  
 Epoch 9/25  
 - 5s - loss: 0.2551 - acc: 0.9380 - val\_loss: 0.4702 - val\_acc: 0.8795  
 Epoch 10/25  
 - 5s - loss: 0.2356 - acc: 0.9374 - val\_loss: 0.4707 - val\_acc: 0.8707  
 Epoch 11/25  
 - 4s - loss: 0.2498 - acc: 0.9328 - val\_loss: 0.4411 - val\_acc: 0.8853  
 Epoch 12/25  
 - 4s - loss: 0.2408 - acc: 0.9373 - val\_loss: 0.4557 - val\_acc: 0.8744  
 Epoch 13/25  
 - 5s - loss: 0.2391 - acc: 0.9388 - val\_loss: 0.4413 - val\_acc: 0.8609  
 Epoch 14/25  
 - 4s - loss: 0.2460 - acc: 0.9351 - val\_loss: 0.4033 - val\_acc: 0.8795  
 Epoch 15/25  
 - 5s - loss: 0.2366 - acc: 0.9380 - val\_loss: 0.3867 - val\_acc: 0.8921  
 Epoch 16/25  
 - 4s - loss: 0.2438 - acc: 0.9358 - val\_loss: 0.4143 - val\_acc: 0.8802  
 Epoch 17/25  
 - 5s - loss: 0.2167 - acc: 0.9416 - val\_loss: 0.4161 - val\_acc: 0.8639  
 Epoch 18/25  
 - 5s - loss: 0.2247 - acc: 0.9377 - val\_loss: 0.3815 - val\_acc: 0.8914  
 Epoch 19/25  
 - 4s - loss: 0.2324 - acc: 0.9393 - val\_loss: 0.4458 - val\_acc: 0.8717  
 Epoch 20/25  
 - 4s - loss: 0.2228 - acc: 0.9407 - val\_loss: 0.4284 - val\_acc: 0.8802  
 Epoch 21/25  
 - 5s - loss: 0.2199 - acc: 0.9406 - val\_loss: 0.5000 - val\_acc: 0.8191  
 Epoch 22/25  
 - 4s - loss: 0.2427 - acc: 0.9357 - val\_loss: 0.4173 - val\_acc: 0.8921  
 Epoch 23/25  
 - 5s - loss: 0.2445 - acc: 0.9347 - val\_loss: 0.3632 - val\_acc: 0.8955  
 Epoch 24/25  
 - 5s - loss: 0.2191 - acc: 0.9425 - val\_loss: 0.4164 - val\_acc: 0.8982  
 Epoch 25/25  
 - 4s - loss: 0.2149 - acc: 0.9446 - val\_loss: 0.5544 - val\_acc: 0.8432  
 Train accuracy 0.899619151186502 Test accuracy: 0.8432304038004751

---

Layer (type)	Output Shape	Param #
conv1d_199 (Conv1D)	(None, 122, 32)	2048
conv1d_200 (Conv1D)	(None, 120, 32)	3104
dropout_100 (Dropout)	(None, 120, 32)	0
max_pooling1d_100 (MaxPoolin	(None, 60, 32)	0

```

-----
flatten_100 (Flatten)          (None, 1920)          0
-----
dense_199 (Dense)              (None, 64)            122944
-----
dense_200 (Dense)              (None, 6)             390
=====
Total params: 128,486
Trainable params: 128,486
Non-trainable params: 0
-----
None
Train on 7352 samples, validate on 2947 samples
Epoch 1/30
  - 7s - loss: 30.5532 - acc: 0.7618 - val_loss: 2.2024 - val_acc: 0.8246
Epoch 2/30
  - 3s - loss: 0.8391 - acc: 0.8853 - val_loss: 0.8323 - val_acc: 0.8035
Epoch 3/30
  - 3s - loss: 0.5331 - acc: 0.8849 - val_loss: 0.7406 - val_acc: 0.8147
Epoch 4/30
  - 3s - loss: 0.4779 - acc: 0.9004 - val_loss: 0.6211 - val_acc: 0.8778
Epoch 5/30
  - 3s - loss: 0.4147 - acc: 0.9128 - val_loss: 0.5577 - val_acc: 0.8792
Epoch 6/30
  - 3s - loss: 0.4284 - acc: 0.9057 - val_loss: 0.6300 - val_acc: 0.8334
Epoch 7/30
  - 3s - loss: 0.3658 - acc: 0.9218 - val_loss: 0.5696 - val_acc: 0.8660
Epoch 8/30
  - 3s - loss: 0.4054 - acc: 0.9089 - val_loss: 0.5670 - val_acc: 0.8371
Epoch 9/30
  - 3s - loss: 0.3656 - acc: 0.9154 - val_loss: 0.5273 - val_acc: 0.8904
Epoch 10/30
  - 3s - loss: 0.3714 - acc: 0.9166 - val_loss: 0.5122 - val_acc: 0.8812
Epoch 11/30
  - 3s - loss: 0.3268 - acc: 0.9274 - val_loss: 0.5266 - val_acc: 0.8660
Epoch 12/30
  - 3s - loss: 0.3229 - acc: 0.9298 - val_loss: 0.4563 - val_acc: 0.9026
Epoch 13/30
  - 3s - loss: 0.3243 - acc: 0.9245 - val_loss: 0.5118 - val_acc: 0.8945
Epoch 14/30
  - 3s - loss: 0.3167 - acc: 0.9264 - val_loss: 0.4692 - val_acc: 0.8792
Epoch 15/30
  - 3s - loss: 0.3177 - acc: 0.9264 - val_loss: 0.5565 - val_acc: 0.8677
Epoch 16/30
  - 3s - loss: 0.3127 - acc: 0.9290 - val_loss: 0.4644 - val_acc: 0.8938
Epoch 17/30
  - 3s - loss: 0.2869 - acc: 0.9319 - val_loss: 0.4130 - val_acc: 0.9023
Epoch 18/30

```

```

- 3s - loss: 0.2899 - acc: 0.9289 - val_loss: 0.4489 - val_acc: 0.8938
Epoch 19/30
- 3s - loss: 0.3160 - acc: 0.9229 - val_loss: 0.4860 - val_acc: 0.8843
Epoch 20/30
- 3s - loss: 0.3489 - acc: 0.9193 - val_loss: 0.5221 - val_acc: 0.8683
Epoch 21/30
- 3s - loss: 0.3036 - acc: 0.9339 - val_loss: 0.5230 - val_acc: 0.8537
Epoch 22/30
- 3s - loss: 0.3286 - acc: 0.9260 - val_loss: 0.4599 - val_acc: 0.8887
Epoch 23/30
- 3s - loss: 0.2815 - acc: 0.9335 - val_loss: 0.4687 - val_acc: 0.8768
Epoch 24/30
- 3s - loss: 0.2894 - acc: 0.9331 - val_loss: 0.4849 - val_acc: 0.8636
Epoch 25/30
- 3s - loss: 0.2874 - acc: 0.9340 - val_loss: 0.4531 - val_acc: 0.8755
Epoch 26/30
- 3s - loss: 0.2595 - acc: 0.9376 - val_loss: 0.4596 - val_acc: 0.8758
Epoch 27/30
- 3s - loss: 0.2937 - acc: 0.9287 - val_loss: 0.4175 - val_acc: 0.9050
Epoch 28/30
- 3s - loss: 0.2621 - acc: 0.9381 - val_loss: 0.4344 - val_acc: 0.8819
Epoch 29/30
- 3s - loss: 0.2722 - acc: 0.9325 - val_loss: 0.4049 - val_acc: 0.8887
Epoch 30/30
- 3s - loss: 0.2669 - acc: 0.9340 - val_loss: 0.3827 - val_acc: 0.9145
Train accuracy 0.9525299238302503 Test accuracy: 0.9144893111638955
-----

```

```

In [10]: from hyperas.utils import eval_hyopt_space
         total_trials = dict()
         total_list = []
         for t, trial in enumerate(trials):
             vals = trial.get('misc').get('vals')
             z = eval_hyopt_space(space, vals)
             total_trials['M'+str(t+1)] = z

```

```

In [11]: best_run

```

```

Out[11]: {'Dense': 1,
          'Dropout': 0.6397045095598795,
          'batch_size': 2,
          'choiceval': 0,
          'filters': 1,
          'filters_1': 1,
          'kernel_size': 2,
          'kernel_size_1': 0,
          'l2': 0.07999281751224634,

```

```

'12_1': 0.0012673510937627475,
'lr': 0.0011215010543928203,
'lr_1': 0.0021517590741381726,
'nb_epoch': 0,
'pool_size': 1}

```

```

In [12]: #best Hyper params from hyperas
eval_hyopt_space(space, best_run)

```

```

Out[12]: {'Dense': 64,
'Dropout': 0.6397045095598795,
'batch_size': 64,
'choiceval': 'adam',
'filters': 32,
'filters_1': 24,
'kernel_size': 7,
'kernel_size_1': 3,
'12': 0.07999281751224634,
'12_1': 0.0012673510937627475,
'lr': 0.0011215010543928203,
'lr_1': 0.0021517590741381726,
'nb_epoch': 25,
'pool_size': 3}

```

```

In [13]: best_model.summary()

```

Layer (type)	Output Shape	Param #
conv1d_119 (Conv1D)	(None, 122, 32)	2048
conv1d_120 (Conv1D)	(None, 120, 24)	2328
dropout_60 (Dropout)	(None, 120, 24)	0
max_pooling1d_60 (MaxPooling)	(None, 40, 24)	0
flatten_60 (Flatten)	(None, 960)	0
dense_119 (Dense)	(None, 64)	61504
dense_120 (Dense)	(None, 6)	390
Total params: 66,270		
Trainable params: 66,270		
Non-trainable params: 0		

```
In [14]: _,acc_val = best_model.evaluate(X_val,Y_val,verbose=0)
         _,acc_train = best_model.evaluate(X_train,Y_train,verbose=0)
         print('Train_accuracy',acc_train,'test_accuracy',acc_val)
```

Train\_accuracy 0.963139281828074 test\_accuracy 0.9229725144214456

```
In [35]: # Confusion Matrix
         print(confusion_matrix_rnn(Y_val, best_model.predict(X_val)))
```

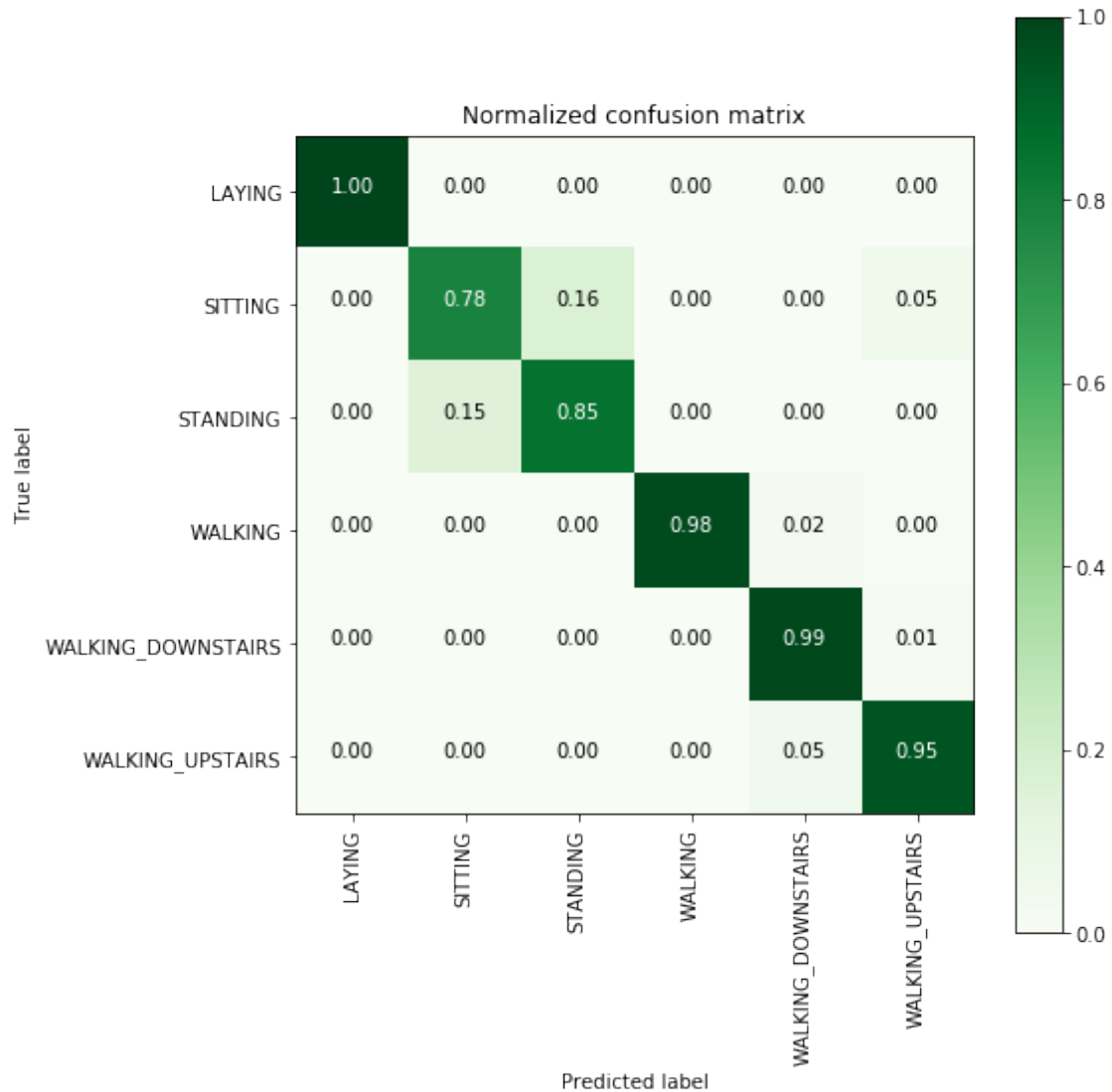
```
[[537  0  0  0  0  0]
 [  0 385 81  0  0 25]
 [  0 80 452  0  0  0]
 [  0  0  0 484 10  2]
 [  0  0  0  0 415  5]
 [  0  1  0  0 23 447]]
```

```
In [44]: import matplotlib.pyplot as plt
         plt.figure(figsize=(8,8))
         cm = confusion_matrix_rnn(Y_val, best_model.predict(X_val))
         plot_confusion_matrix(cm, classes=labels, normalize=True, title='Normalized confusion')
         plt.show()
```

<matplotlib.figure.Figure at 0x14f2465d4da0>

<matplotlib.figure.Figure at 0x14f24226c4a8>

<matplotlib.figure.Figure at 0x14f234cbe860>



We can observe some overfitting in the model. and it is also giving some good results and error is mainly due to static activities. so below model came up wit some different approach to overcome this problem.

### 13.3.1 Divide and Conquer-Based:

In the dataset, Y\_labels are represented as numbers from 1 to 6 as their identifiers.

WALKING as 1

WALKING\_UPSTAIRS as 2

WALKING\_DOWNSTAIRS as 3

SITTING as 4

STANDING as 5

LAYING as 6

- in Data exploration section we observed that we can divide the data into dynamic and static

type so divided walking, waling\_upstairs, walking\_downstairs into category 0 i.e Dynamic, sitting, standing, laying into category 1 i.e. static. - Will use 2 more classifiers seperatly for classifying classes of dynamic and static activities. so that model can learn differnt features for static and dynamic activities

referred below paper

Divide and Conquer-Based 1D CNN Human Activity Recognition Using Test Data Sharpening (<https://www.mdpi.com/1424-8220/18/4/1055/pdf>)

```
In [2]: import os
        os.environ['PYTHONHASHSEED'] = '0'
        import numpy as np
        import tensorflow as tf
        import random as rn
        np.random.seed(0)
        rn.seed(0)
        tf.set_random_seed(0)
        session_conf = tf.ConfigProto(intra_op_parallelism_threads=1,
                                      inter_op_parallelism_threads=1)

        from keras import backend as K

        # The below tf.set_random_seed() will make random number generation
        # in the TensorFlow backend have a well-defined initial state.
        # For further details, see:
        # https://www.tensorflow.org/api_docs/python/tf/set_random_seed

        tf.set_random_seed(0)

        sess = tf.Session(graph=tf.get_default_graph(), config=session_conf)
        K.set_session(sess)

        # Importing libraries
        import pandas as pd
        from matplotlib import pyplot
        from sklearn.preprocessing import StandardScaler
        from keras.models import Sequential
        from keras.layers import Dense
        from keras.layers import Flatten
        from keras.layers import Dropout
        from keras.layers.convolutional import Conv1D
        from keras.layers.convolutional import MaxPooling1D
        from keras.utils import to_categorical
        from keras.models import Sequential
        from keras.layers import LSTM
        from keras.layers.core import Dense, Dropout
```

Using TensorFlow backend.



In [145]: *## Classifying data as 2 class dynamic vs static*

*##data preparation*

```
def data_scaled_2class():
```

```
    """
```

```
    Obtain the dataset from multiple files.
```

```
    Returns: X_train, X_test, y_train, y_test
```

```
    """
```

```
    # Data directory
```

```
    DATADIR = 'UCI_HAR_Dataset'
```

```
    # Raw data signals
```

```
    # Signals are from Accelerometer and Gyroscope
```

```
    # The signals are in x,y,z directions
```

```
    # Sensor signals are filtered to have only body acceleration
```

```
    # excluding the acceleration due to gravity
```

```
    # Triaxial acceleration from the accelerometer is total acceleration
```

```
    SIGNALS = [
```

```
        "body_acc_x",
```

```
        "body_acc_y",
```

```
        "body_acc_z",
```

```
        "body_gyro_x",
```

```
        "body_gyro_y",
```

```
        "body_gyro_z",
```

```
        "total_acc_x",
```

```
        "total_acc_y",
```

```
        "total_acc_z"
```

```
    ]
```

```
    from sklearn.base import BaseEstimator, TransformerMixin
```

```
    class scaling_tseries_data(BaseEstimator, TransformerMixin):
```

```
        from sklearn.preprocessing import StandardScaler
```

```
        def __init__(self):
```

```
            self.scale = None
```

```
        def transform(self, X):
```

```
            temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
```

```
            temp_X1 = self.scale.transform(temp_X1)
```

```
            return temp_X1.reshape(X.shape)
```

```
        def fit(self, X):
```

```
            # remove overlapping
```

```
            remove = int(X.shape[1] / 2)
```

```
            temp_X = X[:, -remove:, :]
```

```
            # flatten data
```

```
            temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape
```

```
            scale = StandardScaler()
```

```
            scale.fit(temp_X)
```

```
            ##saving for further usage
```

```
            ## will use in prediction pipeline
```

```
            pickle.dump(scale, open('Scale_2class.p', 'wb'))
```

```

        self.scale = scale
        return self

# Utility function to read the data from csv file
def _read_csv(filename):
    return pd.read_csv(filename, delim_whitespace=True, header=None)

# Utility function to load the load
def load_signals(subset):
    signals_data = []

    for signal in SIGNALS:
        filename = f'UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.csv'
        signals_data.append( _read_csv(filename).as_matrix())

    # Transpose is used to change the dimensionality of the output,
    # aggregating the signals by combination of sample/timestep.
    # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
    return np.transpose(signals_data, (1, 2, 0))

def load_y(subset):
    """
    The objective that we are trying to predict is a integer, from 1 to 6,
    that represents a human activity. We return a binary representation of
    every sample objective as a 6 bits vector using One Hot Encoding
    (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.h)
    """
    filename = f'UCI_HAR_Dataset/{subset}/y_{subset}.txt'
    y = _read_csv(filename)[0]
    y[y<=3] = 0
    y[y>3] = 1
    return pd.get_dummies(y).as_matrix()

X_train_2c, X_val_2c = load_signals('train'), load_signals('test')
Y_train_2c, Y_val_2c = load_y('train'), load_y('test')
###Scaling data
Scale = scaling_tseries_data()
Scale.fit(X_train_2c)
X_train_2c = Scale.transform(X_train_2c)
X_val_2c = Scale.transform(X_val_2c)
return X_train_2c, Y_train_2c, X_val_2c, Y_val_2c

```

```
In [144]: X_train_2c, Y_train_2c, X_val_2c, Y_val_2c = data_scaled_2class()
```

```
In [68]: print(Y_train_2c.shape)
         print(Y_val_2c.shape)
```

```
(7352, 2)
```

(2947, 2)

## Model for classifying data into Static and Dynamic activities

```
In [72]: K.clear_session()
         np.random.seed(0)
         tf.set_random_seed(0)
         sess = tf.Session(graph=tf.get_default_graph())
         K.set_session(sess)
         model = Sequential()
         model.add(Conv1D(filters=32, kernel_size=3, activation='relu',kernel_initializer='he_
         model.add(Conv1D(filters=32, kernel_size=3, activation='relu',kernel_initializer='he_
         model.add(Dropout(0.6))
         model.add(MaxPooling1D(pool_size=2))
         model.add(Flatten())
         model.add(Dense(50, activation='relu'))
         model.add(Dense(2, activation='softmax'))
         model.summary()
```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 124, 32)	3104
dropout_1 (Dropout)	(None, 124, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 62, 32)	0
flatten_1 (Flatten)	(None, 1984)	0
dense_1 (Dense)	(None, 50)	99250
dense_2 (Dense)	(None, 2)	102
Total params: 103,352		
Trainable params: 103,352		
Non-trainable params: 0		

```
In [73]: import math
         adam = keras.optimizers.Adam(lr=0.001)
```

```
In [74]: model.compile(loss='categorical_crossentropy', optimizer=adam, metrics=['accuracy'])
         model.fit(X_train_2c,Y_train_2c, epochs=20, batch_size=16,validation_data=(X_val_2c, Y_val_2c))
```

Train on 7352 samples, validate on 2947 samples

```
Epoch 1/20
7352/7352 [=====] - 4s 580us/step - loss: 0.0549 - acc: 0.9791 - val_
Epoch 2/20
7352/7352 [=====] - 4s 482us/step - loss: 0.0021 - acc: 0.9995 - val_
Epoch 3/20
7352/7352 [=====] - 4s 484us/step - loss: 7.9422e-04 - acc: 0.9997 - v
Epoch 4/20
7352/7352 [=====] - 4s 483us/step - loss: 0.0029 - acc: 0.9990 - val_
Epoch 5/20
7352/7352 [=====] - 4s 481us/step - loss: 1.3106e-04 - acc: 1.0000 - v
Epoch 6/20
7352/7352 [=====] - 4s 480us/step - loss: 1.7091e-05 - acc: 1.0000 - v
Epoch 7/20
7352/7352 [=====] - 4s 480us/step - loss: 0.0022 - acc: 0.9997 - val_
Epoch 8/20
7352/7352 [=====] - 4s 481us/step - loss: 0.0051 - acc: 0.9989 - val_
Epoch 9/20
7352/7352 [=====] - 4s 480us/step - loss: 3.4291e-05 - acc: 1.0000 - v
Epoch 10/20
7352/7352 [=====] - 4s 478us/step - loss: 2.1046e-04 - acc: 0.9999 - v
Epoch 11/20
7352/7352 [=====] - 4s 482us/step - loss: 3.0157e-05 - acc: 1.0000 - v
Epoch 12/20
7352/7352 [=====] - 4s 482us/step - loss: 5.7799e-06 - acc: 1.0000 - v
Epoch 13/20
7352/7352 [=====] - 4s 481us/step - loss: 1.4363e-06 - acc: 1.0000 - v
Epoch 14/20
7352/7352 [=====] - 4s 480us/step - loss: 1.1018e-06 - acc: 1.0000 - v
Epoch 15/20
7352/7352 [=====] - 4s 483us/step - loss: 7.5717e-07 - acc: 1.0000 - v
Epoch 16/20
7352/7352 [=====] - 4s 480us/step - loss: 4.7786e-07 - acc: 1.0000 - v
Epoch 17/20
7352/7352 [=====] - 4s 480us/step - loss: 1.0220e-06 - acc: 1.0000 - v
Epoch 18/20
7352/7352 [=====] - 4s 480us/step - loss: 1.7438e-06 - acc: 1.0000 - v
Epoch 19/20
7352/7352 [=====] - 4s 487us/step - loss: 6.3406e-07 - acc: 1.0000 - v
Epoch 20/20
7352/7352 [=====] - 4s 480us/step - loss: 5.5710e-07 - acc: 1.0000 - v
```

Out[74]: <keras.callbacks.History at 0x1474816b9358>

```
In [75]: _,acc_val = model.evaluate(X_val_2c,Y_val_2c,verbose=0)
         _,acc_train = model.evaluate(X_train_2c,Y_train_2c,verbose=0)
         print('Train_accuracy',acc_train,'test_accuracy',acc_val)
```

Train\_accuracy 1.0 test\_accuracy 0.9989820156090939

```
In [76]: ##saving model
         model.save('final_model_2class.h5')
```

This model is almost classifying data into dynamic or static correctly with very high accuracy.

### 13.3.2 Classification of Static activities

```
In [149]: ##data preparation
         def data_scaled_static():
             """
             Obtain the dataset from multiple files.
             Returns: X_train, X_test, y_train, y_test
             """

             # Data directory
             DATADIR = 'UCI_HAR_Dataset'
             # Raw data signals
             # Signals are from Accelerometer and Gyroscope
             # The signals are in x,y,z directions
             # Sensor signals are filtered to have only body acceleration
             # excluding the acceleration due to gravity
             # Triaxial acceleration from the accelerometer is total acceleration

             SIGNALS = [
                 "body_acc_x",
                 "body_acc_y",
                 "body_acc_z",
                 "body_gyro_x",
                 "body_gyro_y",
                 "body_gyro_z",
                 "total_acc_x",
                 "total_acc_y",
                 "total_acc_z"
             ]

             from sklearn.base import BaseEstimator, TransformerMixin
             class scaling_tseries_data(BaseEstimator, TransformerMixin):
                 from sklearn.preprocessing import StandardScaler
                 def __init__(self):
                     self.scale = None

                 def transform(self, X):
                     temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
                     temp_X1 = self.scale.transform(temp_X1)
                     return temp_X1.reshape(X.shape)

                 def fit(self, X):
                     # remove overlapping
```

```

        remove = int(X.shape[1] / 2)
        temp_X = X[:, -remove:, :]
        # flatten data
        temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape[0]))
        scale = StandardScaler()
        scale.fit(temp_X)
        #for furter use at prediction pipeline
        pickle.dump(scale,open('Scale_static.p','wb'))
        self.scale = scale
        return self

# Utility function to read the data from csv file
def _read_csv(filename):
    return pd.read_csv(filename, delim_whitespace=True, header=None)

# Utility function to load the load
def load_signals(subset):
    signals_data = []

    for signal in SIGNALS:
        filename = f'UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.csv'
        signals_data.append( _read_csv(filename).as_matrix())

    # Transpose is used to change the dimensionality of the output,
    # aggregating the signals by combination of sample/timestep.
    # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
    return np.transpose(signals_data, (1, 2, 0))

def load_y(subset):
    """
    The objective that we are trying to predict is a integer, from 1 to 6,
    that represents a human activity. We return a binary representation of
    every sample objective as a 6 bits vector using One Hot Encoding
    (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.h)
    """
    filename = f'UCI_HAR_Dataset/{subset}/y_{subset}.txt'
    y = _read_csv(filename)[0]
    y_subset = y>3
    y = y[y_subset]
    return pd.get_dummies(y).as_matrix(),y_subset

Y_train_s,y_train_sub = load_y('train')
Y_val_s,y_test_sub = load_y('test')
X_train_s, X_val_s = load_signals('train'), load_signals('test')
X_train_s = X_train_s[y_train_sub]
X_val_s = X_val_s[y_test_sub]

###Sciling data

```

```

Scale = scaling_tseries_data()
Scale.fit(X_train_s)
X_train_s = Scale.transform(X_train_s)
X_val_s = Scale.transform(X_val_s)

return X_train_s, Y_train_s, X_val_s, Y_val_s

```

```
In [150]: X_train_s, Y_train_s, X_val_s, Y_val_s = data_scaled_static()
```

```
In [7]: print('X Shape of train data',X_train_s.shape, 'Y shape', Y_train_s.shape)
        print('X Shape of val data',X_val_s.shape,'Y shape',Y_val_s.shape)
```

X Shape of train data (4067, 128, 9) Y shape (4067, 3)

X Shape of val data (1560, 128, 9) Y shape (1560, 3)

```
In [8]: import keras
```

## Baseline Model

```
In [24]: np.random.seed(0)
        tf.set_random_seed(0)
        sess = tf.Session(graph=tf.get_default_graph())
        K.set_session(sess)
        model = Sequential()
        model.add(Conv1D(filters=64, kernel_size=7, activation='relu',kernel_initializer='he_
        model.add(Conv1D(filters=32, kernel_size=3, activation='relu',kernel_initializer='he_
        model.add(Dropout(0.6))
        model.add(MaxPooling1D(pool_size=3))
        model.add(Flatten())
        model.add(Dense(30, activation='relu'))
        model.add(Dense(3, activation='softmax'))
        model.summary()
```

Layer (type)	Output Shape	Param #
conv1d_3 (Conv1D)	(None, 122, 64)	4096
conv1d_4 (Conv1D)	(None, 120, 32)	6176
dropout_2 (Dropout)	(None, 120, 32)	0
max_pooling1d_2 (MaxPooling1D)	(None, 40, 32)	0
flatten_2 (Flatten)	(None, 1280)	0
dense_3 (Dense)	(None, 30)	38430

```
dense_4 (Dense)                (None, 3)                93
=====
Total params: 48,795
Trainable params: 48,795
Non-trainable params: 0
-----
```

```
In [25]: import math
         adam = keras.optimizers.Adam(lr=0.004)
         model.compile(loss='categorical_crossentropy', optimizer=adam, metrics=['accuracy'])
         model.fit(X_train_s,Y_train_s, epochs=20, batch_size=32,validation_data=(X_val_s, Y_val_s))
         K.clear_session()
```

Train on 4067 samples, validate on 1560 samples

```
Epoch 1/20
4067/4067 [=====] - 2s 530us/step - loss: 0.4023 - acc: 0.8773 - val_loss: 0.2302 - val_acc: 0.9240
Epoch 2/20
4067/4067 [=====] - 1s 352us/step - loss: 0.2302 - acc: 0.9240 - val_loss: 0.2163 - val_acc: 0.9235
Epoch 3/20
4067/4067 [=====] - 1s 352us/step - loss: 0.2163 - acc: 0.9235 - val_loss: 0.1732 - val_acc: 0.9348
Epoch 4/20
4067/4067 [=====] - 1s 351us/step - loss: 0.1732 - acc: 0.9348 - val_loss: 0.1471 - val_acc: 0.9432
Epoch 5/20
4067/4067 [=====] - 1s 352us/step - loss: 0.1471 - acc: 0.9432 - val_loss: 0.1296 - val_acc: 0.9498
Epoch 6/20
4067/4067 [=====] - 1s 354us/step - loss: 0.1296 - acc: 0.9498 - val_loss: 0.1704 - val_acc: 0.9422
Epoch 7/20
4067/4067 [=====] - 1s 353us/step - loss: 0.1704 - acc: 0.9422 - val_loss: 0.2979 - val_acc: 0.9171
Epoch 8/20
4067/4067 [=====] - 1s 352us/step - loss: 0.2979 - acc: 0.9171 - val_loss: 0.2093 - val_acc: 0.9375
Epoch 9/20
4067/4067 [=====] - 1s 353us/step - loss: 0.2093 - acc: 0.9375 - val_loss: 0.2048 - val_acc: 0.9405
Epoch 10/20
4067/4067 [=====] - 1s 353us/step - loss: 0.2048 - acc: 0.9405 - val_loss: 0.2393 - val_acc: 0.9405
Epoch 11/20
4067/4067 [=====] - 1s 355us/step - loss: 0.2393 - acc: 0.9405 - val_loss: 0.2640 - val_acc: 0.9299
Epoch 12/20
4067/4067 [=====] - 1s 351us/step - loss: 0.2640 - acc: 0.9299 - val_loss: 0.2083 - val_acc: 0.9388
Epoch 13/20
4067/4067 [=====] - 1s 353us/step - loss: 0.2083 - acc: 0.9388 - val_loss: 0.1886 - val_acc: 0.9474
Epoch 14/20
4067/4067 [=====] - 1s 353us/step - loss: 0.1886 - acc: 0.9474 - val_loss: 0.1870 - val_acc: 0.9484
Epoch 15/20
4067/4067 [=====] - 1s 352us/step - loss: 0.1870 - acc: 0.9484 - val_loss: 0.1710 - val_acc: 0.9552
Epoch 16/20
4067/4067 [=====] - 1s 352us/step - loss: 0.1710 - acc: 0.9552 - val_loss: 0.1710 - val_acc: 0.9552
Epoch 17/20
```



```

4067/4067 [=====] - 1s 352us/step - loss: 0.1718 - acc: 0.9506 - val_
Epoch 18/20
4067/4067 [=====] - 1s 352us/step - loss: 0.1699 - acc: 0.9501 - val_
Epoch 19/20
4067/4067 [=====] - 1s 353us/step - loss: 0.1520 - acc: 0.9636 - val_
Epoch 20/20
4067/4067 [=====] - 1s 352us/step - loss: 0.1927 - acc: 0.9592 - val_

```

```

In [40]: def model_cnn(X_train_s, Y_train_s, X_val_s, Y_val_s):
    np.random.seed(0)
    tf.set_random_seed(0)
    sess = tf.Session(graph=tf.get_default_graph())
    K.set_session(sess)
    # Initiliazing the sequential model
    model = Sequential()

    model.add(Conv1D(filters={{choice([28,32,42])}}, kernel_size={{choice([3,5,7])}},
                    kernel_regularizer=l2({{uniform(0,3)}}),input_shape=(128,9)))

    model.add(Conv1D(filters={{choice([16,24,32])}}, kernel_size={{choice([3,5,7])}},
                    activation='relu',kernel_regularizer=l2({{uniform(0,2)}}),kernel_

    model.add(Dropout({{uniform(0.45,0.7)}}))
    model.add(MaxPooling1D(pool_size={{choice([2,3,5])}}))
    model.add(Flatten())
    model.add(Dense({{choice([16,32,64])}}, activation='relu'))
    model.add(Dense(3, activation='softmax'))

    adam = keras.optimizers.Adam(lr={{uniform(0.00065,0.004)}})
    rmsprop = keras.optimizers.RMSprop(lr={{uniform(0.00065,0.004)}})

    choiceval = {{choice(['adam', 'rmsprop'])}}

    if choiceval == 'adam':
        optim = adam
    else:
        optim = rmsprop

    print(model.summary())

    model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=opt

    result = model.fit(X_train_s, Y_train_s,
                    batch_size={{choice([16,32,64])}},
                    nb_epoch={{choice([25,30,35])}},
                    verbose=2,
                    validation_data=(X_val_s, Y_val_s))

```

```

        score, acc = model.evaluate(X_val_s, Y_val_s, verbose=0)
        score1, acc1 = model.evaluate(X_train_s, Y_train_s, verbose=0)
        print('Train accuracy',acc1,'Test accuracy:', acc)
        print('-----')
        K.clear_session()
        return {'loss': -acc, 'status': STATUS_OK, 'train_acc':acc1}

In [9]: X_train, Y_train, X_val, Y_val = data_scaled_static()
        trials = Trials()
        best_run, best_model, space = optim.minimize(model=model_cnn,
                                                    data=data_scaled_static,
                                                    algo=tpe.suggest,
                                                    max_evals=120,rseed = 0,
                                                    trials=trials,notebook_name = 'Human Activity De
                                                    return_space = True)

>>> Imports:
#coding=utf-8

try:
    import os
except:
    pass

try:
    import numpy as np
except:
    pass

try:
    import tensorflow as tf
except:
    pass

try:
    import random as rn
except:
    pass

try:
    from keras import backend as K
except:
    pass

try:
    import pickle
except:
    pass

```

```

try:
    import keras
except:
    pass

try:
    from keras.models import Sequential
except:
    pass

try:
    from keras.layers import LSTM
except:
    pass

try:
    from keras.layers.core import Dense, Dropout
except:
    pass

try:
    from hyperopt import Trials, STATUS_OK, tpe
except:
    pass

try:
    from hyperas import optim
except:
    pass

try:
    from hyperas.distributions import choice, uniform
except:
    pass

try:
    import pandas as pd
except:
    pass

try:
    from matplotlib import pyplot
except:
    pass

try:
    from sklearn.preprocessing import StandardScaler

```

```

except:
    pass

try:
    from keras.models import Sequential
except:
    pass

try:
    from keras.layers import Flatten
except:
    pass

try:
    from keras.regularizers import l2
except:
    pass

try:
    from keras.layers.convolutional import Conv1D
except:
    pass

try:
    from keras.layers.convolutional import MaxPooling1D
except:
    pass

try:
    from keras.utils import to_categorical
except:
    pass

try:
    from sklearn.base import BaseEstimator, TransformerMixin
except:
    pass

try:
    from sklearn.preprocessing import StandardScaler
except:
    pass

>>> Hyperas search space:

def get_space():
    return {
        'filters': hp.choice('filters', [28,32,42]),

```

```

'kernel_size': hp.choice('kernel_size', [3,5,7]),
'l2': hp.uniform('l2', 0,3),
'filters_1': hp.choice('filters_1', [16,24,32]),
'kernel_size_1': hp.choice('kernel_size_1', [3,5,7]),
'l2_1': hp.uniform('l2_1', 0,2),
'Dropout': hp.uniform('Dropout', 0.45,0.7),
'pool_size': hp.choice('pool_size', [2,3,5]),
'Dense': hp.choice('Dense', [16,32,64]),
'lr': hp.uniform('lr', 0.00065,0.004),
'lr_1': hp.uniform('lr_1', 0.00065,0.004),
'choiceval': hp.choice('choiceval', ['adam', 'rmsprop']),
'Dense_1': hp.choice('Dense_1', [16,32,64]),
'nb_epoch': hp.choice('nb_epoch', [25,30,35]),
}

```

>>> Data

```

1:
2: """
3: Obtain the dataset from multiple files.
4: Returns: X_train, X_test, y_train, y_test
5: """
6: # Data directory
7: DATADIR = 'UCI_HAR_Dataset'
8: # Raw data signals
9: # Signals are from Accelerometer and Gyroscope
10: # The signals are in x,y,z directions
11: # Sensor signals are filtered to have only body acceleration
12: # excluding the acceleration due to gravity
13: # Triaxial acceleration from the accelerometer is total acceleration
14: SIGNALS = [
15:     "body_acc_x",
16:     "body_acc_y",
17:     "body_acc_z",
18:     "body_gyro_x",
19:     "body_gyro_y",
20:     "body_gyro_z",
21:     "total_acc_x",
22:     "total_acc_y",
23:     "total_acc_z"
24: ]
25: from sklearn.base import BaseEstimator, TransformerMixin
26: class scaling_tseries_data(BaseEstimator, TransformerMixin):
27:     from sklearn.preprocessing import StandardScaler
28:     def __init__(self):
29:         self.scale = None
30:
31:     def transform(self, X):
32:         temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))

```

```

33:         temp_X1 = self.scale.transform(temp_X1)
34:         return temp_X1.reshape(X.shape)
35:
36:     def fit(self, X):
37:         # remove overlapping
38:         remove = int(X.shape[1] / 2)
39:         temp_X = X[:, -remove:, :]
40:         # flatten data
41:         temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape[2]))
42:         scale = StandardScaler()
43:         scale.fit(temp_X)
44:         self.scale = scale
45:         return self
46:
47: # Utility function to read the data from csv file
48: def _read_csv(filename):
49:     return pd.read_csv(filename, delim_whitespace=True, header=None)
50:
51: # Utility function to load the load
52: def load_signals(subset):
53:     signals_data = []
54:
55:     for signal in SIGNALS:
56:         filename = f'HAR/UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.txt'
57:         signals_data.append(_read_csv(filename).as_matrix())
58:
59:     # Transpose is used to change the dimensionality of the output,
60:     # aggregating the signals by combination of sample/timestep.
61:     # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
62:     return np.transpose(signals_data, (1, 2, 0))
63:
64: def load_y(subset):
65:     """
66:     The objective that we are trying to predict is a integer, from 1 to 6,
67:     that represents a human activity. We return a binary representation of
68:     every sample objective as a 6 bits vector using One Hot Encoding
69:     (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.html)
70:     """
71:     filename = f'HAR/UCI_HAR_Dataset/{subset}/y_{subset}.txt'
72:     y = _read_csv(filename)[0]
73:     y_subset = y>3
74:     y = y[y_subset]
75:     return pd.get_dummies(y).as_matrix(), y_subset
76:
77: Y_train_s, y_train_sub = load_y('train')
78: Y_val_s, y_test_sub = load_y('test')
79: X_train_s, X_val_s = load_signals('train'), load_signals('test')
80: X_train_s = X_train_s[y_train_sub]

```

```

81: X_val_s = X_val_s[y_test_sub]
82:
83: ###Sciling data
84: Scale = scaling_tseries_data()
85: Scale.fit(X_train_s)
86: X_train_s = Scale.transform(X_train_s)
87: X_val_s = Scale.transform(X_val_s)
88:
89:
90:
91:
>>> Resulting replaced keras model:

1: def keras_fmin_fnct(space):
2:
3:     np.random.seed(0)
4:     tf.set_random_seed(0)
5:     sess = tf.Session(graph=tf.get_default_graph())
6:     K.set_session(sess)
7:     # Initiliazing the sequential model
8:     model = Sequential()
9:
10:    model.add(Conv1D(filters=space['filters'], kernel_size=space['kernel_size'],activation='relu',
11:                    kernel_regularizer=l2(space['l2']),input_shape=(128,9)))
12:
13:    model.add(Conv1D(filters=space['filters_1'], kernel_size=space['kernel_size_1'],
14:                    activation='relu',kernel_regularizer=l2(space['l2_1']),kernel_initializer='glorot_uniform'))
15:    model.add(Dropout(space['Dropout']))
16:    model.add(MaxPooling1D(pool_size=space['pool_size']))
17:    model.add(Flatten())
18:    model.add(Dense(space['Dense'], activation='relu'))
19:    model.add(Dense(3, activation='softmax'))
20:
21:    adam = keras.optimizers.Adam(lr=space['lr'])
22:    rmsprop = keras.optimizers.RMSprop(lr=space['lr_1'])
23:
24:    choiceval = space['choiceval']
25:
26:    if choiceval == 'adam':
27:        optim = adam
28:    else:
29:        optim = rmsprop
30:
31:    print(model.summary())
32:
33:    model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=optim)
34:
35:    result = model.fit(X_train_s, Y_train_s,

```

```

36:         batch_size=space['Dense_1'],
37:         nb_epoch=space['nb_epoch'],
38:         verbose=2,
39:         validation_data=(X_val_s, Y_val_s))
40:
41:     score, acc = model.evaluate(X_val_s, Y_val_s, verbose=0)
42:     score1, acc1 = model.evaluate(X_train_s, Y_train_s, verbose=0)
43:     print('Train accuracy',acc1,'Test accuracy:', acc)
44:     print('-----')
45:     K.clear_session()
46:     return {'loss': -acc, 'status': STATUS_OK,'train_acc':acc1}
47:

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 120, 32)	5152
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 32)	0
flatten_1 (Flatten)	(None, 1920)	0
dense_1 (Dense)	(None, 64)	122944
dense_2 (Dense)	(None, 3)	195

Total params: 129,763

Trainable params: 129,763

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35

- 3s - loss: 42.9670 - acc: 0.8372 - val\_loss: 4.9234 - val\_acc: 0.7782

Epoch 2/35

- 3s - loss: 1.3776 - acc: 0.8694 - val\_loss: 0.5038 - val\_acc: 0.8436

Epoch 3/35

- 3s - loss: 0.3892 - acc: 0.8783 - val\_loss: 0.5130 - val\_acc: 0.8173

Epoch 4/35

- 3s - loss: 0.3540 - acc: 0.8825 - val\_loss: 0.4280 - val\_acc: 0.8526

Epoch 5/35

- 3s - loss: 0.3478 - acc: 0.8827 - val\_loss: 0.3993 - val\_acc: 0.8545

Epoch 6/35

- 3s - loss: 0.3120 - acc: 0.8906 - val\_loss: 0.4376 - val\_acc: 0.8141

Epoch 7/35



- 3s - loss: 0.3080 - acc: 0.8889 - val\_loss: 0.3521 - val\_acc: 0.8756  
 Epoch 8/35  
 - 3s - loss: 0.3173 - acc: 0.8874 - val\_loss: 0.4250 - val\_acc: 0.8340  
 Epoch 9/35  
 - 3s - loss: 0.2989 - acc: 0.8989 - val\_loss: 0.3376 - val\_acc: 0.8782  
 Epoch 10/35  
 - 3s - loss: 0.3032 - acc: 0.8987 - val\_loss: 0.3549 - val\_acc: 0.8756  
 Epoch 11/35  
 - 2s - loss: 0.3064 - acc: 0.8886 - val\_loss: 0.6224 - val\_acc: 0.6756  
 Epoch 12/35  
 - 3s - loss: 0.3078 - acc: 0.8894 - val\_loss: 0.4546 - val\_acc: 0.8135  
 Epoch 13/35  
 - 3s - loss: 0.3044 - acc: 0.8925 - val\_loss: 0.4411 - val\_acc: 0.8154  
 Epoch 14/35  
 - 2s - loss: 0.3060 - acc: 0.8940 - val\_loss: 0.5506 - val\_acc: 0.7077  
 Epoch 15/35  
 - 2s - loss: 0.3053 - acc: 0.8886 - val\_loss: 0.3330 - val\_acc: 0.8763  
 Epoch 16/35  
 - 3s - loss: 0.3068 - acc: 0.8945 - val\_loss: 0.3525 - val\_acc: 0.8731  
 Epoch 17/35  
 - 2s - loss: 0.3072 - acc: 0.8916 - val\_loss: 0.3374 - val\_acc: 0.8731  
 Epoch 18/35  
 - 3s - loss: 0.3192 - acc: 0.8911 - val\_loss: 0.4121 - val\_acc: 0.8128  
 Epoch 19/35  
 - 2s - loss: 0.3016 - acc: 0.8886 - val\_loss: 0.4873 - val\_acc: 0.8513  
 Epoch 20/35  
 - 3s - loss: 0.2928 - acc: 0.8977 - val\_loss: 0.4111 - val\_acc: 0.8590  
 Epoch 21/35  
 - 3s - loss: 0.2822 - acc: 0.8953 - val\_loss: 0.4154 - val\_acc: 0.8538  
 Epoch 22/35  
 - 3s - loss: 0.2985 - acc: 0.8930 - val\_loss: 0.4039 - val\_acc: 0.8090  
 Epoch 23/35  
 - 2s - loss: 0.2939 - acc: 0.8925 - val\_loss: 0.3331 - val\_acc: 0.8756  
 Epoch 24/35  
 - 3s - loss: 0.3030 - acc: 0.8923 - val\_loss: 0.3315 - val\_acc: 0.8750  
 Epoch 25/35  
 - 3s - loss: 0.2921 - acc: 0.8916 - val\_loss: 0.3216 - val\_acc: 0.8750  
 Epoch 26/35  
 - 3s - loss: 0.3054 - acc: 0.8948 - val\_loss: 0.3465 - val\_acc: 0.8776  
 Epoch 27/35  
 - 3s - loss: 0.2949 - acc: 0.8970 - val\_loss: 0.4477 - val\_acc: 0.8474  
 Epoch 28/35  
 - 3s - loss: 0.2960 - acc: 0.8948 - val\_loss: 0.3987 - val\_acc: 0.8558  
 Epoch 29/35  
 - 3s - loss: 0.3110 - acc: 0.8945 - val\_loss: 0.3383 - val\_acc: 0.8750  
 Epoch 30/35  
 - 3s - loss: 0.2854 - acc: 0.8972 - val\_loss: 0.3260 - val\_acc: 0.8744  
 Epoch 31/35

```

- 2s - loss: 0.2999 - acc: 0.8930 - val_loss: 0.4587 - val_acc: 0.8538
Epoch 32/35
- 3s - loss: 0.2874 - acc: 0.8982 - val_loss: 0.3296 - val_acc: 0.8750
Epoch 33/35
- 2s - loss: 0.2900 - acc: 0.8945 - val_loss: 0.4240 - val_acc: 0.7878
Epoch 34/35
- 3s - loss: 0.3173 - acc: 0.8886 - val_loss: 0.3402 - val_acc: 0.8744
Epoch 35/35
- 3s - loss: 0.2850 - acc: 0.8965 - val_loss: 0.4223 - val_acc: 0.8494
Train accuracy 0.8623063683304647 Test accuracy: 0.8493589743589743

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 24)	2040
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

Total params: 65,531
Trainable params: 65,531
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
- 2s - loss: 107.7755 - acc: 0.8156 - val_loss: 27.1620 - val_acc: 0.8718
Epoch 2/25
- 1s - loss: 9.8363 - acc: 0.8943 - val_loss: 2.0358 - val_acc: 0.8731
Epoch 3/25
- 1s - loss: 0.8329 - acc: 0.8911 - val_loss: 0.5357 - val_acc: 0.8519
Epoch 4/25
- 1s - loss: 0.4220 - acc: 0.8753 - val_loss: 0.4997 - val_acc: 0.8321
Epoch 5/25
- 1s - loss: 0.3914 - acc: 0.8783 - val_loss: 0.4897 - val_acc: 0.8526
Epoch 6/25
- 1s - loss: 0.3726 - acc: 0.8894 - val_loss: 0.5682 - val_acc: 0.8506
Epoch 7/25
- 1s - loss: 0.3854 - acc: 0.8771 - val_loss: 0.5066 - val_acc: 0.8538

```

```

Epoch 8/25
- 1s - loss: 0.3577 - acc: 0.8891 - val_loss: 0.4740 - val_acc: 0.8513
Epoch 9/25
- 1s - loss: 0.3472 - acc: 0.8891 - val_loss: 0.4676 - val_acc: 0.8609
Epoch 10/25
- 1s - loss: 0.3437 - acc: 0.8901 - val_loss: 0.4649 - val_acc: 0.8397
Epoch 11/25
- 1s - loss: 0.3913 - acc: 0.8817 - val_loss: 0.4772 - val_acc: 0.8692
Epoch 12/25
- 1s - loss: 0.3470 - acc: 0.8866 - val_loss: 0.4665 - val_acc: 0.8359
Epoch 13/25
- 1s - loss: 0.3419 - acc: 0.8953 - val_loss: 0.4225 - val_acc: 0.8545
Epoch 14/25
- 1s - loss: 0.3535 - acc: 0.8812 - val_loss: 0.5233 - val_acc: 0.8346
Epoch 15/25
- 1s - loss: 0.3765 - acc: 0.8832 - val_loss: 0.4568 - val_acc: 0.8583
Epoch 16/25
- 1s - loss: 0.3415 - acc: 0.8950 - val_loss: 0.4650 - val_acc: 0.8385
Epoch 17/25
- 1s - loss: 0.3771 - acc: 0.8800 - val_loss: 0.4210 - val_acc: 0.8641
Epoch 18/25
- 1s - loss: 0.3484 - acc: 0.8916 - val_loss: 0.4836 - val_acc: 0.8519
Epoch 19/25
- 1s - loss: 0.3492 - acc: 0.8852 - val_loss: 0.4335 - val_acc: 0.8500
Epoch 20/25
- 1s - loss: 0.3388 - acc: 0.8879 - val_loss: 0.4112 - val_acc: 0.8724
Epoch 21/25
- 1s - loss: 0.3380 - acc: 0.8901 - val_loss: 0.4494 - val_acc: 0.8224
Epoch 22/25
- 1s - loss: 0.3294 - acc: 0.8923 - val_loss: 0.4383 - val_acc: 0.8699
Epoch 23/25
- 1s - loss: 0.3349 - acc: 0.8925 - val_loss: 0.4344 - val_acc: 0.8603
Epoch 24/25
- 1s - loss: 0.3206 - acc: 0.8921 - val_loss: 0.4220 - val_acc: 0.8718
Epoch 25/25
- 1s - loss: 0.3043 - acc: 0.8960 - val_loss: 0.4598 - val_acc: 0.8468
Train accuracy 0.8782886648635357 Test accuracy: 0.8467948717948718

```

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 126, 32)	896
<hr/>		
conv1d_2 (Conv1D)	(None, 122, 16)	2576
<hr/>		
dropout_1 (Dropout)	(None, 122, 16)	0
<hr/>		
max_pooling1d_1 (MaxPooling1	(None, 40, 16)	0

flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 32)	20512
dense_2 (Dense)	(None, 3)	99

=====  
Total params: 24,083

Trainable params: 24,083

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35

- 2s - loss: 25.2528 - acc: 0.8618 - val\_loss: 13.1982 - val\_acc: 0.8904

Epoch 2/35

- 1s - loss: 7.7455 - acc: 0.9056 - val\_loss: 4.0894 - val\_acc: 0.8814

Epoch 3/35

- 1s - loss: 2.3235 - acc: 0.9095 - val\_loss: 1.3512 - val\_acc: 0.8744

Epoch 4/35

- 1s - loss: 0.7613 - acc: 0.9164 - val\_loss: 0.5820 - val\_acc: 0.8891

Epoch 5/35

- 1s - loss: 0.3998 - acc: 0.9026 - val\_loss: 0.4254 - val\_acc: 0.8891

Epoch 6/35

- 1s - loss: 0.2983 - acc: 0.9110 - val\_loss: 0.5666 - val\_acc: 0.8205

Epoch 7/35

- 1s - loss: 0.3196 - acc: 0.9002 - val\_loss: 0.3998 - val\_acc: 0.8750

Epoch 8/35

- 1s - loss: 0.2803 - acc: 0.9098 - val\_loss: 0.3911 - val\_acc: 0.8635

Epoch 9/35

- 1s - loss: 0.2686 - acc: 0.9196 - val\_loss: 0.3725 - val\_acc: 0.8776

Epoch 10/35

- 1s - loss: 0.2638 - acc: 0.9157 - val\_loss: 0.3477 - val\_acc: 0.9045

Epoch 11/35

- 1s - loss: 0.2896 - acc: 0.9083 - val\_loss: 0.3604 - val\_acc: 0.8878

Epoch 12/35

- 1s - loss: 0.2636 - acc: 0.9132 - val\_loss: 0.3318 - val\_acc: 0.9045

Epoch 13/35

- 1s - loss: 0.2411 - acc: 0.9223 - val\_loss: 0.3369 - val\_acc: 0.8769

Epoch 14/35

- 1s - loss: 0.2641 - acc: 0.9144 - val\_loss: 0.3250 - val\_acc: 0.8962

Epoch 15/35

- 1s - loss: 0.2551 - acc: 0.9206 - val\_loss: 0.3202 - val\_acc: 0.8923

Epoch 16/35

- 1s - loss: 0.2431 - acc: 0.9169 - val\_loss: 0.3543 - val\_acc: 0.8667

Epoch 17/35

- 1s - loss: 0.2763 - acc: 0.9088 - val\_loss: 0.3336 - val\_acc: 0.8795

Epoch 18/35

```

- 1s - loss: 0.2791 - acc: 0.9093 - val_loss: 0.3168 - val_acc: 0.8942
Epoch 19/35
- 1s - loss: 0.2573 - acc: 0.9171 - val_loss: 0.3173 - val_acc: 0.9064
Epoch 20/35
- 1s - loss: 0.2531 - acc: 0.9203 - val_loss: 0.3584 - val_acc: 0.8750
Epoch 21/35
- 1s - loss: 0.2530 - acc: 0.9223 - val_loss: 0.3800 - val_acc: 0.8538
Epoch 22/35
- 1s - loss: 0.2505 - acc: 0.9154 - val_loss: 0.3242 - val_acc: 0.8923
Epoch 23/35
- 1s - loss: 0.2536 - acc: 0.9191 - val_loss: 0.3269 - val_acc: 0.8763
Epoch 24/35
- 1s - loss: 0.2311 - acc: 0.9262 - val_loss: 0.2929 - val_acc: 0.9199
Epoch 25/35
- 1s - loss: 0.2499 - acc: 0.9174 - val_loss: 0.3113 - val_acc: 0.8917
Epoch 26/35
- 1s - loss: 0.2573 - acc: 0.9171 - val_loss: 0.3467 - val_acc: 0.8923
Epoch 27/35
- 1s - loss: 0.2287 - acc: 0.9282 - val_loss: 0.3835 - val_acc: 0.8500
Epoch 28/35
- 1s - loss: 0.2560 - acc: 0.9142 - val_loss: 0.3170 - val_acc: 0.9103
Epoch 29/35
- 1s - loss: 0.2708 - acc: 0.9169 - val_loss: 0.3516 - val_acc: 0.8974
Epoch 30/35
- 1s - loss: 0.2454 - acc: 0.9225 - val_loss: 0.2972 - val_acc: 0.9096
Epoch 31/35
- 1s - loss: 0.2307 - acc: 0.9265 - val_loss: 0.3133 - val_acc: 0.9051
Epoch 32/35
- 1s - loss: 0.2350 - acc: 0.9240 - val_loss: 0.2859 - val_acc: 0.8994
Epoch 33/35
- 1s - loss: 0.2247 - acc: 0.9319 - val_loss: 0.3358 - val_acc: 0.8718
Epoch 34/35
- 1s - loss: 0.2702 - acc: 0.9093 - val_loss: 0.3891 - val_acc: 0.8545
Epoch 35/35
- 1s - loss: 0.2614 - acc: 0.9196 - val_loss: 0.3144 - val_acc: 0.8917
Train accuracy 0.9358249323825916 Test accuracy: 0.8916666666666667

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_2 (Conv1D)	(None, 122, 24)	2328
-----		
dropout_1 (Dropout)	(None, 122, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
-----		

flatten_1 (Flatten)	(None, 1464)	0
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dense_1 (Dense)	(None, 64)	93760
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dense_2 (Dense)	(None, 3)	195
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Total params: 97,755  
 Trainable params: 97,755  
 Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 48.6761 - acc: 0.8208 - val\_loss: 36.4390 - val\_acc: 0.8769

Epoch 2/30

- 1s - loss: 27.6787 - acc: 0.9056 - val\_loss: 19.9078 - val\_acc: 0.8609

Epoch 3/30

- 1s - loss: 14.3425 - acc: 0.9130 - val\_loss: 9.7273 - val\_acc: 0.8538

Epoch 4/30

- 1s - loss: 6.6277 - acc: 0.9208 - val\_loss: 4.2976 - val\_acc: 0.8590

Epoch 5/30

- 1s - loss: 2.7216 - acc: 0.9107 - val\_loss: 1.6937 - val\_acc: 0.8737

Epoch 6/30

- 1s - loss: 1.0326 - acc: 0.9115 - val\_loss: 0.7342 - val\_acc: 0.8692

Epoch 7/30

- 1s - loss: 0.4824 - acc: 0.9088 - val\_loss: 0.5077 - val\_acc: 0.8558

Epoch 8/30

- 1s - loss: 0.3487 - acc: 0.9122 - val\_loss: 0.4903 - val\_acc: 0.8301

Epoch 9/30

- 1s - loss: 0.3156 - acc: 0.9127 - val\_loss: 0.4162 - val\_acc: 0.8705

Epoch 10/30

- 1s - loss: 0.2960 - acc: 0.9073 - val\_loss: 0.3542 - val\_acc: 0.8897

Epoch 11/30

- 1s - loss: 0.2776 - acc: 0.9088 - val\_loss: 0.3476 - val\_acc: 0.8635

Epoch 12/30

- 1s - loss: 0.2708 - acc: 0.9125 - val\_loss: 0.3557 - val\_acc: 0.8660

Epoch 13/30

- 1s - loss: 0.2656 - acc: 0.9093 - val\_loss: 0.3381 - val\_acc: 0.8788

Epoch 14/30

- 1s - loss: 0.2538 - acc: 0.9171 - val\_loss: 0.4070 - val\_acc: 0.8583

Epoch 15/30

- 1s - loss: 0.2552 - acc: 0.9154 - val\_loss: 0.4458 - val\_acc: 0.8455

Epoch 16/30

- 1s - loss: 0.2529 - acc: 0.9122 - val\_loss: 0.3219 - val\_acc: 0.8872

Epoch 17/30

- 1s - loss: 0.2471 - acc: 0.9181 - val\_loss: 0.3488 - val\_acc: 0.8692

Epoch 18/30

- 1s - loss: 0.2490 - acc: 0.9147 - val\_loss: 0.3467 - val\_acc: 0.8679

```

Epoch 19/30
  - 1s - loss: 0.2426 - acc: 0.9157 - val_loss: 0.3126 - val_acc: 0.8833
Epoch 20/30
  - 1s - loss: 0.2403 - acc: 0.9196 - val_loss: 0.3161 - val_acc: 0.8827
Epoch 21/30
  - 1s - loss: 0.2355 - acc: 0.9208 - val_loss: 0.3398 - val_acc: 0.8660
Epoch 22/30
  - 1s - loss: 0.2326 - acc: 0.9186 - val_loss: 0.3187 - val_acc: 0.8853
Epoch 23/30
  - 1s - loss: 0.2339 - acc: 0.9157 - val_loss: 0.2852 - val_acc: 0.9058
Epoch 24/30
  - 1s - loss: 0.2328 - acc: 0.9201 - val_loss: 0.2829 - val_acc: 0.9051
Epoch 25/30
  - 1s - loss: 0.2294 - acc: 0.9211 - val_loss: 0.2957 - val_acc: 0.8910
Epoch 26/30
  - 1s - loss: 0.2294 - acc: 0.9201 - val_loss: 0.2893 - val_acc: 0.8917
Epoch 27/30
  - 1s - loss: 0.2217 - acc: 0.9240 - val_loss: 0.2877 - val_acc: 0.8878
Epoch 28/30
  - 1s - loss: 0.2242 - acc: 0.9253 - val_loss: 0.3036 - val_acc: 0.9013
Epoch 29/30
  - 1s - loss: 0.2226 - acc: 0.9297 - val_loss: 0.2802 - val_acc: 0.9103
Epoch 30/30
  - 1s - loss: 0.2286 - acc: 0.9203 - val_loss: 0.2794 - val_acc: 0.9141
Train accuracy 0.9250061470371281 Test accuracy: 0.9141025641025641

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 124, 42)          1932
-----
conv1d_2 (Conv1D)            (None, 118, 16)          4720
-----
dropout_1 (Dropout)          (None, 118, 16)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 39, 16)          0
-----
flatten_1 (Flatten)          (None, 624)              0
-----
dense_1 (Dense)              (None, 32)               20000
-----
dense_2 (Dense)              (None, 3)                99
=====
Total params: 26,751
Trainable params: 26,751
Non-trainable params: 0

```

```

-----
None

```

Train on 4067 samples, validate on 1560 samples

Epoch 1/30  
- 2s - loss: 17.6417 - acc: 0.8552 - val\_loss: 0.5933 - val\_acc: 0.8391  
Epoch 2/30  
- 2s - loss: 0.3888 - acc: 0.8810 - val\_loss: 0.4008 - val\_acc: 0.8622  
Epoch 3/30  
- 2s - loss: 0.3217 - acc: 0.8871 - val\_loss: 0.4081 - val\_acc: 0.8372  
Epoch 4/30  
- 2s - loss: 0.3013 - acc: 0.8950 - val\_loss: 0.3550 - val\_acc: 0.8699  
Epoch 5/30  
- 2s - loss: 0.2945 - acc: 0.8957 - val\_loss: 0.3787 - val\_acc: 0.8590  
Epoch 6/30  
- 2s - loss: 0.2898 - acc: 0.8923 - val\_loss: 0.3767 - val\_acc: 0.8500  
Epoch 7/30  
- 2s - loss: 0.2779 - acc: 0.8960 - val\_loss: 0.3403 - val\_acc: 0.8699  
Epoch 8/30  
- 2s - loss: 0.2820 - acc: 0.8933 - val\_loss: 0.4185 - val\_acc: 0.8506  
Epoch 9/30  
- 2s - loss: 0.2794 - acc: 0.8962 - val\_loss: 0.3474 - val\_acc: 0.8782  
Epoch 10/30  
- 2s - loss: 0.2821 - acc: 0.8970 - val\_loss: 0.3557 - val\_acc: 0.8731  
Epoch 11/30  
- 2s - loss: 0.2805 - acc: 0.8987 - val\_loss: 0.4081 - val\_acc: 0.8186  
Epoch 12/30  
- 2s - loss: 0.2887 - acc: 0.8911 - val\_loss: 0.3503 - val\_acc: 0.8667  
Epoch 13/30  
- 2s - loss: 0.2782 - acc: 0.8985 - val\_loss: 0.3569 - val\_acc: 0.8622  
Epoch 14/30  
- 2s - loss: 0.2811 - acc: 0.8980 - val\_loss: 0.3981 - val\_acc: 0.8481  
Epoch 15/30  
- 2s - loss: 0.2918 - acc: 0.9002 - val\_loss: 0.3573 - val\_acc: 0.8776  
Epoch 16/30  
- 2s - loss: 0.2798 - acc: 0.9051 - val\_loss: 0.3547 - val\_acc: 0.8731  
Epoch 17/30  
- 2s - loss: 0.2874 - acc: 0.8997 - val\_loss: 0.3736 - val\_acc: 0.8679  
Epoch 18/30  
- 2s - loss: 0.2732 - acc: 0.9036 - val\_loss: 0.3300 - val\_acc: 0.8859  
Epoch 19/30  
- 2s - loss: 0.2780 - acc: 0.9016 - val\_loss: 0.3151 - val\_acc: 0.8897  
Epoch 20/30  
- 2s - loss: 0.2679 - acc: 0.9041 - val\_loss: 0.4124 - val\_acc: 0.8744  
Epoch 21/30  
- 2s - loss: 0.2640 - acc: 0.9048 - val\_loss: 0.3168 - val\_acc: 0.8782  
Epoch 22/30  
- 2s - loss: 0.2778 - acc: 0.8987 - val\_loss: 0.4950 - val\_acc: 0.7391  
Epoch 23/30  
- 2s - loss: 0.2816 - acc: 0.8992 - val\_loss: 0.4877 - val\_acc: 0.8654  
Epoch 24/30



```

- 2s - loss: 0.2774 - acc: 0.9036 - val_loss: 0.4370 - val_acc: 0.8692
Epoch 25/30
- 2s - loss: 0.2853 - acc: 0.9019 - val_loss: 0.3551 - val_acc: 0.8821
Epoch 26/30
- 2s - loss: 0.2749 - acc: 0.9071 - val_loss: 0.3258 - val_acc: 0.8846
Epoch 27/30
- 2s - loss: 0.2759 - acc: 0.9075 - val_loss: 0.3863 - val_acc: 0.8699
Epoch 28/30
- 2s - loss: 0.2863 - acc: 0.9078 - val_loss: 0.4269 - val_acc: 0.8609
Epoch 29/30
- 2s - loss: 0.2785 - acc: 0.9061 - val_loss: 0.4088 - val_acc: 0.8699
Epoch 30/30
- 2s - loss: 0.2684 - acc: 0.9115 - val_loss: 0.2964 - val_acc: 0.9032
Train accuracy 0.9149250061470371 Test accuracy: 0.9032051282051282
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 118, 24)	7080
dropout_1 (Dropout)	(None, 118, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 39, 24)	0
flatten_1 (Flatten)	(None, 936)	0
dense_1 (Dense)	(None, 32)	29984
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 39,095
Trainable params: 39,095
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
- 3s - loss: 42.3929 - acc: 0.8367 - val_loss: 0.5708 - val_acc: 0.7955
Epoch 2/35
- 2s - loss: 0.4337 - acc: 0.8621 - val_loss: 0.4548 - val_acc: 0.8397
Epoch 3/35
- 2s - loss: 0.3726 - acc: 0.8758 - val_loss: 0.5142 - val_acc: 0.8019
Epoch 4/35
- 2s - loss: 0.3619 - acc: 0.8803 - val_loss: 0.3876 - val_acc: 0.8673
Epoch 5/35
- 2s - loss: 0.3459 - acc: 0.8844 - val_loss: 0.3709 - val_acc: 0.8635

```

Epoch 6/35  
- 2s - loss: 0.3610 - acc: 0.8822 - val\_loss: 0.4755 - val\_acc: 0.8122

Epoch 7/35  
- 2s - loss: 0.3397 - acc: 0.8817 - val\_loss: 0.3920 - val\_acc: 0.8487

Epoch 8/35  
- 2s - loss: 0.3407 - acc: 0.8830 - val\_loss: 0.4564 - val\_acc: 0.8256

Epoch 9/35  
- 2s - loss: 0.3428 - acc: 0.8859 - val\_loss: 0.4021 - val\_acc: 0.8545

Epoch 10/35  
- 2s - loss: 0.3523 - acc: 0.8773 - val\_loss: 0.4094 - val\_acc: 0.8724

Epoch 11/35  
- 2s - loss: 0.3453 - acc: 0.8874 - val\_loss: 0.5456 - val\_acc: 0.6987

Epoch 12/35  
- 2s - loss: 0.3416 - acc: 0.8805 - val\_loss: 0.4425 - val\_acc: 0.8321

Epoch 13/35  
- 2s - loss: 0.3460 - acc: 0.8790 - val\_loss: 0.5230 - val\_acc: 0.8263

Epoch 14/35  
- 2s - loss: 0.3423 - acc: 0.8852 - val\_loss: 0.5578 - val\_acc: 0.7731

Epoch 15/35  
- 2s - loss: 0.3401 - acc: 0.8803 - val\_loss: 0.3589 - val\_acc: 0.8699

Epoch 16/35  
- 2s - loss: 0.3376 - acc: 0.8869 - val\_loss: 0.3667 - val\_acc: 0.8718

Epoch 17/35  
- 2s - loss: 0.3445 - acc: 0.8800 - val\_loss: 0.5077 - val\_acc: 0.8551

Epoch 18/35  
- 2s - loss: 0.3437 - acc: 0.8874 - val\_loss: 0.4615 - val\_acc: 0.8641

Epoch 19/35  
- 2s - loss: 0.3384 - acc: 0.8847 - val\_loss: 0.4151 - val\_acc: 0.8615

Epoch 20/35  
- 2s - loss: 0.3290 - acc: 0.8854 - val\_loss: 0.3880 - val\_acc: 0.8705

Epoch 21/35  
- 2s - loss: 0.3244 - acc: 0.8891 - val\_loss: 0.3474 - val\_acc: 0.8699

Epoch 22/35  
- 2s - loss: 0.3478 - acc: 0.8842 - val\_loss: 0.4395 - val\_acc: 0.8058

Epoch 23/35  
- 2s - loss: 0.3419 - acc: 0.8857 - val\_loss: 0.3777 - val\_acc: 0.8737

Epoch 24/35  
- 2s - loss: 0.3326 - acc: 0.8871 - val\_loss: 0.3558 - val\_acc: 0.8833

Epoch 25/35  
- 2s - loss: 0.3369 - acc: 0.8825 - val\_loss: 0.3804 - val\_acc: 0.8699

Epoch 26/35  
- 2s - loss: 0.3399 - acc: 0.8901 - val\_loss: 0.3880 - val\_acc: 0.8853

Epoch 27/35  
- 2s - loss: 0.3344 - acc: 0.8891 - val\_loss: 0.3479 - val\_acc: 0.8763

Epoch 28/35  
- 2s - loss: 0.3375 - acc: 0.8862 - val\_loss: 0.4381 - val\_acc: 0.7756

Epoch 29/35  
- 2s - loss: 0.3308 - acc: 0.8886 - val\_loss: 0.3927 - val\_acc: 0.8622

Epoch 30/35  
 - 2s - loss: 0.3339 - acc: 0.8925 - val\_loss: 0.3587 - val\_acc: 0.8827  
 Epoch 31/35  
 - 2s - loss: 0.3289 - acc: 0.8869 - val\_loss: 0.3735 - val\_acc: 0.8615  
 Epoch 32/35  
 - 2s - loss: 0.3222 - acc: 0.8916 - val\_loss: 0.3662 - val\_acc: 0.8654  
 Epoch 33/35  
 - 2s - loss: 0.3339 - acc: 0.8891 - val\_loss: 0.5826 - val\_acc: 0.7212  
 Epoch 34/35  
 - 2s - loss: 0.3293 - acc: 0.8891 - val\_loss: 0.3959 - val\_acc: 0.8827  
 Epoch 35/35  
 - 2s - loss: 0.3349 - acc: 0.8857 - val\_loss: 0.5930 - val\_acc: 0.7122  
 Train accuracy 0.6958446029014015 Test accuracy: 0.7121794871794872

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 118, 32)	4512
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 39, 32)	0
flatten_1 (Flatten)	(None, 1248)	0
dense_1 (Dense)	(None, 64)	79936
dense_2 (Dense)	(None, 3)	195

Total params: 86,435  
 Trainable params: 86,435  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/35  
 - 3s - loss: 6.9600 - acc: 0.8235 - val\_loss: 0.5693 - val\_acc: 0.8179  
 Epoch 2/35  
 - 2s - loss: 0.4846 - acc: 0.8581 - val\_loss: 0.5166 - val\_acc: 0.8103  
 Epoch 3/35  
 - 2s - loss: 0.4538 - acc: 0.8667 - val\_loss: 0.5572 - val\_acc: 0.7910  
 Epoch 4/35  
 - 2s - loss: 0.4473 - acc: 0.8662 - val\_loss: 0.4365 - val\_acc: 0.8545  
 Epoch 5/35  
 - 2s - loss: 0.4592 - acc: 0.8716 - val\_loss: 0.5709 - val\_acc: 0.8359  
 Epoch 6/35

- 2s - loss: 0.4279 - acc: 0.8736 - val\_loss: 0.4444 - val\_acc: 0.8449  
 Epoch 7/35  
 - 2s - loss: 0.4495 - acc: 0.8721 - val\_loss: 0.6148 - val\_acc: 0.8551  
 Epoch 8/35  
 - 2s - loss: 0.4238 - acc: 0.8785 - val\_loss: 0.5658 - val\_acc: 0.8077  
 Epoch 9/35  
 - 2s - loss: 0.4255 - acc: 0.8746 - val\_loss: 0.3969 - val\_acc: 0.8692  
 Epoch 10/35  
 - 2s - loss: 0.4254 - acc: 0.8704 - val\_loss: 0.4922 - val\_acc: 0.8641  
 Epoch 11/35  
 - 2s - loss: 0.4141 - acc: 0.8795 - val\_loss: 0.7674 - val\_acc: 0.6583  
 Epoch 12/35  
 - 2s - loss: 0.4166 - acc: 0.8771 - val\_loss: 0.4749 - val\_acc: 0.8481  
 Epoch 13/35  
 - 2s - loss: 0.3977 - acc: 0.8734 - val\_loss: 0.4262 - val\_acc: 0.8564  
 Epoch 14/35  
 - 2s - loss: 0.3995 - acc: 0.8807 - val\_loss: 0.5386 - val\_acc: 0.8192  
 Epoch 15/35  
 - 2s - loss: 0.4260 - acc: 0.8756 - val\_loss: 0.4063 - val\_acc: 0.8840  
 Epoch 16/35  
 - 2s - loss: 0.4157 - acc: 0.8830 - val\_loss: 0.4773 - val\_acc: 0.8673  
 Epoch 17/35  
 - 2s - loss: 0.4085 - acc: 0.8736 - val\_loss: 0.6763 - val\_acc: 0.8506  
 Epoch 18/35  
 - 2s - loss: 0.4150 - acc: 0.8822 - val\_loss: 0.8862 - val\_acc: 0.6949  
 Epoch 19/35  
 - 2s - loss: 0.3998 - acc: 0.8800 - val\_loss: 0.3981 - val\_acc: 0.8846  
 Epoch 20/35  
 - 2s - loss: 0.4064 - acc: 0.8766 - val\_loss: 0.4759 - val\_acc: 0.8487  
 Epoch 21/35  
 - 2s - loss: 0.4031 - acc: 0.8798 - val\_loss: 0.4083 - val\_acc: 0.8654  
 Epoch 22/35  
 - 2s - loss: 0.4187 - acc: 0.8756 - val\_loss: 0.6439 - val\_acc: 0.8429  
 Epoch 23/35  
 - 2s - loss: 0.4130 - acc: 0.8694 - val\_loss: 0.3951 - val\_acc: 0.8724  
 Epoch 24/35  
 - 2s - loss: 0.4047 - acc: 0.8780 - val\_loss: 0.6084 - val\_acc: 0.8500  
 Epoch 25/35  
 - 2s - loss: 0.4010 - acc: 0.8827 - val\_loss: 0.5251 - val\_acc: 0.8205  
 Epoch 26/35  
 - 2s - loss: 0.4013 - acc: 0.8753 - val\_loss: 0.5734 - val\_acc: 0.8673  
 Epoch 27/35  
 - 2s - loss: 0.4101 - acc: 0.8773 - val\_loss: 0.5612 - val\_acc: 0.8551  
 Epoch 28/35  
 - 2s - loss: 0.3949 - acc: 0.8866 - val\_loss: 0.6224 - val\_acc: 0.7526  
 Epoch 29/35  
 - 2s - loss: 0.3920 - acc: 0.8776 - val\_loss: 0.4070 - val\_acc: 0.8718  
 Epoch 30/35

```

- 2s - loss: 0.3930 - acc: 0.8830 - val_loss: 0.4015 - val_acc: 0.8686
Epoch 31/35
- 2s - loss: 0.4058 - acc: 0.8830 - val_loss: 0.5066 - val_acc: 0.8590
Epoch 32/35
- 2s - loss: 0.3982 - acc: 0.8835 - val_loss: 0.3849 - val_acc: 0.8731
Epoch 33/35
- 2s - loss: 0.3962 - acc: 0.8837 - val_loss: 0.5838 - val_acc: 0.8615
Epoch 34/35
- 2s - loss: 0.3887 - acc: 0.8820 - val_loss: 1.1173 - val_acc: 0.6744
Epoch 35/35
- 2s - loss: 0.4125 - acc: 0.8751 - val_loss: 1.0478 - val_acc: 0.6333
Train accuracy 0.6282271944922547 Test accuracy: 0.6333333333333333

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 124, 32)	4064
dropout_1 (Dropout)	(None, 124, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 62, 32)	0
flatten_1 (Flatten)	(None, 1984)	0
dense_1 (Dense)	(None, 16)	31760
dense_2 (Dense)	(None, 3)	51

---

```

Total params: 37,051
Trainable params: 37,051
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
- 2s - loss: 19.3203 - acc: 0.8380 - val_loss: 1.0916 - val_acc: 0.8000
Epoch 2/25
- 1s - loss: 0.4815 - acc: 0.8697 - val_loss: 0.4513 - val_acc: 0.8551
Epoch 3/25
- 1s - loss: 0.3589 - acc: 0.8768 - val_loss: 0.4089 - val_acc: 0.8571
Epoch 4/25
- 1s - loss: 0.3488 - acc: 0.8837 - val_loss: 0.4222 - val_acc: 0.8462
Epoch 5/25
- 1s - loss: 0.3456 - acc: 0.8839 - val_loss: 0.3923 - val_acc: 0.8551
Epoch 6/25
- 1s - loss: 0.3302 - acc: 0.8884 - val_loss: 0.4464 - val_acc: 0.8051

```

```

Epoch 7/25
- 1s - loss: 0.3224 - acc: 0.8866 - val_loss: 0.3477 - val_acc: 0.8865
Epoch 8/25
- 1s - loss: 0.3257 - acc: 0.8852 - val_loss: 0.3964 - val_acc: 0.8301
Epoch 9/25
- 1s - loss: 0.3064 - acc: 0.8938 - val_loss: 0.3364 - val_acc: 0.8731
Epoch 10/25
- 1s - loss: 0.3178 - acc: 0.8903 - val_loss: 0.3454 - val_acc: 0.8840
Epoch 11/25
- 1s - loss: 0.3077 - acc: 0.8903 - val_loss: 0.6779 - val_acc: 0.6994
Epoch 12/25
- 1s - loss: 0.3128 - acc: 0.8933 - val_loss: 0.4286 - val_acc: 0.8147
Epoch 13/25
- 1s - loss: 0.3156 - acc: 0.8854 - val_loss: 0.4041 - val_acc: 0.8346
Epoch 14/25
- 1s - loss: 0.3018 - acc: 0.9004 - val_loss: 0.5115 - val_acc: 0.7333
Epoch 15/25
- 1s - loss: 0.3136 - acc: 0.8933 - val_loss: 0.3453 - val_acc: 0.8769
Epoch 16/25
- 1s - loss: 0.3068 - acc: 0.8918 - val_loss: 0.3599 - val_acc: 0.8724
Epoch 17/25
- 1s - loss: 0.3069 - acc: 0.8884 - val_loss: 0.3407 - val_acc: 0.8756
Epoch 18/25
- 1s - loss: 0.3059 - acc: 0.8935 - val_loss: 0.5186 - val_acc: 0.7224
Epoch 19/25
- 1s - loss: 0.3055 - acc: 0.8864 - val_loss: 0.3272 - val_acc: 0.8769
Epoch 20/25
- 1s - loss: 0.2908 - acc: 0.8950 - val_loss: 0.3611 - val_acc: 0.8705
Epoch 21/25
- 1s - loss: 0.3072 - acc: 0.8913 - val_loss: 0.3415 - val_acc: 0.8769
Epoch 22/25
- 1s - loss: 0.3055 - acc: 0.8901 - val_loss: 0.4698 - val_acc: 0.7353
Epoch 23/25
- 1s - loss: 0.3106 - acc: 0.8935 - val_loss: 0.3426 - val_acc: 0.8846
Epoch 24/25
- 1s - loss: 0.3179 - acc: 0.8940 - val_loss: 0.3598 - val_acc: 0.8718
Epoch 25/25
- 1s - loss: 0.2975 - acc: 0.8972 - val_loss: 0.3509 - val_acc: 0.8808
Train accuracy 0.9168920580280305 Test accuracy: 0.8807692307692307

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 28)	784
conv1d_2 (Conv1D)	(None, 122, 16)	2256
dropout_1 (Dropout)	(None, 122, 16)	0

---

```

-----
max_pooling1d_1 (MaxPooling1 (None, 61, 16)          0
-----
flatten_1 (Flatten)          (None, 976)          0
-----
dense_1 (Dense)              (None, 32)          31264
-----
dense_2 (Dense)              (None, 3)           99
=====
Total params: 34,403
Trainable params: 34,403
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
  - 2s - loss: 126.6348 - acc: 0.8188 - val_loss: 71.3596 - val_acc: 0.8724
Epoch 2/35
  - 1s - loss: 45.1661 - acc: 0.8945 - val_loss: 26.1391 - val_acc: 0.8667
Epoch 3/35
  - 1s - loss: 16.3547 - acc: 0.8977 - val_loss: 9.2923 - val_acc: 0.8724
Epoch 4/35
  - 1s - loss: 5.6638 - acc: 0.8938 - val_loss: 3.1821 - val_acc: 0.8705
Epoch 5/35
  - 1s - loss: 1.9140 - acc: 0.8965 - val_loss: 1.1921 - val_acc: 0.8622
Epoch 6/35
  - 1s - loss: 0.7577 - acc: 0.8943 - val_loss: 0.6856 - val_acc: 0.8494
Epoch 7/35
  - 1s - loss: 0.4549 - acc: 0.8898 - val_loss: 0.4904 - val_acc: 0.8571
Epoch 8/35
  - 1s - loss: 0.4150 - acc: 0.8776 - val_loss: 0.5124 - val_acc: 0.8321
Epoch 9/35
  - 1s - loss: 0.3590 - acc: 0.8943 - val_loss: 0.4545 - val_acc: 0.8545
Epoch 10/35
  - 1s - loss: 0.3550 - acc: 0.8918 - val_loss: 0.4451 - val_acc: 0.8667
Epoch 11/35
  - 1s - loss: 0.3504 - acc: 0.8903 - val_loss: 0.4579 - val_acc: 0.8750
Epoch 12/35
  - 1s - loss: 0.3546 - acc: 0.8825 - val_loss: 0.4139 - val_acc: 0.8526
Epoch 13/35
  - 1s - loss: 0.3386 - acc: 0.8928 - val_loss: 0.4422 - val_acc: 0.8538
Epoch 14/35
  - 1s - loss: 0.3176 - acc: 0.9016 - val_loss: 0.4978 - val_acc: 0.7391
Epoch 15/35
  - 1s - loss: 0.3263 - acc: 0.8911 - val_loss: 0.4150 - val_acc: 0.8705
Epoch 16/35
  - 1s - loss: 0.3287 - acc: 0.8928 - val_loss: 0.4119 - val_acc: 0.8462
Epoch 17/35

```

```

- 1s - loss: 0.3106 - acc: 0.8967 - val_loss: 0.3799 - val_acc: 0.8615
Epoch 18/35
- 1s - loss: 0.3089 - acc: 0.8967 - val_loss: 0.3751 - val_acc: 0.8756
Epoch 19/35
- 1s - loss: 0.3030 - acc: 0.8985 - val_loss: 0.4225 - val_acc: 0.8506
Epoch 20/35
- 1s - loss: 0.3029 - acc: 0.8967 - val_loss: 0.3877 - val_acc: 0.8558
Epoch 21/35
- 1s - loss: 0.3004 - acc: 0.8985 - val_loss: 0.3855 - val_acc: 0.8615
Epoch 22/35
- 1s - loss: 0.3023 - acc: 0.8989 - val_loss: 0.3827 - val_acc: 0.8596
Epoch 23/35
- 1s - loss: 0.3152 - acc: 0.8901 - val_loss: 0.3668 - val_acc: 0.8705
Epoch 24/35
- 1s - loss: 0.3059 - acc: 0.8962 - val_loss: 0.4014 - val_acc: 0.8558
Epoch 25/35
- 1s - loss: 0.3043 - acc: 0.8975 - val_loss: 0.3759 - val_acc: 0.8712
Epoch 26/35
- 1s - loss: 0.2853 - acc: 0.9024 - val_loss: 0.3676 - val_acc: 0.8756
Epoch 27/35
- 1s - loss: 0.2797 - acc: 0.9019 - val_loss: 0.3599 - val_acc: 0.8628
Epoch 28/35
- 1s - loss: 0.2869 - acc: 0.8980 - val_loss: 0.3489 - val_acc: 0.8769
Epoch 29/35
- 1s - loss: 0.2780 - acc: 0.9039 - val_loss: 0.3629 - val_acc: 0.8705
Epoch 30/35
- 1s - loss: 0.2892 - acc: 0.8972 - val_loss: 0.3431 - val_acc: 0.8865
Epoch 31/35
- 1s - loss: 0.2787 - acc: 0.8989 - val_loss: 0.3500 - val_acc: 0.8827
Epoch 32/35
- 1s - loss: 0.2762 - acc: 0.9026 - val_loss: 0.3930 - val_acc: 0.8686
Epoch 33/35
- 1s - loss: 0.2804 - acc: 0.9051 - val_loss: 0.3565 - val_acc: 0.8833
Epoch 34/35
- 1s - loss: 0.2750 - acc: 0.9004 - val_loss: 0.3396 - val_acc: 0.8827
Epoch 35/35
- 1s - loss: 0.2847 - acc: 0.8997 - val_loss: 0.3395 - val_acc: 0.8859
Train accuracy 0.8937791984263584 Test accuracy: 0.8858974358974359
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 120, 24)	5064
dropout_1 (Dropout)	(None, 120, 24)	0



```

max_pooling1d_1 (MaxPooling1 (None, 24, 24)          0
-----
flatten_1 (Flatten)          (None, 576)          0
-----
dense_1 (Dense)              (None, 32)          18464
-----
dense_2 (Dense)              (None, 3)           99
=====
Total params: 25,559
Trainable params: 25,559
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
  - 2s - loss: 25.7420 - acc: 0.7937 - val_loss: 0.6374 - val_acc: 0.8109
Epoch 2/35
  - 2s - loss: 0.5072 - acc: 0.8532 - val_loss: 0.5647 - val_acc: 0.8186
Epoch 3/35
  - 2s - loss: 0.4717 - acc: 0.8579 - val_loss: 0.5768 - val_acc: 0.7904
Epoch 4/35
  - 2s - loss: 0.4442 - acc: 0.8660 - val_loss: 0.5064 - val_acc: 0.8628
Epoch 5/35
  - 2s - loss: 0.4605 - acc: 0.8672 - val_loss: 0.5048 - val_acc: 0.8679
Epoch 6/35
  - 2s - loss: 0.4261 - acc: 0.8697 - val_loss: 0.5736 - val_acc: 0.8077
Epoch 7/35
  - 2s - loss: 0.4209 - acc: 0.8736 - val_loss: 0.4956 - val_acc: 0.8423
Epoch 8/35
  - 2s - loss: 0.4291 - acc: 0.8724 - val_loss: 0.6130 - val_acc: 0.8103
Epoch 9/35
  - 2s - loss: 0.4383 - acc: 0.8716 - val_loss: 0.5028 - val_acc: 0.8494
Epoch 10/35
  - 2s - loss: 0.4121 - acc: 0.8689 - val_loss: 0.4916 - val_acc: 0.8474
Epoch 11/35
  - 2s - loss: 0.4157 - acc: 0.8807 - val_loss: 0.7591 - val_acc: 0.6526
Epoch 12/35
  - 2s - loss: 0.4192 - acc: 0.8726 - val_loss: 0.6396 - val_acc: 0.7776
Epoch 13/35
  - 2s - loss: 0.4135 - acc: 0.8677 - val_loss: 0.5069 - val_acc: 0.8429
Epoch 14/35
  - 2s - loss: 0.4164 - acc: 0.8712 - val_loss: 0.6237 - val_acc: 0.6949
Epoch 15/35
  - 2s - loss: 0.4076 - acc: 0.8788 - val_loss: 0.5072 - val_acc: 0.8718
Epoch 16/35
  - 2s - loss: 0.4046 - acc: 0.8778 - val_loss: 0.4822 - val_acc: 0.8404
Epoch 17/35
  - 2s - loss: 0.4090 - acc: 0.8685 - val_loss: 0.5593 - val_acc: 0.8551

```

```

Epoch 18/35
- 2s - loss: 0.4041 - acc: 0.8795 - val_loss: 0.5904 - val_acc: 0.7865
Epoch 19/35
- 2s - loss: 0.4018 - acc: 0.8805 - val_loss: 0.5366 - val_acc: 0.8147
Epoch 20/35
- 2s - loss: 0.4003 - acc: 0.8736 - val_loss: 0.5941 - val_acc: 0.8506
Epoch 21/35
- 2s - loss: 0.3941 - acc: 0.8768 - val_loss: 0.4866 - val_acc: 0.8641
Epoch 22/35
- 2s - loss: 0.3997 - acc: 0.8812 - val_loss: 0.8116 - val_acc: 0.5897
Epoch 23/35
- 2s - loss: 0.4156 - acc: 0.8721 - val_loss: 0.6770 - val_acc: 0.7885
Epoch 24/35
- 2s - loss: 0.3940 - acc: 0.8773 - val_loss: 0.5612 - val_acc: 0.8263
Epoch 25/35
- 2s - loss: 0.4056 - acc: 0.8758 - val_loss: 0.6364 - val_acc: 0.6936
Epoch 26/35
- 2s - loss: 0.3937 - acc: 0.8854 - val_loss: 0.7403 - val_acc: 0.7583
Epoch 27/35
- 2s - loss: 0.4134 - acc: 0.8790 - val_loss: 0.5800 - val_acc: 0.8385
Epoch 28/35
- 2s - loss: 0.3979 - acc: 0.8803 - val_loss: 0.9663 - val_acc: 0.6635
Epoch 29/35
- 2s - loss: 0.4070 - acc: 0.8736 - val_loss: 0.4899 - val_acc: 0.8212
Epoch 30/35
- 2s - loss: 0.3978 - acc: 0.8761 - val_loss: 0.5087 - val_acc: 0.8462
Epoch 31/35
- 2s - loss: 0.3901 - acc: 0.8761 - val_loss: 0.6601 - val_acc: 0.8301
Epoch 32/35
- 2s - loss: 0.3889 - acc: 0.8800 - val_loss: 0.4782 - val_acc: 0.8500
Epoch 33/35
- 2s - loss: 0.4267 - acc: 0.8746 - val_loss: 0.9585 - val_acc: 0.6679
Epoch 34/35
- 2s - loss: 0.4026 - acc: 0.8761 - val_loss: 0.7081 - val_acc: 0.6647
Epoch 35/35
- 2s - loss: 0.4083 - acc: 0.8748 - val_loss: 0.9453 - val_acc: 0.5968
Train accuracy 0.5706909269731989 Test accuracy: 0.5967948721005366

```

---

Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 124, 42)	1932
<hr/>		
conv1d_2 (Conv1D)	(None, 122, 32)	4064
<hr/>		
dropout_1 (Dropout)	(None, 122, 32)	0
<hr/>		
max_pooling1d_1 (MaxPooling1	(None, 24, 32)	0

```

-----
flatten_1 (Flatten)                (None, 768)                0
-----
dense_1 (Dense)                    (None, 16)                 12304
-----
dense_2 (Dense)                    (None, 3)                  51
=====
Total params: 18,351
Trainable params: 18,351
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
  - 2s - loss: 44.1078 - acc: 0.8404 - val_loss: 0.7388 - val_acc: 0.7981
Epoch 2/25
  - 2s - loss: 0.4274 - acc: 0.8763 - val_loss: 0.5307 - val_acc: 0.8462
Epoch 3/25
  - 2s - loss: 0.3543 - acc: 0.8825 - val_loss: 0.4717 - val_acc: 0.8397
Epoch 4/25
  - 2s - loss: 0.3200 - acc: 0.8913 - val_loss: 0.4563 - val_acc: 0.8545
Epoch 5/25
  - 2s - loss: 0.3197 - acc: 0.8881 - val_loss: 0.4099 - val_acc: 0.8782
Epoch 6/25
  - 2s - loss: 0.3199 - acc: 0.8839 - val_loss: 0.4773 - val_acc: 0.8173
Epoch 7/25
  - 2s - loss: 0.3045 - acc: 0.8938 - val_loss: 0.3985 - val_acc: 0.8635
Epoch 8/25
  - 2s - loss: 0.3084 - acc: 0.8918 - val_loss: 0.4285 - val_acc: 0.8429
Epoch 9/25
  - 2s - loss: 0.3070 - acc: 0.8923 - val_loss: 0.4075 - val_acc: 0.8737
Epoch 10/25
  - 2s - loss: 0.3134 - acc: 0.8886 - val_loss: 0.4194 - val_acc: 0.8692
Epoch 11/25
  - 2s - loss: 0.3057 - acc: 0.8957 - val_loss: 0.4943 - val_acc: 0.7558
Epoch 12/25
  - 2s - loss: 0.3159 - acc: 0.8830 - val_loss: 0.4176 - val_acc: 0.8635
Epoch 13/25
  - 2s - loss: 0.3093 - acc: 0.8822 - val_loss: 0.4172 - val_acc: 0.8391
Epoch 14/25
  - 2s - loss: 0.3075 - acc: 0.8896 - val_loss: 0.4675 - val_acc: 0.8019
Epoch 15/25
  - 2s - loss: 0.3047 - acc: 0.8923 - val_loss: 0.3886 - val_acc: 0.8731
Epoch 16/25
  - 2s - loss: 0.3086 - acc: 0.8898 - val_loss: 0.3817 - val_acc: 0.8795
Epoch 17/25
  - 2s - loss: 0.3056 - acc: 0.8871 - val_loss: 0.3888 - val_acc: 0.8609
Epoch 18/25

```

```

- 2s - loss: 0.3090 - acc: 0.8908 - val_loss: 0.3714 - val_acc: 0.8904
Epoch 19/25
- 2s - loss: 0.2967 - acc: 0.8967 - val_loss: 0.3731 - val_acc: 0.8917
Epoch 20/25
- 2s - loss: 0.3028 - acc: 0.8891 - val_loss: 0.3904 - val_acc: 0.8622
Epoch 21/25
- 2s - loss: 0.2918 - acc: 0.8953 - val_loss: 0.3799 - val_acc: 0.8705
Epoch 22/25
- 2s - loss: 0.3016 - acc: 0.8960 - val_loss: 0.4320 - val_acc: 0.8615
Epoch 23/25
- 2s - loss: 0.3132 - acc: 0.8866 - val_loss: 0.3772 - val_acc: 0.8776
Epoch 24/25
- 2s - loss: 0.3000 - acc: 0.8948 - val_loss: 0.3870 - val_acc: 0.8673
Epoch 25/25
- 2s - loss: 0.2930 - acc: 0.8918 - val_loss: 0.3706 - val_acc: 0.8821
Train accuracy 0.9195967543643964 Test accuracy: 0.882051282051282
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 120, 16)	4720
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 32)	20512
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 26,507
Trainable params: 26,507
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
- 3s - loss: 23.6945 - acc: 0.8611 - val_loss: 4.4418 - val_acc: 0.8712
Epoch 2/35
- 2s - loss: 1.5054 - acc: 0.9007 - val_loss: 0.6027 - val_acc: 0.8788
Epoch 3/35
- 2s - loss: 0.3698 - acc: 0.8876 - val_loss: 0.4359 - val_acc: 0.8538
Epoch 4/35
- 2s - loss: 0.3561 - acc: 0.8891 - val_loss: 0.4283 - val_acc: 0.8776

```

Epoch 5/35  
- 2s - loss: 0.3218 - acc: 0.8948 - val\_loss: 0.4960 - val\_acc: 0.8282

Epoch 6/35  
- 2s - loss: 0.3091 - acc: 0.9004 - val\_loss: 0.4005 - val\_acc: 0.8769

Epoch 7/35  
- 2s - loss: 0.2971 - acc: 0.8953 - val\_loss: 0.3997 - val\_acc: 0.8827

Epoch 8/35  
- 2s - loss: 0.3001 - acc: 0.9002 - val\_loss: 0.4082 - val\_acc: 0.8686

Epoch 9/35  
- 2s - loss: 0.3001 - acc: 0.8994 - val\_loss: 0.3827 - val\_acc: 0.8782

Epoch 10/35  
- 2s - loss: 0.2818 - acc: 0.9044 - val\_loss: 0.3744 - val\_acc: 0.8737

Epoch 11/35  
- 2s - loss: 0.2805 - acc: 0.9004 - val\_loss: 0.3885 - val\_acc: 0.8769

Epoch 12/35  
- 2s - loss: 0.2967 - acc: 0.8955 - val\_loss: 0.3843 - val\_acc: 0.8808

Epoch 13/35  
- 2s - loss: 0.2948 - acc: 0.8999 - val\_loss: 0.3550 - val\_acc: 0.8788

Epoch 14/35  
- 2s - loss: 0.3038 - acc: 0.8955 - val\_loss: 0.4180 - val\_acc: 0.8353

Epoch 15/35  
- 2s - loss: 0.3014 - acc: 0.8999 - val\_loss: 0.3713 - val\_acc: 0.8840

Epoch 16/35  
- 2s - loss: 0.2854 - acc: 0.8997 - val\_loss: 0.3789 - val\_acc: 0.8686

Epoch 17/35  
- 2s - loss: 0.2919 - acc: 0.8950 - val\_loss: 0.3503 - val\_acc: 0.8776

Epoch 18/35  
- 2s - loss: 0.2644 - acc: 0.9036 - val\_loss: 0.3684 - val\_acc: 0.8596

Epoch 19/35  
- 2s - loss: 0.2798 - acc: 0.8982 - val\_loss: 0.3606 - val\_acc: 0.8679

Epoch 20/35  
- 2s - loss: 0.2815 - acc: 0.9036 - val\_loss: 0.3350 - val\_acc: 0.8750

Epoch 21/35  
- 2s - loss: 0.2722 - acc: 0.9029 - val\_loss: 0.3828 - val\_acc: 0.8577

Epoch 22/35  
- 2s - loss: 0.2834 - acc: 0.8962 - val\_loss: 0.3561 - val\_acc: 0.8769

Epoch 23/35  
- 2s - loss: 0.2709 - acc: 0.9034 - val\_loss: 0.3602 - val\_acc: 0.8750

Epoch 24/35  
- 2s - loss: 0.2750 - acc: 0.9019 - val\_loss: 0.3588 - val\_acc: 0.8718

Epoch 25/35  
- 2s - loss: 0.2736 - acc: 0.8977 - val\_loss: 0.3973 - val\_acc: 0.8551

Epoch 26/35  
- 2s - loss: 0.2718 - acc: 0.9016 - val\_loss: 0.3525 - val\_acc: 0.8827

Epoch 27/35  
- 2s - loss: 0.2721 - acc: 0.9007 - val\_loss: 0.3368 - val\_acc: 0.8788

Epoch 28/35  
- 2s - loss: 0.2748 - acc: 0.9004 - val\_loss: 0.3609 - val\_acc: 0.8795

```

Epoch 29/35
- 2s - loss: 0.2644 - acc: 0.9044 - val_loss: 0.3624 - val_acc: 0.8686
Epoch 30/35
- 2s - loss: 0.2784 - acc: 0.9002 - val_loss: 0.3454 - val_acc: 0.8763
Epoch 31/35
- 2s - loss: 0.2835 - acc: 0.8982 - val_loss: 0.3417 - val_acc: 0.8756
Epoch 32/35
- 2s - loss: 0.2633 - acc: 0.9024 - val_loss: 0.3908 - val_acc: 0.8679
Epoch 33/35
- 2s - loss: 0.2602 - acc: 0.9014 - val_loss: 0.3514 - val_acc: 0.8737
Epoch 34/35
- 2s - loss: 0.2580 - acc: 0.9019 - val_loss: 0.3546 - val_acc: 0.8679
Epoch 35/35
- 2s - loss: 0.2597 - acc: 0.9071 - val_loss: 0.3402 - val_acc: 0.8718
Train accuracy 0.9009097614949594 Test accuracy: 0.8717948717948718
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 116, 24)	7080
dropout_1 (Dropout)	(None, 116, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 58, 24)	0
flatten_1 (Flatten)	(None, 1392)	0
dense_1 (Dense)	(None, 32)	44576
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 54,443
Trainable params: 54,443
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
- 3s - loss: 35.9853 - acc: 0.8471 - val_loss: 0.5876 - val_acc: 0.8538
Epoch 2/35
- 2s - loss: 0.4546 - acc: 0.8719 - val_loss: 0.4936 - val_acc: 0.8423
Epoch 3/35
- 2s - loss: 0.4331 - acc: 0.8712 - val_loss: 0.4578 - val_acc: 0.8314
Epoch 4/35
- 2s - loss: 0.4523 - acc: 0.8746 - val_loss: 0.4865 - val_acc: 0.8442
Epoch 5/35

```

- 2s - loss: 0.3968 - acc: 0.8753 - val\_loss: 0.5295 - val\_acc: 0.8026  
 Epoch 6/35  
 - 2s - loss: 0.3934 - acc: 0.8803 - val\_loss: 0.4169 - val\_acc: 0.8750  
 Epoch 7/35  
 - 2s - loss: 0.4000 - acc: 0.8756 - val\_loss: 0.4696 - val\_acc: 0.8673  
 Epoch 8/35  
 - 2s - loss: 0.3884 - acc: 0.8842 - val\_loss: 0.6348 - val\_acc: 0.7872  
 Epoch 9/35  
 - 2s - loss: 0.4052 - acc: 0.8771 - val\_loss: 0.4995 - val\_acc: 0.8385  
 Epoch 10/35  
 - 2s - loss: 0.3876 - acc: 0.8812 - val\_loss: 0.4794 - val\_acc: 0.8692  
 Epoch 11/35  
 - 2s - loss: 0.3827 - acc: 0.8815 - val\_loss: 0.4938 - val\_acc: 0.8263  
 Epoch 12/35  
 - 2s - loss: 0.3801 - acc: 0.8837 - val\_loss: 0.3967 - val\_acc: 0.8654  
 Epoch 13/35  
 - 2s - loss: 0.4064 - acc: 0.8721 - val\_loss: 0.4692 - val\_acc: 0.8558  
 Epoch 14/35  
 - 2s - loss: 0.3925 - acc: 0.8830 - val\_loss: 0.4389 - val\_acc: 0.8731  
 Epoch 15/35  
 - 2s - loss: 0.4079 - acc: 0.8751 - val\_loss: 0.4130 - val\_acc: 0.8538  
 Epoch 16/35  
 - 2s - loss: 0.3715 - acc: 0.8817 - val\_loss: 0.4582 - val\_acc: 0.8333  
 Epoch 17/35  
 - 2s - loss: 0.4056 - acc: 0.8763 - val\_loss: 0.4515 - val\_acc: 0.8429  
 Epoch 18/35  
 - 2s - loss: 0.3747 - acc: 0.8751 - val\_loss: 0.4263 - val\_acc: 0.8519  
 Epoch 19/35  
 - 2s - loss: 0.3943 - acc: 0.8729 - val\_loss: 0.4198 - val\_acc: 0.8667  
 Epoch 20/35  
 - 2s - loss: 0.3564 - acc: 0.8894 - val\_loss: 0.3832 - val\_acc: 0.8705  
 Epoch 21/35  
 - 2s - loss: 0.3771 - acc: 0.8778 - val\_loss: 0.3932 - val\_acc: 0.8603  
 Epoch 22/35  
 - 2s - loss: 0.3992 - acc: 0.8704 - val\_loss: 0.5431 - val\_acc: 0.8487  
 Epoch 23/35  
 - 2s - loss: 0.4005 - acc: 0.8714 - val\_loss: 0.4083 - val\_acc: 0.8712  
 Epoch 24/35  
 - 2s - loss: 0.3853 - acc: 0.8734 - val\_loss: 0.4257 - val\_acc: 0.8667  
 Epoch 25/35  
 - 2s - loss: 0.3590 - acc: 0.8847 - val\_loss: 0.4321 - val\_acc: 0.8442  
 Epoch 26/35  
 - 2s - loss: 0.4065 - acc: 0.8667 - val\_loss: 0.3918 - val\_acc: 0.8622  
 Epoch 27/35  
 - 2s - loss: 0.3874 - acc: 0.8748 - val\_loss: 0.3983 - val\_acc: 0.8641  
 Epoch 28/35  
 - 2s - loss: 0.3794 - acc: 0.8773 - val\_loss: 0.4910 - val\_acc: 0.8686  
 Epoch 29/35

```

- 2s - loss: 0.3890 - acc: 0.8822 - val_loss: 0.3878 - val_acc: 0.8718
Epoch 30/35
- 2s - loss: 0.3871 - acc: 0.8736 - val_loss: 0.4352 - val_acc: 0.8647
Epoch 31/35
- 2s - loss: 0.3995 - acc: 0.8748 - val_loss: 0.3998 - val_acc: 0.8692
Epoch 32/35
- 2s - loss: 0.3908 - acc: 0.8785 - val_loss: 0.4617 - val_acc: 0.8186
Epoch 33/35
- 2s - loss: 0.3608 - acc: 0.8778 - val_loss: 0.4415 - val_acc: 0.8583
Epoch 34/35
- 2s - loss: 0.3528 - acc: 0.8744 - val_loss: 0.4880 - val_acc: 0.8577
Epoch 35/35
- 2s - loss: 0.3879 - acc: 0.8783 - val_loss: 0.5049 - val_acc: 0.8212
Train accuracy 0.8568969756577329 Test accuracy: 0.8211538461538461
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 122, 24)	3864
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 98,715
Trainable params: 98,715
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
- 3s - loss: 68.8837 - acc: 0.8512 - val_loss: 8.5622 - val_acc: 0.8256
Epoch 2/35
- 2s - loss: 2.5736 - acc: 0.8837 - val_loss: 0.6541 - val_acc: 0.8615
Epoch 3/35
- 2s - loss: 0.4448 - acc: 0.8783 - val_loss: 0.4645 - val_acc: 0.8365
Epoch 4/35
- 2s - loss: 0.4352 - acc: 0.8648 - val_loss: 0.4886 - val_acc: 0.8436
Epoch 5/35
- 2s - loss: 0.3960 - acc: 0.8805 - val_loss: 0.4923 - val_acc: 0.8583

```



Epoch 6/35  
- 2s - loss: 0.3543 - acc: 0.8916 - val\_loss: 0.4373 - val\_acc: 0.8622

Epoch 7/35  
- 2s - loss: 0.3430 - acc: 0.8906 - val\_loss: 0.4473 - val\_acc: 0.8397

Epoch 8/35  
- 2s - loss: 0.4080 - acc: 0.8803 - val\_loss: 0.4994 - val\_acc: 0.8333

Epoch 9/35  
- 2s - loss: 0.4065 - acc: 0.8911 - val\_loss: 0.4119 - val\_acc: 0.8577

Epoch 10/35  
- 2s - loss: 0.3674 - acc: 0.8896 - val\_loss: 0.4190 - val\_acc: 0.8718

Epoch 11/35  
- 2s - loss: 0.3980 - acc: 0.8736 - val\_loss: 0.4793 - val\_acc: 0.8628

Epoch 12/35  
- 2s - loss: 0.3569 - acc: 0.8835 - val\_loss: 0.3857 - val\_acc: 0.8647

Epoch 13/35  
- 2s - loss: 0.3408 - acc: 0.8871 - val\_loss: 0.4287 - val\_acc: 0.8577

Epoch 14/35  
- 2s - loss: 0.3523 - acc: 0.8862 - val\_loss: 0.4451 - val\_acc: 0.8590

Epoch 15/35  
- 2s - loss: 0.3410 - acc: 0.8908 - val\_loss: 0.4039 - val\_acc: 0.8795

Epoch 16/35  
- 2s - loss: 0.3681 - acc: 0.8830 - val\_loss: 0.4105 - val\_acc: 0.8590

Epoch 17/35  
- 2s - loss: 0.3326 - acc: 0.8911 - val\_loss: 0.4004 - val\_acc: 0.8596

Epoch 18/35  
- 2s - loss: 0.3502 - acc: 0.8879 - val\_loss: 0.4274 - val\_acc: 0.8429

Epoch 19/35  
- 2s - loss: 0.3403 - acc: 0.8881 - val\_loss: 0.3823 - val\_acc: 0.8609

Epoch 20/35  
- 2s - loss: 0.3332 - acc: 0.8911 - val\_loss: 0.3868 - val\_acc: 0.8596

Epoch 21/35  
- 2s - loss: 0.3756 - acc: 0.8862 - val\_loss: 0.3719 - val\_acc: 0.8724

Epoch 22/35  
- 2s - loss: 0.3579 - acc: 0.8837 - val\_loss: 0.4066 - val\_acc: 0.8673

Epoch 23/35  
- 2s - loss: 0.3363 - acc: 0.8928 - val\_loss: 0.3755 - val\_acc: 0.8699

Epoch 24/35  
- 2s - loss: 0.3443 - acc: 0.8812 - val\_loss: 0.4512 - val\_acc: 0.8295

Epoch 25/35  
- 2s - loss: 0.3777 - acc: 0.8849 - val\_loss: 0.4027 - val\_acc: 0.8494

Epoch 26/35  
- 2s - loss: 0.3442 - acc: 0.8876 - val\_loss: 0.4848 - val\_acc: 0.8404

Epoch 27/35  
- 2s - loss: 0.3339 - acc: 0.8940 - val\_loss: 0.3780 - val\_acc: 0.8737

Epoch 28/35  
- 2s - loss: 0.3419 - acc: 0.8859 - val\_loss: 0.4035 - val\_acc: 0.8660

Epoch 29/35  
- 2s - loss: 0.3246 - acc: 0.8965 - val\_loss: 0.4492 - val\_acc: 0.8340

Epoch 30/35  
 - 2s - loss: 0.3968 - acc: 0.8771 - val\_loss: 0.4436 - val\_acc: 0.8660  
 Epoch 31/35  
 - 2s - loss: 0.3378 - acc: 0.8884 - val\_loss: 0.3835 - val\_acc: 0.8673  
 Epoch 32/35  
 - 2s - loss: 0.3199 - acc: 0.8898 - val\_loss: 0.4012 - val\_acc: 0.8590  
 Epoch 33/35  
 - 2s - loss: 0.3410 - acc: 0.8921 - val\_loss: 0.4443 - val\_acc: 0.8737  
 Epoch 34/35  
 - 2s - loss: 0.3391 - acc: 0.8898 - val\_loss: 0.4033 - val\_acc: 0.8506  
 Epoch 35/35  
 - 2s - loss: 0.3347 - acc: 0.8938 - val\_loss: 0.3564 - val\_acc: 0.8840  
 Train accuracy 0.8982050651585936 Test accuracy: 0.8839743589743589

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 120, 24)	3864
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 24)	0
flatten_1 (Flatten)	(None, 576)	0
dense_1 (Dense)	(None, 32)	18464
dense_2 (Dense)	(None, 3)	99

Total params: 23,899  
 Trainable params: 23,899  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/25  
 - 2s - loss: 96.9605 - acc: 0.8603 - val\_loss: 44.1102 - val\_acc: 0.8776  
 Epoch 2/25  
 - 2s - loss: 23.5065 - acc: 0.8972 - val\_loss: 10.4376 - val\_acc: 0.8712  
 Epoch 3/25  
 - 2s - loss: 5.3069 - acc: 0.8997 - val\_loss: 2.4245 - val\_acc: 0.8647  
 Epoch 4/25  
 - 2s - loss: 1.2289 - acc: 0.8894 - val\_loss: 0.8433 - val\_acc: 0.8551  
 Epoch 5/25  
 - 2s - loss: 0.4823 - acc: 0.8945 - val\_loss: 0.5879 - val\_acc: 0.8609  
 Epoch 6/25

```

- 2s - loss: 0.3460 - acc: 0.9007 - val_loss: 0.5154 - val_acc: 0.8538
Epoch 7/25
- 2s - loss: 0.3476 - acc: 0.8921 - val_loss: 0.4774 - val_acc: 0.8821
Epoch 8/25
- 2s - loss: 0.4090 - acc: 0.8859 - val_loss: 0.5254 - val_acc: 0.8545
Epoch 9/25
- 2s - loss: 0.3254 - acc: 0.8987 - val_loss: 0.4918 - val_acc: 0.8558
Epoch 10/25
- 2s - loss: 0.3318 - acc: 0.8925 - val_loss: 0.4649 - val_acc: 0.8776
Epoch 11/25
- 2s - loss: 0.3300 - acc: 0.8923 - val_loss: 0.5354 - val_acc: 0.8712
Epoch 12/25
- 2s - loss: 0.3297 - acc: 0.8896 - val_loss: 0.4586 - val_acc: 0.8808
Epoch 13/25
- 2s - loss: 0.3230 - acc: 0.8948 - val_loss: 0.4854 - val_acc: 0.8615
Epoch 14/25
- 2s - loss: 0.3037 - acc: 0.8977 - val_loss: 0.4693 - val_acc: 0.8500
Epoch 15/25
- 2s - loss: 0.3085 - acc: 0.8962 - val_loss: 0.5329 - val_acc: 0.8122
Epoch 16/25
- 2s - loss: 0.3080 - acc: 0.9004 - val_loss: 0.4325 - val_acc: 0.8667
Epoch 17/25
- 2s - loss: 0.3061 - acc: 0.8999 - val_loss: 0.4220 - val_acc: 0.8628
Epoch 18/25
- 2s - loss: 0.2914 - acc: 0.8975 - val_loss: 0.4093 - val_acc: 0.8782
Epoch 19/25
- 2s - loss: 0.3017 - acc: 0.8985 - val_loss: 0.4726 - val_acc: 0.8365
Epoch 20/25
- 2s - loss: 0.3069 - acc: 0.8953 - val_loss: 0.4155 - val_acc: 0.8788
Epoch 21/25
- 2s - loss: 0.2890 - acc: 0.9083 - val_loss: 0.4151 - val_acc: 0.8763
Epoch 22/25
- 2s - loss: 0.2849 - acc: 0.9039 - val_loss: 0.4144 - val_acc: 0.8801
Epoch 23/25
- 2s - loss: 0.3571 - acc: 0.8793 - val_loss: 0.4062 - val_acc: 0.8756
Epoch 24/25
- 2s - loss: 0.2914 - acc: 0.8953 - val_loss: 0.4044 - val_acc: 0.8782
Epoch 25/25
- 2s - loss: 0.2989 - acc: 0.8935 - val_loss: 0.4068 - val_acc: 0.8724
Train accuracy 0.8996803540693386 Test accuracy: 0.8724358974358974

```

```

-----
Layer (type)                Output Shape                Param #
-----
conv1d_1 (Conv1D)           (None, 126, 28)            784
-----
conv1d_2 (Conv1D)           (None, 124, 16)            1360
-----

```

dropout_1 (Dropout)	(None, 124, 16)	0
-----		
max_pooling1d_1 (MaxPooling1d)	(None, 41, 16)	0
-----		
flatten_1 (Flatten)	(None, 656)	0
-----		
dense_1 (Dense)	(None, 64)	42048
-----		
dense_2 (Dense)	(None, 3)	195
=====		

Total params: 44,387  
 Trainable params: 44,387  
 Non-trainable params: 0

-----

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/25

- 2s - loss: 39.6450 - acc: 0.8488 - val\_loss: 1.7554 - val\_acc: 0.8455

Epoch 2/25

- 2s - loss: 0.5191 - acc: 0.8741 - val\_loss: 0.4689 - val\_acc: 0.8635

Epoch 3/25

- 2s - loss: 0.3547 - acc: 0.8822 - val\_loss: 0.4486 - val\_acc: 0.8365

Epoch 4/25

- 2s - loss: 0.3319 - acc: 0.8849 - val\_loss: 0.4397 - val\_acc: 0.8532

Epoch 5/25

- 2s - loss: 0.3319 - acc: 0.8876 - val\_loss: 0.3727 - val\_acc: 0.8769

Epoch 6/25

- 2s - loss: 0.3347 - acc: 0.8847 - val\_loss: 0.4408 - val\_acc: 0.8224

Epoch 7/25

- 2s - loss: 0.3234 - acc: 0.8869 - val\_loss: 0.3747 - val\_acc: 0.8635

Epoch 8/25

- 2s - loss: 0.3283 - acc: 0.8891 - val\_loss: 0.4439 - val\_acc: 0.8327

Epoch 9/25

- 2s - loss: 0.3320 - acc: 0.8876 - val\_loss: 0.3903 - val\_acc: 0.8750

Epoch 10/25

- 2s - loss: 0.3321 - acc: 0.8795 - val\_loss: 0.3975 - val\_acc: 0.8667

Epoch 11/25

- 2s - loss: 0.3207 - acc: 0.8906 - val\_loss: 0.5501 - val\_acc: 0.6981

Epoch 12/25

- 2s - loss: 0.3241 - acc: 0.8844 - val\_loss: 0.3841 - val\_acc: 0.8673

Epoch 13/25

- 2s - loss: 0.3204 - acc: 0.8862 - val\_loss: 0.3810 - val\_acc: 0.8603

Epoch 14/25

- 2s - loss: 0.3107 - acc: 0.8889 - val\_loss: 0.4732 - val\_acc: 0.7513

Epoch 15/25

- 2s - loss: 0.3162 - acc: 0.8918 - val\_loss: 0.3644 - val\_acc: 0.8763

Epoch 16/25

- 2s - loss: 0.3065 - acc: 0.8916 - val\_loss: 0.3972 - val\_acc: 0.8731

Epoch 17/25  
 - 2s - loss: 0.3073 - acc: 0.8876 - val\_loss: 0.4707 - val\_acc: 0.8571  
 Epoch 18/25  
 - 2s - loss: 0.3132 - acc: 0.8913 - val\_loss: 0.4235 - val\_acc: 0.8622  
 Epoch 19/25  
 - 2s - loss: 0.3105 - acc: 0.8903 - val\_loss: 0.3848 - val\_acc: 0.8737  
 Epoch 20/25  
 - 2s - loss: 0.3010 - acc: 0.8889 - val\_loss: 0.5121 - val\_acc: 0.8449  
 Epoch 21/25  
 - 2s - loss: 0.2979 - acc: 0.8923 - val\_loss: 0.4287 - val\_acc: 0.8558  
 Epoch 22/25  
 - 2s - loss: 0.3039 - acc: 0.8987 - val\_loss: 0.4496 - val\_acc: 0.7346  
 Epoch 23/25  
 - 2s - loss: 0.3044 - acc: 0.8864 - val\_loss: 0.4049 - val\_acc: 0.8635  
 Epoch 24/25  
 - 2s - loss: 0.3064 - acc: 0.8901 - val\_loss: 0.4089 - val\_acc: 0.8417  
 Epoch 25/25  
 - 2s - loss: 0.3041 - acc: 0.8921 - val\_loss: 0.4358 - val\_acc: 0.7827  
 Train accuracy 0.7814113597246127 Test accuracy: 0.7826923076923077

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 24)	2040
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 24)	0
flatten_1 (Flatten)	(None, 576)	0
dense_1 (Dense)	(None, 16)	9232
dense_2 (Dense)	(None, 3)	51

Total params: 13,115  
 Trainable params: 13,115  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/35  
 - 1s - loss: 23.9156 - acc: 0.8291 - val\_loss: 3.8605 - val\_acc: 0.8186  
 Epoch 2/35  
 - 1s - loss: 1.1680 - acc: 0.8665 - val\_loss: 0.6067 - val\_acc: 0.8506  
 Epoch 3/35

- 1s - loss: 0.4252 - acc: 0.8758 - val\_loss: 0.5267 - val\_acc: 0.7923  
 Epoch 4/35  
 - 1s - loss: 0.3600 - acc: 0.8881 - val\_loss: 0.5056 - val\_acc: 0.8147  
 Epoch 5/35  
 - 1s - loss: 0.3511 - acc: 0.8835 - val\_loss: 0.4290 - val\_acc: 0.8603  
 Epoch 6/35  
 - 1s - loss: 0.3290 - acc: 0.8916 - val\_loss: 0.4222 - val\_acc: 0.8551  
 Epoch 7/35  
 - 1s - loss: 0.3379 - acc: 0.8837 - val\_loss: 0.3947 - val\_acc: 0.8865  
 Epoch 8/35  
 - 1s - loss: 0.3325 - acc: 0.8935 - val\_loss: 0.4351 - val\_acc: 0.8494  
 Epoch 9/35  
 - 1s - loss: 0.3265 - acc: 0.8938 - val\_loss: 0.4048 - val\_acc: 0.8731  
 Epoch 10/35  
 - 1s - loss: 0.3162 - acc: 0.8943 - val\_loss: 0.4260 - val\_acc: 0.8679  
 Epoch 11/35  
 - 1s - loss: 0.3305 - acc: 0.8884 - val\_loss: 0.4208 - val\_acc: 0.8628  
 Epoch 12/35  
 - 1s - loss: 0.3184 - acc: 0.8972 - val\_loss: 0.4141 - val\_acc: 0.8801  
 Epoch 13/35  
 - 1s - loss: 0.3204 - acc: 0.8975 - val\_loss: 0.4283 - val\_acc: 0.8654  
 Epoch 14/35  
 - 1s - loss: 0.3052 - acc: 0.8987 - val\_loss: 0.4516 - val\_acc: 0.8506  
 Epoch 15/35  
 - 1s - loss: 0.3164 - acc: 0.8869 - val\_loss: 0.4020 - val\_acc: 0.8763  
 Epoch 16/35  
 - 1s - loss: 0.3203 - acc: 0.8953 - val\_loss: 0.4029 - val\_acc: 0.8673  
 Epoch 17/35  
 - 1s - loss: 0.3039 - acc: 0.8992 - val\_loss: 0.3738 - val\_acc: 0.8795  
 Epoch 18/35  
 - 1s - loss: 0.3145 - acc: 0.8967 - val\_loss: 0.4002 - val\_acc: 0.8859  
 Epoch 19/35  
 - 1s - loss: 0.3221 - acc: 0.8916 - val\_loss: 0.3862 - val\_acc: 0.8885  
 Epoch 20/35  
 - 1s - loss: 0.3100 - acc: 0.8965 - val\_loss: 0.3804 - val\_acc: 0.8994  
 Epoch 21/35  
 - 1s - loss: 0.2972 - acc: 0.9046 - val\_loss: 0.3806 - val\_acc: 0.8821  
 Epoch 22/35  
 - 1s - loss: 0.3132 - acc: 0.8960 - val\_loss: 0.4109 - val\_acc: 0.8596  
 Epoch 23/35  
 - 1s - loss: 0.3217 - acc: 0.8923 - val\_loss: 0.4111 - val\_acc: 0.8622  
 Epoch 24/35  
 - 1s - loss: 0.2969 - acc: 0.9009 - val\_loss: 0.4113 - val\_acc: 0.8487  
 Epoch 25/35  
 - 1s - loss: 0.3070 - acc: 0.8970 - val\_loss: 0.4513 - val\_acc: 0.8513  
 Epoch 26/35  
 - 1s - loss: 0.3163 - acc: 0.9002 - val\_loss: 0.3926 - val\_acc: 0.8795  
 Epoch 27/35

```

- 1s - loss: 0.2942 - acc: 0.9016 - val_loss: 0.4021 - val_acc: 0.8686
Epoch 28/35
- 1s - loss: 0.3070 - acc: 0.8980 - val_loss: 0.4131 - val_acc: 0.8827
Epoch 29/35
- 1s - loss: 0.3073 - acc: 0.9029 - val_loss: 0.3971 - val_acc: 0.8776
Epoch 30/35
- 1s - loss: 0.3138 - acc: 0.8923 - val_loss: 0.3743 - val_acc: 0.8840
Epoch 31/35
- 1s - loss: 0.3083 - acc: 0.8948 - val_loss: 0.3860 - val_acc: 0.8782
Epoch 32/35
- 1s - loss: 0.2965 - acc: 0.8972 - val_loss: 0.3546 - val_acc: 0.8840
Epoch 33/35
- 1s - loss: 0.3042 - acc: 0.9021 - val_loss: 0.4022 - val_acc: 0.8429
Epoch 34/35
- 1s - loss: 0.2954 - acc: 0.9044 - val_loss: 0.4514 - val_acc: 0.8622
Epoch 35/35
- 1s - loss: 0.3067 - acc: 0.9004 - val_loss: 0.3845 - val_acc: 0.8673
Train accuracy 0.9048438652569462 Test accuracy: 0.8673076923076923

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 118, 32)	4512
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 32)	0
flatten_1 (Flatten)	(None, 1888)	0
dense_1 (Dense)	(None, 32)	60448
dense_2 (Dense)	(None, 3)	99

```

Total params: 66,851
Trainable params: 66,851
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
- 2s - loss: 16.0176 - acc: 0.8249 - val_loss: 0.7809 - val_acc: 0.8141
Epoch 2/25
- 1s - loss: 0.4720 - acc: 0.8758 - val_loss: 0.4422 - val_acc: 0.8615
Epoch 3/25
- 2s - loss: 0.3647 - acc: 0.8891 - val_loss: 0.4111 - val_acc: 0.8641

```

```

Epoch 4/25
- 1s - loss: 0.3533 - acc: 0.8938 - val_loss: 0.3677 - val_acc: 0.8756
Epoch 5/25
- 1s - loss: 0.3401 - acc: 0.8943 - val_loss: 0.3692 - val_acc: 0.8750
Epoch 6/25
- 1s - loss: 0.3359 - acc: 0.9002 - val_loss: 0.5727 - val_acc: 0.8224
Epoch 7/25
- 2s - loss: 0.3265 - acc: 0.8989 - val_loss: 0.4125 - val_acc: 0.8628
Epoch 8/25
- 2s - loss: 0.3303 - acc: 0.8977 - val_loss: 0.4286 - val_acc: 0.8596
Epoch 9/25
- 1s - loss: 0.3141 - acc: 0.9044 - val_loss: 0.3662 - val_acc: 0.8744
Epoch 10/25
- 1s - loss: 0.3268 - acc: 0.9019 - val_loss: 0.3558 - val_acc: 0.8795
Epoch 11/25
- 1s - loss: 0.3288 - acc: 0.9002 - val_loss: 0.6492 - val_acc: 0.7333
Epoch 12/25
- 1s - loss: 0.3296 - acc: 0.8997 - val_loss: 0.4738 - val_acc: 0.8327
Epoch 13/25
- 1s - loss: 0.3307 - acc: 0.8923 - val_loss: 0.4284 - val_acc: 0.8410
Epoch 14/25
- 1s - loss: 0.3202 - acc: 0.8960 - val_loss: 0.5643 - val_acc: 0.7314
Epoch 15/25
- 1s - loss: 0.3228 - acc: 0.9019 - val_loss: 0.3655 - val_acc: 0.8788
Epoch 16/25
- 1s - loss: 0.3093 - acc: 0.9085 - val_loss: 0.3907 - val_acc: 0.8744
Epoch 17/25
- 1s - loss: 0.3215 - acc: 0.8948 - val_loss: 0.3702 - val_acc: 0.8756
Epoch 18/25
- 1s - loss: 0.3045 - acc: 0.9041 - val_loss: 0.5465 - val_acc: 0.7372
Epoch 19/25
- 1s - loss: 0.3056 - acc: 0.9002 - val_loss: 0.3581 - val_acc: 0.8776
Epoch 20/25
- 1s - loss: 0.3108 - acc: 0.9090 - val_loss: 0.3644 - val_acc: 0.8712
Epoch 21/25
- 1s - loss: 0.3172 - acc: 0.9039 - val_loss: 0.4481 - val_acc: 0.8641
Epoch 22/25
- 1s - loss: 0.3293 - acc: 0.8994 - val_loss: 0.4676 - val_acc: 0.8135
Epoch 23/25
- 1s - loss: 0.3113 - acc: 0.9026 - val_loss: 0.3363 - val_acc: 0.8776
Epoch 24/25
- 1s - loss: 0.3100 - acc: 0.9009 - val_loss: 0.3531 - val_acc: 0.8885
Epoch 25/25
- 2s - loss: 0.3045 - acc: 0.8980 - val_loss: 0.3790 - val_acc: 0.8641
Train accuracy 0.9080403245635603 Test accuracy: 0.8641025641025641

```

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Layer (type)	Output Shape	Param #
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```

=====
conv1d_1 (Conv1D)                (None, 126, 28)                784
-----
conv1d_2 (Conv1D)                (None, 120, 32)                6304
-----
dropout_1 (Dropout)              (None, 120, 32)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 60, 32)                0
-----
flatten_1 (Flatten)              (None, 1920)                  0
-----
dense_1 (Dense)                  (None, 32)                    61472
-----
dense_2 (Dense)                  (None, 3)                     99
=====
Total params: 68,659
Trainable params: 68,659
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
  - 2s - loss: 86.3377 - acc: 0.8168 - val_loss: 44.0305 - val_acc: 0.8660
Epoch 2/35
  - 1s - loss: 27.0937 - acc: 0.9024 - val_loss: 15.7847 - val_acc: 0.8891
Epoch 3/35
  - 1s - loss: 10.8588 - acc: 0.9026 - val_loss: 7.4043 - val_acc: 0.8763
Epoch 4/35
  - 1s - loss: 5.4188 - acc: 0.9051 - val_loss: 3.9739 - val_acc: 0.8788
Epoch 5/35
  - 1s - loss: 2.9383 - acc: 0.8992 - val_loss: 2.1930 - val_acc: 0.8878
Epoch 6/35
  - 1s - loss: 1.6034 - acc: 0.9107 - val_loss: 1.2794 - val_acc: 0.8712
Epoch 7/35
  - 1s - loss: 0.9471 - acc: 0.8994 - val_loss: 0.8565 - val_acc: 0.8558
Epoch 8/35
  - 1s - loss: 0.6268 - acc: 0.8938 - val_loss: 0.5847 - val_acc: 0.8865
Epoch 9/35
  - 1s - loss: 0.4310 - acc: 0.9083 - val_loss: 0.4934 - val_acc: 0.8558
Epoch 10/35
  - 1s - loss: 0.3590 - acc: 0.9031 - val_loss: 0.4320 - val_acc: 0.8635
Epoch 11/35
  - 1s - loss: 0.3276 - acc: 0.8972 - val_loss: 0.3907 - val_acc: 0.8859
Epoch 12/35
  - 1s - loss: 0.2996 - acc: 0.8985 - val_loss: 0.3847 - val_acc: 0.8788
Epoch 13/35
  - 1s - loss: 0.2978 - acc: 0.9034 - val_loss: 0.3639 - val_acc: 0.8859
Epoch 14/35

```

```

- 1s - loss: 0.3013 - acc: 0.8955 - val_loss: 0.3825 - val_acc: 0.8744
Epoch 15/35
- 1s - loss: 0.2962 - acc: 0.9036 - val_loss: 0.3716 - val_acc: 0.8821
Epoch 16/35
- 1s - loss: 0.2872 - acc: 0.9078 - val_loss: 0.4039 - val_acc: 0.8365
Epoch 17/35
- 1s - loss: 0.2907 - acc: 0.9009 - val_loss: 0.3589 - val_acc: 0.8731
Epoch 18/35
- 1s - loss: 0.2962 - acc: 0.9021 - val_loss: 0.3527 - val_acc: 0.8827
Epoch 19/35
- 1s - loss: 0.2813 - acc: 0.9007 - val_loss: 0.3443 - val_acc: 0.8885
Epoch 20/35
- 1s - loss: 0.2724 - acc: 0.9095 - val_loss: 0.3571 - val_acc: 0.8801
Epoch 21/35
- 1s - loss: 0.2761 - acc: 0.9083 - val_loss: 0.3620 - val_acc: 0.8667
Epoch 22/35
- 1s - loss: 0.2889 - acc: 0.8992 - val_loss: 0.3343 - val_acc: 0.8801
Epoch 23/35
- 1s - loss: 0.2766 - acc: 0.9039 - val_loss: 0.3460 - val_acc: 0.8788
Epoch 24/35
- 1s - loss: 0.2737 - acc: 0.9053 - val_loss: 0.3255 - val_acc: 0.8897
Epoch 25/35
- 1s - loss: 0.2640 - acc: 0.9056 - val_loss: 0.3261 - val_acc: 0.8795
Epoch 26/35
- 1s - loss: 0.2682 - acc: 0.9026 - val_loss: 0.3226 - val_acc: 0.8872
Epoch 27/35
- 1s - loss: 0.2683 - acc: 0.9044 - val_loss: 0.3427 - val_acc: 0.8833
Epoch 28/35
- 1s - loss: 0.2812 - acc: 0.8999 - val_loss: 0.3541 - val_acc: 0.8718
Epoch 29/35
- 1s - loss: 0.2761 - acc: 0.9073 - val_loss: 0.3367 - val_acc: 0.8763
Epoch 30/35
- 1s - loss: 0.2676 - acc: 0.9016 - val_loss: 0.3325 - val_acc: 0.8859
Epoch 31/35
- 1s - loss: 0.2525 - acc: 0.9093 - val_loss: 0.3221 - val_acc: 0.8846
Epoch 32/35
- 1s - loss: 0.2583 - acc: 0.9075 - val_loss: 0.3200 - val_acc: 0.8910
Epoch 33/35
- 1s - loss: 0.2627 - acc: 0.9073 - val_loss: 0.3138 - val_acc: 0.8878
Epoch 34/35
- 1s - loss: 0.2744 - acc: 0.9053 - val_loss: 0.3702 - val_acc: 0.8647
Epoch 35/35
- 1s - loss: 0.2573 - acc: 0.9127 - val_loss: 0.3277 - val_acc: 0.8885
Train accuracy 0.906073272682567 Test accuracy: 0.8884615384615384

```

```

-----
Layer (type)                Output Shape                Param #
=====

```

conv1d_1 (Conv1D)	(None, 124, 42)	1932
-----		
conv1d_2 (Conv1D)	(None, 118, 24)	7080
-----		
dropout_1 (Dropout)	(None, 118, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 39, 24)	0
-----		
flatten_1 (Flatten)	(None, 936)	0
-----		
dense_1 (Dense)	(None, 16)	14992
-----		
dense_2 (Dense)	(None, 3)	51
=====		
Total params: 24,055		
Trainable params: 24,055		
Non-trainable params: 0		
-----		
None		
Train on 4067 samples, validate on 1560 samples		
Epoch 1/25		
- 2s - loss: 76.2702 - acc: 0.8353 - val_loss: 25.1869 - val_acc: 0.8821		
Epoch 2/25		
- 1s - loss: 11.1232 - acc: 0.8938 - val_loss: 3.5524 - val_acc: 0.8731		
Epoch 3/25		
- 1s - loss: 1.5264 - acc: 0.9004 - val_loss: 0.7478 - val_acc: 0.8571		
Epoch 4/25		
- 1s - loss: 0.4610 - acc: 0.8876 - val_loss: 0.5229 - val_acc: 0.8359		
Epoch 5/25		
- 1s - loss: 0.3451 - acc: 0.8933 - val_loss: 0.5281 - val_acc: 0.8487		
Epoch 6/25		
- 1s - loss: 0.3233 - acc: 0.8992 - val_loss: 0.4392 - val_acc: 0.8788		
Epoch 7/25		
- 1s - loss: 0.3491 - acc: 0.8908 - val_loss: 0.4258 - val_acc: 0.8673		
Epoch 8/25		
- 1s - loss: 0.3435 - acc: 0.8938 - val_loss: 0.4569 - val_acc: 0.8667		
Epoch 9/25		
- 1s - loss: 0.3111 - acc: 0.9024 - val_loss: 0.4586 - val_acc: 0.8558		
Epoch 10/25		
- 1s - loss: 0.3085 - acc: 0.8999 - val_loss: 0.4345 - val_acc: 0.8635		
Epoch 11/25		
- 1s - loss: 0.3390 - acc: 0.8881 - val_loss: 0.4639 - val_acc: 0.8712		
Epoch 12/25		
- 1s - loss: 0.3388 - acc: 0.8916 - val_loss: 0.4224 - val_acc: 0.8583		
Epoch 13/25		
- 1s - loss: 0.3059 - acc: 0.8987 - val_loss: 0.4016 - val_acc: 0.8769		
Epoch 14/25		
- 1s - loss: 0.3137 - acc: 0.8985 - val_loss: 0.4283 - val_acc: 0.8622		

```

Epoch 15/25
- 1s - loss: 0.3042 - acc: 0.8948 - val_loss: 0.4284 - val_acc: 0.8686
Epoch 16/25
- 1s - loss: 0.3252 - acc: 0.8908 - val_loss: 0.4174 - val_acc: 0.8654
Epoch 17/25
- 1s - loss: 0.3023 - acc: 0.8982 - val_loss: 0.4539 - val_acc: 0.8571
Epoch 18/25
- 1s - loss: 0.3046 - acc: 0.8972 - val_loss: 0.4322 - val_acc: 0.8494
Epoch 19/25
- 1s - loss: 0.2990 - acc: 0.8992 - val_loss: 0.4050 - val_acc: 0.8667
Epoch 20/25
- 1s - loss: 0.4272 - acc: 0.8886 - val_loss: 0.4348 - val_acc: 0.8596
Epoch 21/25
- 1s - loss: 0.2832 - acc: 0.9071 - val_loss: 0.4148 - val_acc: 0.8641
Epoch 22/25
- 1s - loss: 0.2867 - acc: 0.8994 - val_loss: 0.3897 - val_acc: 0.8635
Epoch 23/25
- 1s - loss: 0.2933 - acc: 0.8957 - val_loss: 0.3932 - val_acc: 0.8699
Epoch 24/25
- 1s - loss: 0.2849 - acc: 0.8962 - val_loss: 0.3948 - val_acc: 0.8712
Epoch 25/25
- 1s - loss: 0.2988 - acc: 0.8989 - val_loss: 0.4211 - val_acc: 0.8571
Train accuracy 0.8952544873371036 Test accuracy: 0.857051282051282

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 64)	41024
dense_2 (Dense)	(None, 3)	195

---

```

Total params: 44,243
Trainable params: 44,243
Non-trainable params: 0

```

---

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30

```

- 2s - loss: 25.6302 - acc: 0.7937 - val\_loss: 18.6629 - val\_acc: 0.8628  
 Epoch 2/30  
 - 1s - loss: 13.9066 - acc: 0.8906 - val\_loss: 9.8837 - val\_acc: 0.8596  
 Epoch 3/30  
 - 1s - loss: 6.9876 - acc: 0.9034 - val\_loss: 4.7720 - val\_acc: 0.8558  
 Epoch 4/30  
 - 1s - loss: 3.2449 - acc: 0.9134 - val\_loss: 2.2974 - val\_acc: 0.8455  
 Epoch 5/30  
 - 1s - loss: 1.5296 - acc: 0.9115 - val\_loss: 1.1637 - val\_acc: 0.8724  
 Epoch 6/30  
 - 1s - loss: 0.7631 - acc: 0.9095 - val\_loss: 0.6714 - val\_acc: 0.8577  
 Epoch 7/30  
 - 1s - loss: 0.4716 - acc: 0.9112 - val\_loss: 0.5300 - val\_acc: 0.8718  
 Epoch 8/30  
 - 1s - loss: 0.3585 - acc: 0.9166 - val\_loss: 0.4886 - val\_acc: 0.8237  
 Epoch 9/30  
 - 1s - loss: 0.3228 - acc: 0.9132 - val\_loss: 0.4153 - val\_acc: 0.8494  
 Epoch 10/30  
 - 1s - loss: 0.2976 - acc: 0.9107 - val\_loss: 0.3792 - val\_acc: 0.8641  
 Epoch 11/30  
 - 1s - loss: 0.2760 - acc: 0.9137 - val\_loss: 0.3542 - val\_acc: 0.8679  
 Epoch 12/30  
 - 1s - loss: 0.2679 - acc: 0.9130 - val\_loss: 0.3626 - val\_acc: 0.8756  
 Epoch 13/30  
 - 1s - loss: 0.2593 - acc: 0.9147 - val\_loss: 0.3330 - val\_acc: 0.8795  
 Epoch 14/30  
 - 1s - loss: 0.2492 - acc: 0.9191 - val\_loss: 0.3726 - val\_acc: 0.8782  
 Epoch 15/30  
 - 1s - loss: 0.2504 - acc: 0.9171 - val\_loss: 0.3283 - val\_acc: 0.8833  
 Epoch 16/30  
 - 1s - loss: 0.2389 - acc: 0.9184 - val\_loss: 0.3301 - val\_acc: 0.8782  
 Epoch 17/30  
 - 1s - loss: 0.2367 - acc: 0.9179 - val\_loss: 0.3467 - val\_acc: 0.8679  
 Epoch 18/30  
 - 1s - loss: 0.2352 - acc: 0.9201 - val\_loss: 0.3066 - val\_acc: 0.8801  
 Epoch 19/30  
 - 1s - loss: 0.2336 - acc: 0.9164 - val\_loss: 0.3047 - val\_acc: 0.9013  
 Epoch 20/30  
 - 1s - loss: 0.2273 - acc: 0.9228 - val\_loss: 0.3292 - val\_acc: 0.8782  
 Epoch 21/30  
 - 1s - loss: 0.2213 - acc: 0.9253 - val\_loss: 0.3360 - val\_acc: 0.8673  
 Epoch 22/30  
 - 1s - loss: 0.2222 - acc: 0.9211 - val\_loss: 0.3458 - val\_acc: 0.8872  
 Epoch 23/30  
 - 1s - loss: 0.2229 - acc: 0.9223 - val\_loss: 0.3284 - val\_acc: 0.8987  
 Epoch 24/30  
 - 1s - loss: 0.2226 - acc: 0.9243 - val\_loss: 0.2973 - val\_acc: 0.9019  
 Epoch 25/30

```

- 1s - loss: 0.2188 - acc: 0.9243 - val_loss: 0.3558 - val_acc: 0.8750
Epoch 26/30
- 1s - loss: 0.2164 - acc: 0.9211 - val_loss: 0.3237 - val_acc: 0.8987
Epoch 27/30
- 1s - loss: 0.2121 - acc: 0.9262 - val_loss: 0.2964 - val_acc: 0.9019
Epoch 28/30
- 1s - loss: 0.2118 - acc: 0.9309 - val_loss: 0.3226 - val_acc: 0.8987
Epoch 29/30
- 1s - loss: 0.2134 - acc: 0.9275 - val_loss: 0.2957 - val_acc: 0.8962
Epoch 30/30
- 1s - loss: 0.2082 - acc: 0.9297 - val_loss: 0.2846 - val_acc: 0.9096
Train accuracy 0.9092697319891813 Test accuracy: 0.9096153846153846

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

---

```

Total params: 65,747
Trainable params: 65,747
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 26.9325 - acc: 0.7986 - val_loss: 20.5459 - val_acc: 0.8654
Epoch 2/30
- 1s - loss: 15.9832 - acc: 0.8896 - val_loss: 12.0087 - val_acc: 0.8724
Epoch 3/30
- 1s - loss: 8.9774 - acc: 0.9075 - val_loss: 6.5144 - val_acc: 0.8686
Epoch 4/30
- 1s - loss: 4.7182 - acc: 0.9157 - val_loss: 3.4371 - val_acc: 0.8519
Epoch 5/30
- 1s - loss: 2.4324 - acc: 0.9098 - val_loss: 1.8308 - val_acc: 0.8724
Epoch 6/30
- 1s - loss: 1.2698 - acc: 0.9139 - val_loss: 1.0284 - val_acc: 0.8660

```

Epoch 7/30  
- 1s - loss: 0.7299 - acc: 0.9137 - val\_loss: 0.6770 - val\_acc: 0.8692

Epoch 8/30  
- 1s - loss: 0.4692 - acc: 0.9171 - val\_loss: 0.5751 - val\_acc: 0.8250

Epoch 9/30  
- 1s - loss: 0.3765 - acc: 0.9132 - val\_loss: 0.4409 - val\_acc: 0.8545

Epoch 10/30  
- 1s - loss: 0.3309 - acc: 0.9134 - val\_loss: 0.4002 - val\_acc: 0.8679

Epoch 11/30  
- 1s - loss: 0.3022 - acc: 0.9103 - val\_loss: 0.3713 - val\_acc: 0.8635

Epoch 12/30  
- 1s - loss: 0.2864 - acc: 0.9132 - val\_loss: 0.3842 - val\_acc: 0.8769

Epoch 13/30  
- 1s - loss: 0.2743 - acc: 0.9125 - val\_loss: 0.3538 - val\_acc: 0.8724

Epoch 14/30  
- 1s - loss: 0.2603 - acc: 0.9203 - val\_loss: 0.3699 - val\_acc: 0.8827

Epoch 15/30  
- 1s - loss: 0.2608 - acc: 0.9176 - val\_loss: 0.3417 - val\_acc: 0.8827

Epoch 16/30  
- 1s - loss: 0.2490 - acc: 0.9164 - val\_loss: 0.3383 - val\_acc: 0.8712

Epoch 17/30  
- 1s - loss: 0.2449 - acc: 0.9206 - val\_loss: 0.3435 - val\_acc: 0.8705

Epoch 18/30  
- 1s - loss: 0.2418 - acc: 0.9208 - val\_loss: 0.3078 - val\_acc: 0.8821

Epoch 19/30  
- 1s - loss: 0.2417 - acc: 0.9176 - val\_loss: 0.3162 - val\_acc: 0.8942

Epoch 20/30  
- 1s - loss: 0.2359 - acc: 0.9235 - val\_loss: 0.3239 - val\_acc: 0.8776

Epoch 21/30  
- 1s - loss: 0.2297 - acc: 0.9235 - val\_loss: 0.3464 - val\_acc: 0.8615

Epoch 22/30  
- 1s - loss: 0.2261 - acc: 0.9225 - val\_loss: 0.3048 - val\_acc: 0.9000

Epoch 23/30  
- 1s - loss: 0.2260 - acc: 0.9262 - val\_loss: 0.3162 - val\_acc: 0.8853

Epoch 24/30  
- 1s - loss: 0.2275 - acc: 0.9235 - val\_loss: 0.3175 - val\_acc: 0.8981

Epoch 25/30  
- 1s - loss: 0.2227 - acc: 0.9240 - val\_loss: 0.3650 - val\_acc: 0.8705

Epoch 26/30  
- 1s - loss: 0.2217 - acc: 0.9216 - val\_loss: 0.3231 - val\_acc: 0.9026

Epoch 27/30  
- 1s - loss: 0.2160 - acc: 0.9248 - val\_loss: 0.2907 - val\_acc: 0.8917

Epoch 28/30  
- 1s - loss: 0.2146 - acc: 0.9309 - val\_loss: 0.3170 - val\_acc: 0.9026

Epoch 29/30  
- 1s - loss: 0.2160 - acc: 0.9302 - val\_loss: 0.2847 - val\_acc: 0.9006

Epoch 30/30  
- 1s - loss: 0.2108 - acc: 0.9284 - val\_loss: 0.2914 - val\_acc: 0.9109

Train accuracy 0.9146791246619129 Test accuracy: 0.9108974358974359

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

Total params: 65,747

Trainable params: 65,747

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 10.6708 - acc: 0.8375 - val\_loss: 3.0306 - val\_acc: 0.8936

Epoch 2/30

- 1s - loss: 1.3031 - acc: 0.8940 - val\_loss: 0.8003 - val\_acc: 0.8692

Epoch 3/30

- 1s - loss: 0.4745 - acc: 0.9021 - val\_loss: 0.4832 - val\_acc: 0.8654

Epoch 4/30

- 1s - loss: 0.3943 - acc: 0.9071 - val\_loss: 0.4872 - val\_acc: 0.8372

Epoch 5/30

- 1s - loss: 0.3386 - acc: 0.9117 - val\_loss: 0.6474 - val\_acc: 0.8481

Epoch 6/30

- 1s - loss: 0.3360 - acc: 0.9120 - val\_loss: 0.3573 - val\_acc: 0.8840

Epoch 7/30

- 1s - loss: 0.2948 - acc: 0.9218 - val\_loss: 0.4944 - val\_acc: 0.8590

Epoch 8/30

- 1s - loss: 0.2882 - acc: 0.9257 - val\_loss: 0.8616 - val\_acc: 0.8109

Epoch 9/30

- 1s - loss: 0.2941 - acc: 0.9221 - val\_loss: 0.3259 - val\_acc: 0.8859

Epoch 10/30

- 1s - loss: 0.2511 - acc: 0.9304 - val\_loss: 0.3186 - val\_acc: 0.9058

Epoch 11/30

- 1s - loss: 0.3248 - acc: 0.9260 - val\_loss: 0.3478 - val\_acc: 0.8846

Epoch 12/30



```

- 1s - loss: 0.2423 - acc: 0.9260 - val_loss: 0.2804 - val_acc: 0.9212
Epoch 13/30
- 1s - loss: 0.2329 - acc: 0.9341 - val_loss: 0.3019 - val_acc: 0.8904
Epoch 14/30
- 1s - loss: 0.2314 - acc: 0.9388 - val_loss: 0.2531 - val_acc: 0.9314
Epoch 15/30
- 1s - loss: 0.2395 - acc: 0.9339 - val_loss: 0.2778 - val_acc: 0.8981
Epoch 16/30
- 1s - loss: 0.1990 - acc: 0.9434 - val_loss: 0.3221 - val_acc: 0.8872
Epoch 17/30
- 1s - loss: 0.2038 - acc: 0.9437 - val_loss: 0.2670 - val_acc: 0.9000
Epoch 18/30
- 1s - loss: 0.2313 - acc: 0.9378 - val_loss: 0.2377 - val_acc: 0.9115
Epoch 19/30
- 1s - loss: 0.2157 - acc: 0.9366 - val_loss: 0.2415 - val_acc: 0.9192
Epoch 20/30
- 1s - loss: 0.1927 - acc: 0.9479 - val_loss: 0.2540 - val_acc: 0.9019
Epoch 21/30
- 1s - loss: 0.1921 - acc: 0.9442 - val_loss: 0.3710 - val_acc: 0.8827
Epoch 22/30
- 1s - loss: 0.1744 - acc: 0.9503 - val_loss: 0.2931 - val_acc: 0.9103
Epoch 23/30
- 1s - loss: 0.2202 - acc: 0.9405 - val_loss: 0.2419 - val_acc: 0.9103
Epoch 24/30
- 1s - loss: 0.1932 - acc: 0.9442 - val_loss: 0.2433 - val_acc: 0.9096
Epoch 25/30
- 1s - loss: 0.1796 - acc: 0.9481 - val_loss: 0.2784 - val_acc: 0.9013
Epoch 26/30
- 1s - loss: 0.1815 - acc: 0.9466 - val_loss: 0.2110 - val_acc: 0.9481
Epoch 27/30
- 1s - loss: 0.2025 - acc: 0.9471 - val_loss: 0.2576 - val_acc: 0.9077
Epoch 28/30
- 1s - loss: 0.1613 - acc: 0.9548 - val_loss: 0.2180 - val_acc: 0.9333
Epoch 29/30
- 1s - loss: 0.1916 - acc: 0.9548 - val_loss: 0.2340 - val_acc: 0.9256
Epoch 30/30
- 1s - loss: 0.1729 - acc: 0.9560 - val_loss: 0.2294 - val_acc: 0.9385
Train accuracy 0.9586919104991394 Test accuracy: 0.9384615384615385

```

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
<hr/>		
conv1d_2 (Conv1D)	(None, 122, 16)	1552
<hr/>		
dropout_1 (Dropout)	(None, 122, 16)	0
<hr/>		

```

max_pooling1d_1 (MaxPooling1 (None, 61, 16)          0
-----
flatten_1 (Flatten)          (None, 976)          0
-----
dense_1 (Dense)              (None, 64)          62528
-----
dense_2 (Dense)              (None, 3)          195
=====
Total params: 65,747
Trainable params: 65,747
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 15.4856 - acc: 0.8316 - val_loss: 4.1580 - val_acc: 0.8814
Epoch 2/30
  - 1s - loss: 1.7032 - acc: 0.8930 - val_loss: 0.7813 - val_acc: 0.8846
Epoch 3/30
  - 1s - loss: 0.6480 - acc: 0.8908 - val_loss: 0.6089 - val_acc: 0.8628
Epoch 4/30
  - 1s - loss: 0.4856 - acc: 0.9073 - val_loss: 0.5497 - val_acc: 0.8436
Epoch 5/30
  - 1s - loss: 0.3912 - acc: 0.9098 - val_loss: 0.5123 - val_acc: 0.8391
Epoch 6/30
  - 1s - loss: 0.3610 - acc: 0.9122 - val_loss: 0.3813 - val_acc: 0.8846
Epoch 7/30
  - 1s - loss: 0.3283 - acc: 0.9144 - val_loss: 0.4082 - val_acc: 0.8654
Epoch 8/30
  - 1s - loss: 0.2958 - acc: 0.9206 - val_loss: 0.3969 - val_acc: 0.8679
Epoch 9/30
  - 1s - loss: 0.2882 - acc: 0.9159 - val_loss: 0.3565 - val_acc: 0.8699
Epoch 10/30
  - 1s - loss: 0.2762 - acc: 0.9176 - val_loss: 0.3432 - val_acc: 0.8840
Epoch 11/30
  - 1s - loss: 0.2701 - acc: 0.9176 - val_loss: 0.3623 - val_acc: 0.8936
Epoch 12/30
  - 1s - loss: 0.2543 - acc: 0.9233 - val_loss: 0.3398 - val_acc: 0.8891
Epoch 13/30
  - 1s - loss: 0.2592 - acc: 0.9196 - val_loss: 0.3358 - val_acc: 0.8808
Epoch 14/30
  - 1s - loss: 0.2605 - acc: 0.9233 - val_loss: 0.3106 - val_acc: 0.9032
Epoch 15/30
  - 1s - loss: 0.2418 - acc: 0.9267 - val_loss: 0.3132 - val_acc: 0.8878
Epoch 16/30
  - 1s - loss: 0.2415 - acc: 0.9255 - val_loss: 0.2845 - val_acc: 0.8942
Epoch 17/30
  - 1s - loss: 0.2342 - acc: 0.9275 - val_loss: 0.3099 - val_acc: 0.8801

```

```

Epoch 18/30
- 1s - loss: 0.2347 - acc: 0.9265 - val_loss: 0.2961 - val_acc: 0.8904
Epoch 19/30
- 1s - loss: 0.2391 - acc: 0.9225 - val_loss: 0.2872 - val_acc: 0.8994
Epoch 20/30
- 1s - loss: 0.2343 - acc: 0.9255 - val_loss: 0.2909 - val_acc: 0.8949
Epoch 21/30
- 1s - loss: 0.2407 - acc: 0.9238 - val_loss: 0.3913 - val_acc: 0.8558
Epoch 22/30
- 1s - loss: 0.2164 - acc: 0.9304 - val_loss: 0.3842 - val_acc: 0.8788
Epoch 23/30
- 1s - loss: 0.2176 - acc: 0.9297 - val_loss: 0.2916 - val_acc: 0.9090
Epoch 24/30
- 1s - loss: 0.2304 - acc: 0.9257 - val_loss: 0.2637 - val_acc: 0.8962
Epoch 25/30
- 1s - loss: 0.2160 - acc: 0.9329 - val_loss: 0.2817 - val_acc: 0.8917
Epoch 26/30
- 1s - loss: 0.2132 - acc: 0.9297 - val_loss: 0.2627 - val_acc: 0.9160
Epoch 27/30
- 1s - loss: 0.2087 - acc: 0.9378 - val_loss: 0.3105 - val_acc: 0.8795
Epoch 28/30
- 1s - loss: 0.2089 - acc: 0.9368 - val_loss: 0.2812 - val_acc: 0.9128
Epoch 29/30
- 1s - loss: 0.2083 - acc: 0.9353 - val_loss: 0.2541 - val_acc: 0.9090
Epoch 30/30
- 1s - loss: 0.1995 - acc: 0.9375 - val_loss: 0.2903 - val_acc: 0.9109
Train accuracy 0.9286943693139906 Test accuracy: 0.9108974358974359

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

```

Total params: 65,747
Trainable params: 65,747
Non-trainable params: 0

```

```

-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 23.4762 - acc: 0.8028 - val_loss: 7.8031 - val_acc: 0.8885
Epoch 2/30
  - 1s - loss: 3.2596 - acc: 0.8741 - val_loss: 1.0084 - val_acc: 0.8673
Epoch 3/30
  - 1s - loss: 0.5528 - acc: 0.8842 - val_loss: 0.5528 - val_acc: 0.7846
Epoch 4/30
  - 1s - loss: 0.3728 - acc: 0.8889 - val_loss: 0.5339 - val_acc: 0.7859
Epoch 5/30
  - 1s - loss: 0.3396 - acc: 0.8948 - val_loss: 0.4318 - val_acc: 0.8359
Epoch 6/30
  - 1s - loss: 0.3194 - acc: 0.8908 - val_loss: 0.4361 - val_acc: 0.8314
Epoch 7/30
  - 1s - loss: 0.3280 - acc: 0.8862 - val_loss: 0.3402 - val_acc: 0.8872
Epoch 8/30
  - 1s - loss: 0.3071 - acc: 0.8930 - val_loss: 0.4096 - val_acc: 0.8340
Epoch 9/30
  - 1s - loss: 0.3025 - acc: 0.8965 - val_loss: 0.3430 - val_acc: 0.8878
Epoch 10/30
  - 1s - loss: 0.2948 - acc: 0.8953 - val_loss: 0.3679 - val_acc: 0.8782
Epoch 11/30
  - 1s - loss: 0.3049 - acc: 0.8928 - val_loss: 0.3593 - val_acc: 0.8686
Epoch 12/30
  - 1s - loss: 0.2853 - acc: 0.8977 - val_loss: 0.3362 - val_acc: 0.8712
Epoch 13/30
  - 1s - loss: 0.2850 - acc: 0.9029 - val_loss: 0.3386 - val_acc: 0.8840
Epoch 14/30
  - 1s - loss: 0.2796 - acc: 0.9036 - val_loss: 0.3825 - val_acc: 0.8699
Epoch 15/30
  - 1s - loss: 0.2865 - acc: 0.8943 - val_loss: 0.4078 - val_acc: 0.8455
Epoch 16/30
  - 1s - loss: 0.2806 - acc: 0.8970 - val_loss: 0.3435 - val_acc: 0.8801
Epoch 17/30
  - 1s - loss: 0.2751 - acc: 0.9048 - val_loss: 0.3711 - val_acc: 0.8564
Epoch 18/30
  - 1s - loss: 0.2817 - acc: 0.8982 - val_loss: 0.3223 - val_acc: 0.8782
Epoch 19/30
  - 1s - loss: 0.2767 - acc: 0.8962 - val_loss: 0.3392 - val_acc: 0.8750
Epoch 20/30
  - 1s - loss: 0.2871 - acc: 0.8911 - val_loss: 0.3364 - val_acc: 0.8769
Epoch 21/30
  - 1s - loss: 0.2780 - acc: 0.8987 - val_loss: 0.3378 - val_acc: 0.8731
Epoch 22/30
  - 1s - loss: 0.2683 - acc: 0.8960 - val_loss: 0.3401 - val_acc: 0.8635
Epoch 23/30

```

```

- 1s - loss: 0.2733 - acc: 0.8957 - val_loss: 0.3293 - val_acc: 0.8763
Epoch 24/30
- 1s - loss: 0.2777 - acc: 0.8962 - val_loss: 0.3370 - val_acc: 0.8724
Epoch 25/30
- 1s - loss: 0.2783 - acc: 0.8967 - val_loss: 0.3866 - val_acc: 0.8577
Epoch 26/30
- 1s - loss: 0.2764 - acc: 0.8982 - val_loss: 0.3259 - val_acc: 0.8776
Epoch 27/30
- 1s - loss: 0.2567 - acc: 0.9048 - val_loss: 0.3186 - val_acc: 0.8846
Epoch 28/30
- 1s - loss: 0.2729 - acc: 0.8997 - val_loss: 0.3371 - val_acc: 0.8788
Epoch 29/30
- 1s - loss: 0.2717 - acc: 0.9031 - val_loss: 0.3460 - val_acc: 0.8712
Epoch 30/30
- 1s - loss: 0.2828 - acc: 0.9002 - val_loss: 0.3589 - val_acc: 0.8724
Train accuracy 0.8753380870420457 Test accuracy: 0.8724358974358974
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 24)	2328
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 97,755
Trainable params: 97,755
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 79.4652 - acc: 0.8190 - val_loss: 51.5287 - val_acc: 0.8808
Epoch 2/30
- 1s - loss: 34.1855 - acc: 0.9036 - val_loss: 20.0307 - val_acc: 0.8596
Epoch 3/30
- 1s - loss: 11.9922 - acc: 0.9031 - val_loss: 6.1111 - val_acc: 0.8429
Epoch 4/30
- 1s - loss: 3.2231 - acc: 0.8967 - val_loss: 1.5264 - val_acc: 0.8276

```

Epoch 5/30  
- 1s - loss: 0.7694 - acc: 0.8933 - val\_loss: 0.6135 - val\_acc: 0.8487

Epoch 6/30  
- 1s - loss: 0.3817 - acc: 0.8918 - val\_loss: 0.4667 - val\_acc: 0.8603

Epoch 7/30  
- 1s - loss: 0.3356 - acc: 0.8950 - val\_loss: 0.4181 - val\_acc: 0.8603

Epoch 8/30  
- 1s - loss: 0.3126 - acc: 0.8957 - val\_loss: 0.4520 - val\_acc: 0.8237

Epoch 9/30  
- 1s - loss: 0.3068 - acc: 0.9012 - val\_loss: 0.3998 - val\_acc: 0.8615

Epoch 10/30  
- 1s - loss: 0.3018 - acc: 0.8953 - val\_loss: 0.3765 - val\_acc: 0.8808

Epoch 11/30  
- 1s - loss: 0.2875 - acc: 0.9002 - val\_loss: 0.4068 - val\_acc: 0.8474

Epoch 12/30  
- 1s - loss: 0.2836 - acc: 0.8997 - val\_loss: 0.3538 - val\_acc: 0.8603

Epoch 13/30  
- 1s - loss: 0.2825 - acc: 0.9026 - val\_loss: 0.3350 - val\_acc: 0.8795

Epoch 14/30  
- 1s - loss: 0.2729 - acc: 0.9058 - val\_loss: 0.3877 - val\_acc: 0.8750

Epoch 15/30  
- 1s - loss: 0.2775 - acc: 0.9048 - val\_loss: 0.4551 - val\_acc: 0.8417

Epoch 16/30  
- 1s - loss: 0.2723 - acc: 0.9029 - val\_loss: 0.3352 - val\_acc: 0.8756

Epoch 17/30  
- 1s - loss: 0.2640 - acc: 0.9122 - val\_loss: 0.3509 - val\_acc: 0.8647

Epoch 18/30  
- 1s - loss: 0.2693 - acc: 0.9078 - val\_loss: 0.3204 - val\_acc: 0.8821

Epoch 19/30  
- 1s - loss: 0.2697 - acc: 0.9009 - val\_loss: 0.3268 - val\_acc: 0.8923

Epoch 20/30  
- 1s - loss: 0.2670 - acc: 0.9071 - val\_loss: 0.4416 - val\_acc: 0.8359

Epoch 21/30  
- 1s - loss: 0.2595 - acc: 0.9098 - val\_loss: 0.3762 - val\_acc: 0.8583

Epoch 22/30  
- 1s - loss: 0.2645 - acc: 0.9004 - val\_loss: 0.3243 - val\_acc: 0.8833

Epoch 23/30  
- 1s - loss: 0.2690 - acc: 0.8999 - val\_loss: 0.3198 - val\_acc: 0.8872

Epoch 24/30  
- 1s - loss: 0.2661 - acc: 0.9088 - val\_loss: 0.3728 - val\_acc: 0.8724

Epoch 25/30  
- 1s - loss: 0.2615 - acc: 0.9061 - val\_loss: 0.3471 - val\_acc: 0.8724

Epoch 26/30  
- 1s - loss: 0.2621 - acc: 0.9068 - val\_loss: 0.3437 - val\_acc: 0.8872

Epoch 27/30  
- 1s - loss: 0.2598 - acc: 0.9053 - val\_loss: 0.3159 - val\_acc: 0.8731

Epoch 28/30  
- 1s - loss: 0.2641 - acc: 0.9073 - val\_loss: 0.3220 - val\_acc: 0.8929

Epoch 29/30

- 1s - loss: 0.2564 - acc: 0.9107 - val\_loss: 0.3258 - val\_acc: 0.8910

Epoch 30/30

- 1s - loss: 0.2665 - acc: 0.9112 - val\_loss: 0.3483 - val\_acc: 0.8731

Train accuracy 0.8856651094172608 Test accuracy: 0.8730769230769231

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_2 (Conv1D)	(None, 122, 24)	2328
-----		
dropout_1 (Dropout)	(None, 122, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
-----		
flatten_1 (Flatten)	(None, 1464)	0
-----		
dense_1 (Dense)	(None, 64)	93760
-----		
dense_2 (Dense)	(None, 3)	195
=====		

Total params: 97,755

Trainable params: 97,755

Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 61.2443 - acc: 0.8232 - val\_loss: 23.7625 - val\_acc: 0.8686

Epoch 2/30

- 1s - loss: 10.2820 - acc: 0.8776 - val\_loss: 2.6804 - val\_acc: 0.8641

Epoch 3/30

- 1s - loss: 1.0548 - acc: 0.8719 - val\_loss: 0.6479 - val\_acc: 0.7840

Epoch 4/30

- 1s - loss: 0.4146 - acc: 0.8766 - val\_loss: 0.5441 - val\_acc: 0.8186

Epoch 5/30

- 1s - loss: 0.3523 - acc: 0.8911 - val\_loss: 0.5060 - val\_acc: 0.8410

Epoch 6/30

- 1s - loss: 0.3390 - acc: 0.8901 - val\_loss: 0.4509 - val\_acc: 0.8551

Epoch 7/30

- 1s - loss: 0.3308 - acc: 0.8916 - val\_loss: 0.4191 - val\_acc: 0.8641

Epoch 8/30

- 1s - loss: 0.3229 - acc: 0.8881 - val\_loss: 0.4539 - val\_acc: 0.8179

Epoch 9/30

- 1s - loss: 0.3193 - acc: 0.8935 - val\_loss: 0.4919 - val\_acc: 0.8385

Epoch 10/30

```

- 1s - loss: 0.3183 - acc: 0.8896 - val_loss: 0.4255 - val_acc: 0.8673
Epoch 11/30
- 1s - loss: 0.3095 - acc: 0.8898 - val_loss: 0.4030 - val_acc: 0.8506
Epoch 12/30
- 1s - loss: 0.3103 - acc: 0.8901 - val_loss: 0.3712 - val_acc: 0.8641
Epoch 13/30
- 1s - loss: 0.3004 - acc: 0.8960 - val_loss: 0.3456 - val_acc: 0.8737
Epoch 14/30
- 1s - loss: 0.3141 - acc: 0.8933 - val_loss: 0.4700 - val_acc: 0.8494
Epoch 15/30
- 1s - loss: 0.3094 - acc: 0.8957 - val_loss: 0.3662 - val_acc: 0.8782
Epoch 16/30
- 1s - loss: 0.3056 - acc: 0.8898 - val_loss: 0.3510 - val_acc: 0.8769
Epoch 17/30
- 1s - loss: 0.2934 - acc: 0.8975 - val_loss: 0.3409 - val_acc: 0.8718
Epoch 18/30
- 1s - loss: 0.3041 - acc: 0.8938 - val_loss: 0.3968 - val_acc: 0.8551
Epoch 19/30
- 1s - loss: 0.2965 - acc: 0.8925 - val_loss: 0.3705 - val_acc: 0.8654
Epoch 20/30
- 1s - loss: 0.3006 - acc: 0.8906 - val_loss: 0.3530 - val_acc: 0.8750
Epoch 21/30
- 1s - loss: 0.2923 - acc: 0.8997 - val_loss: 0.3560 - val_acc: 0.8699
Epoch 22/30
- 1s - loss: 0.2953 - acc: 0.8953 - val_loss: 0.3739 - val_acc: 0.8635
Epoch 23/30
- 1s - loss: 0.2996 - acc: 0.8891 - val_loss: 0.3872 - val_acc: 0.8609
Epoch 24/30
- 1s - loss: 0.2901 - acc: 0.8928 - val_loss: 0.4060 - val_acc: 0.8449
Epoch 25/30
- 1s - loss: 0.2986 - acc: 0.8908 - val_loss: 0.3861 - val_acc: 0.8615
Epoch 26/30
- 1s - loss: 0.2980 - acc: 0.8950 - val_loss: 0.3556 - val_acc: 0.8795
Epoch 27/30
- 1s - loss: 0.2881 - acc: 0.8957 - val_loss: 0.3256 - val_acc: 0.8801
Epoch 28/30
- 1s - loss: 0.2954 - acc: 0.8948 - val_loss: 0.3600 - val_acc: 0.8724
Epoch 29/30
- 1s - loss: 0.2936 - acc: 0.8977 - val_loss: 0.3445 - val_acc: 0.8769
Epoch 30/30
- 1s - loss: 0.2940 - acc: 0.8955 - val_loss: 0.3589 - val_acc: 0.8782
Train accuracy 0.880009835259405 Test accuracy: 0.8782051282051282

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 124, 32)            1472
-----

```



conv1d_2 (Conv1D)	(None, 122, 16)	1552
-----		
dropout_1 (Dropout)	(None, 122, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
-----		
flatten_1 (Flatten)	(None, 976)	0
-----		
dense_1 (Dense)	(None, 64)	62528
-----		
dense_2 (Dense)	(None, 3)	195
=====		
Total params: 65,747		
Trainable params: 65,747		
Non-trainable params: 0		
-----		
None		
Train on 4067 samples, validate on 1560 samples		
Epoch 1/30		
- 2s - loss: 15.0350 - acc: 0.8075 - val_loss: 3.2371 - val_acc: 0.8449		
Epoch 2/30		
- 1s - loss: 1.1831 - acc: 0.8694 - val_loss: 0.5183 - val_acc: 0.8609		
Epoch 3/30		
- 1s - loss: 0.4007 - acc: 0.8766 - val_loss: 0.5115 - val_acc: 0.7949		
Epoch 4/30		
- 1s - loss: 0.3665 - acc: 0.8864 - val_loss: 0.4254 - val_acc: 0.8359		
Epoch 5/30		
- 1s - loss: 0.3494 - acc: 0.8803 - val_loss: 0.4174 - val_acc: 0.8724		
Epoch 6/30		
- 1s - loss: 0.3498 - acc: 0.8898 - val_loss: 0.3842 - val_acc: 0.8615		
Epoch 7/30		
- 1s - loss: 0.3331 - acc: 0.8906 - val_loss: 0.4642 - val_acc: 0.8647		
Epoch 8/30		
- 1s - loss: 0.3107 - acc: 0.8943 - val_loss: 0.3988 - val_acc: 0.8417		
Epoch 9/30		
- 1s - loss: 0.3098 - acc: 0.8987 - val_loss: 0.4624 - val_acc: 0.8417		
Epoch 10/30		
- 1s - loss: 0.3091 - acc: 0.8906 - val_loss: 0.7163 - val_acc: 0.7821		
Epoch 11/30		
- 1s - loss: 0.3221 - acc: 0.8913 - val_loss: 0.3589 - val_acc: 0.8737		
Epoch 12/30		
- 1s - loss: 0.2937 - acc: 0.8975 - val_loss: 0.3452 - val_acc: 0.8782		
Epoch 13/30		
- 1s - loss: 0.3028 - acc: 0.8997 - val_loss: 0.3415 - val_acc: 0.8814		
Epoch 14/30		
- 1s - loss: 0.2918 - acc: 0.9019 - val_loss: 0.4030 - val_acc: 0.8635		
Epoch 15/30		
- 1s - loss: 0.2998 - acc: 0.8977 - val_loss: 0.3434 - val_acc: 0.8731		

```

Epoch 16/30
- 1s - loss: 0.3080 - acc: 0.8962 - val_loss: 0.3744 - val_acc: 0.8776
Epoch 17/30
- 1s - loss: 0.2883 - acc: 0.9041 - val_loss: 0.3440 - val_acc: 0.8737
Epoch 18/30
- 1s - loss: 0.2903 - acc: 0.9007 - val_loss: 0.5757 - val_acc: 0.8635
Epoch 19/30
- 1s - loss: 0.3157 - acc: 0.8962 - val_loss: 0.3680 - val_acc: 0.8724
Epoch 20/30
- 1s - loss: 0.2900 - acc: 0.9004 - val_loss: 0.3570 - val_acc: 0.8731
Epoch 21/30
- 1s - loss: 0.2965 - acc: 0.9031 - val_loss: 0.3450 - val_acc: 0.8801
Epoch 22/30
- 1s - loss: 0.2949 - acc: 0.9031 - val_loss: 0.3578 - val_acc: 0.8833
Epoch 23/30
- 1s - loss: 0.2877 - acc: 0.9044 - val_loss: 0.3655 - val_acc: 0.8756
Epoch 24/30
- 1s - loss: 0.2933 - acc: 0.9016 - val_loss: 0.3481 - val_acc: 0.8859
Epoch 25/30
- 1s - loss: 0.2786 - acc: 0.9021 - val_loss: 0.3282 - val_acc: 0.8744
Epoch 26/30
- 1s - loss: 0.2932 - acc: 0.9061 - val_loss: 0.3638 - val_acc: 0.8814
Epoch 27/30
- 1s - loss: 0.2989 - acc: 0.8992 - val_loss: 0.3777 - val_acc: 0.8821
Epoch 28/30
- 1s - loss: 0.2799 - acc: 0.9073 - val_loss: 0.3279 - val_acc: 0.8968
Epoch 29/30
- 1s - loss: 0.2758 - acc: 0.9100 - val_loss: 0.3359 - val_acc: 0.8827
Epoch 30/30
- 1s - loss: 0.2939 - acc: 0.9021 - val_loss: 0.3142 - val_acc: 0.8878
Train accuracy 0.9203343988197689 Test accuracy: 0.8878205128205128

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 65,747
Trainable params: 65,747
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 53.2061 - acc: 0.7927 - val_loss: 19.2166 - val_acc: 0.8776
Epoch 2/30
  - 1s - loss: 7.6087 - acc: 0.8687 - val_loss: 1.4357 - val_acc: 0.8718
Epoch 3/30
  - 1s - loss: 0.6387 - acc: 0.8687 - val_loss: 0.5616 - val_acc: 0.7846
Epoch 4/30
  - 1s - loss: 0.3894 - acc: 0.8815 - val_loss: 0.5348 - val_acc: 0.7808
Epoch 5/30
  - 1s - loss: 0.3512 - acc: 0.8857 - val_loss: 0.4411 - val_acc: 0.8436
Epoch 6/30
  - 1s - loss: 0.3315 - acc: 0.8891 - val_loss: 0.4119 - val_acc: 0.8506
Epoch 7/30
  - 1s - loss: 0.3304 - acc: 0.8869 - val_loss: 0.3660 - val_acc: 0.8853
Epoch 8/30
  - 1s - loss: 0.3259 - acc: 0.8933 - val_loss: 0.4755 - val_acc: 0.8045
Epoch 9/30
  - 1s - loss: 0.3267 - acc: 0.8916 - val_loss: 0.3950 - val_acc: 0.8583
Epoch 10/30
  - 1s - loss: 0.3213 - acc: 0.8874 - val_loss: 0.3607 - val_acc: 0.8724
Epoch 11/30
  - 1s - loss: 0.3154 - acc: 0.8901 - val_loss: 0.4196 - val_acc: 0.8513
Epoch 12/30
  - 1s - loss: 0.3189 - acc: 0.8886 - val_loss: 0.4089 - val_acc: 0.8545
Epoch 13/30
  - 1s - loss: 0.3138 - acc: 0.8913 - val_loss: 0.3721 - val_acc: 0.8769
Epoch 14/30
  - 1s - loss: 0.3051 - acc: 0.8970 - val_loss: 0.6546 - val_acc: 0.7577
Epoch 15/30
  - 1s - loss: 0.3136 - acc: 0.8871 - val_loss: 0.4367 - val_acc: 0.8372
Epoch 16/30
  - 1s - loss: 0.3245 - acc: 0.8857 - val_loss: 0.3434 - val_acc: 0.8724
Epoch 17/30
  - 1s - loss: 0.2984 - acc: 0.8975 - val_loss: 0.3368 - val_acc: 0.8731
Epoch 18/30
  - 1s - loss: 0.3282 - acc: 0.8866 - val_loss: 0.4201 - val_acc: 0.8558
Epoch 19/30
  - 1s - loss: 0.3111 - acc: 0.8891 - val_loss: 0.3868 - val_acc: 0.8622
Epoch 20/30
  - 1s - loss: 0.3042 - acc: 0.8935 - val_loss: 0.9469 - val_acc: 0.6705
Epoch 21/30

```

```

- 1s - loss: 0.3134 - acc: 0.8859 - val_loss: 0.3585 - val_acc: 0.8667
Epoch 22/30
- 1s - loss: 0.2963 - acc: 0.8965 - val_loss: 0.3386 - val_acc: 0.8808
Epoch 23/30
- 1s - loss: 0.3086 - acc: 0.8898 - val_loss: 0.3380 - val_acc: 0.8808
Epoch 24/30
- 1s - loss: 0.3120 - acc: 0.8916 - val_loss: 0.3947 - val_acc: 0.8622
Epoch 25/30
- 1s - loss: 0.3002 - acc: 0.8908 - val_loss: 0.4136 - val_acc: 0.8538
Epoch 26/30
- 1s - loss: 0.2991 - acc: 0.8965 - val_loss: 0.3758 - val_acc: 0.8744
Epoch 27/30
- 1s - loss: 0.2892 - acc: 0.8977 - val_loss: 0.3328 - val_acc: 0.8795
Epoch 28/30
- 1s - loss: 0.3078 - acc: 0.8943 - val_loss: 0.3520 - val_acc: 0.8756
Epoch 29/30
- 1s - loss: 0.3021 - acc: 0.9002 - val_loss: 0.3631 - val_acc: 0.8718
Epoch 30/30
- 1s - loss: 0.3060 - acc: 0.8894 - val_loss: 0.4888 - val_acc: 0.8391
Train accuracy 0.843865256946152 Test accuracy: 0.8391025641025641
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 24)	2328
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

```

Total params: 97,755
Trainable params: 97,755
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 14.9010 - acc: 0.8439 - val_loss: 1.7914 - val_acc: 0.8442
Epoch 2/30
- 1s - loss: 0.9005 - acc: 0.8776 - val_loss: 0.6297 - val_acc: 0.8833

```

Epoch 3/30  
- 1s - loss: 0.4880 - acc: 0.8970 - val\_loss: 0.5680 - val\_acc: 0.8442  
Epoch 4/30  
- 1s - loss: 0.4149 - acc: 0.9009 - val\_loss: 0.4602 - val\_acc: 0.8494  
Epoch 5/30  
- 1s - loss: 0.3439 - acc: 0.8999 - val\_loss: 0.3831 - val\_acc: 0.8744  
Epoch 6/30  
- 1s - loss: 0.3072 - acc: 0.9083 - val\_loss: 0.3455 - val\_acc: 0.8891  
Epoch 7/30  
- 1s - loss: 0.3105 - acc: 0.9041 - val\_loss: 0.3369 - val\_acc: 0.8929  
Epoch 8/30  
- 1s - loss: 0.3173 - acc: 0.9068 - val\_loss: 0.5060 - val\_acc: 0.8237  
Epoch 9/30  
- 1s - loss: 0.3005 - acc: 0.9105 - val\_loss: 0.3260 - val\_acc: 0.8910  
Epoch 10/30  
- 1s - loss: 0.3013 - acc: 0.9073 - val\_loss: 0.3821 - val\_acc: 0.8673  
Epoch 11/30  
- 1s - loss: 0.2934 - acc: 0.9056 - val\_loss: 0.3504 - val\_acc: 0.8731  
Epoch 12/30  
- 1s - loss: 0.2800 - acc: 0.9090 - val\_loss: 0.3297 - val\_acc: 0.8936  
Epoch 13/30  
- 1s - loss: 0.2861 - acc: 0.9122 - val\_loss: 0.3351 - val\_acc: 0.8840  
Epoch 14/30  
- 1s - loss: 0.2918 - acc: 0.9147 - val\_loss: 0.3388 - val\_acc: 0.8897  
Epoch 15/30  
- 1s - loss: 0.2746 - acc: 0.9100 - val\_loss: 0.3878 - val\_acc: 0.8647  
Epoch 16/30  
- 1s - loss: 0.2795 - acc: 0.9115 - val\_loss: 0.3558 - val\_acc: 0.8776  
Epoch 17/30  
- 1s - loss: 0.2522 - acc: 0.9196 - val\_loss: 0.3607 - val\_acc: 0.8615  
Epoch 18/30  
- 1s - loss: 0.2591 - acc: 0.9162 - val\_loss: 0.3016 - val\_acc: 0.8917  
Epoch 19/30  
- 1s - loss: 0.2802 - acc: 0.9056 - val\_loss: 0.3431 - val\_acc: 0.8744  
Epoch 20/30  
- 1s - loss: 0.2516 - acc: 0.9196 - val\_loss: 1.5613 - val\_acc: 0.6301  
Epoch 21/30  
- 1s - loss: 0.2797 - acc: 0.9164 - val\_loss: 0.3422 - val\_acc: 0.8712  
Epoch 22/30  
- 1s - loss: 0.2568 - acc: 0.9127 - val\_loss: 0.3241 - val\_acc: 0.8808  
Epoch 23/30  
- 1s - loss: 0.2501 - acc: 0.9191 - val\_loss: 0.2901 - val\_acc: 0.9045  
Epoch 24/30  
- 1s - loss: 0.2590 - acc: 0.9179 - val\_loss: 0.3032 - val\_acc: 0.9096  
Epoch 25/30  
- 1s - loss: 0.2605 - acc: 0.9230 - val\_loss: 0.6357 - val\_acc: 0.8237  
Epoch 26/30  
- 1s - loss: 0.2657 - acc: 0.9164 - val\_loss: 0.2888 - val\_acc: 0.9109

Epoch 27/30  
 - 1s - loss: 0.2391 - acc: 0.9248 - val\_loss: 0.4405 - val\_acc: 0.8801  
 Epoch 28/30  
 - 1s - loss: 0.2524 - acc: 0.9248 - val\_loss: 0.2829 - val\_acc: 0.9006  
 Epoch 29/30  
 - 1s - loss: 0.2635 - acc: 0.9201 - val\_loss: 0.2846 - val\_acc: 0.9058  
 Epoch 30/30  
 - 1s - loss: 0.2428 - acc: 0.9233 - val\_loss: 0.3520 - val\_acc: 0.8942  
 Train accuracy 0.8979591836734694 Test accuracy: 0.8942307692307693

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 24)	2328
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 24)	0
flatten_1 (Flatten)	(None, 576)	0
dense_1 (Dense)	(None, 64)	36928
dense_2 (Dense)	(None, 3)	195

Total params: 40,923  
 Trainable params: 40,923  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/30  
 - 2s - loss: 71.0170 - acc: 0.8212 - val\_loss: 50.0453 - val\_acc: 0.8590  
 Epoch 2/30  
 - 1s - loss: 35.7718 - acc: 0.8985 - val\_loss: 23.6875 - val\_acc: 0.8526  
 Epoch 3/30  
 - 1s - loss: 15.7852 - acc: 0.9039 - val\_loss: 9.6487 - val\_acc: 0.8474  
 Epoch 4/30  
 - 1s - loss: 5.9161 - acc: 0.9098 - val\_loss: 3.4132 - val\_acc: 0.8429  
 Epoch 5/30  
 - 1s - loss: 1.9134 - acc: 0.8997 - val\_loss: 1.1500 - val\_acc: 0.8654  
 Epoch 6/30  
 - 1s - loss: 0.6184 - acc: 0.8982 - val\_loss: 0.5992 - val\_acc: 0.8583  
 Epoch 7/30  
 - 1s - loss: 0.3711 - acc: 0.8960 - val\_loss: 0.4878 - val\_acc: 0.8635  
 Epoch 8/30

```

- 1s - loss: 0.3242 - acc: 0.8965 - val_loss: 0.4754 - val_acc: 0.8365
Epoch 9/30
- 1s - loss: 0.3117 - acc: 0.9046 - val_loss: 0.4711 - val_acc: 0.8647
Epoch 10/30
- 1s - loss: 0.3015 - acc: 0.9002 - val_loss: 0.4409 - val_acc: 0.8628
Epoch 11/30
- 1s - loss: 0.2860 - acc: 0.9009 - val_loss: 0.4500 - val_acc: 0.8686
Epoch 12/30
- 1s - loss: 0.2817 - acc: 0.9004 - val_loss: 0.4095 - val_acc: 0.8712
Epoch 13/30
- 1s - loss: 0.2776 - acc: 0.9061 - val_loss: 0.3941 - val_acc: 0.8660
Epoch 14/30
- 1s - loss: 0.2705 - acc: 0.9056 - val_loss: 0.5141 - val_acc: 0.8340
Epoch 15/30
- 1s - loss: 0.2737 - acc: 0.9048 - val_loss: 0.4842 - val_acc: 0.8436
Epoch 16/30
- 1s - loss: 0.2699 - acc: 0.9012 - val_loss: 0.3894 - val_acc: 0.8788
Epoch 17/30
- 1s - loss: 0.2655 - acc: 0.9063 - val_loss: 0.3820 - val_acc: 0.8660
Epoch 18/30
- 1s - loss: 0.2620 - acc: 0.9044 - val_loss: 0.3878 - val_acc: 0.8821
Epoch 19/30
- 1s - loss: 0.2657 - acc: 0.9007 - val_loss: 0.3938 - val_acc: 0.8737
Epoch 20/30
- 1s - loss: 0.2639 - acc: 0.9021 - val_loss: 0.4405 - val_acc: 0.8635
Epoch 21/30
- 1s - loss: 0.2583 - acc: 0.9085 - val_loss: 0.3702 - val_acc: 0.8788
Epoch 22/30
- 1s - loss: 0.2612 - acc: 0.8997 - val_loss: 0.3859 - val_acc: 0.8763
Epoch 23/30
- 1s - loss: 0.2679 - acc: 0.9021 - val_loss: 0.3955 - val_acc: 0.8673
Epoch 24/30
- 1s - loss: 0.2617 - acc: 0.9031 - val_loss: 0.3930 - val_acc: 0.8744
Epoch 25/30
- 1s - loss: 0.2614 - acc: 0.9009 - val_loss: 0.3939 - val_acc: 0.8468
Epoch 26/30
- 1s - loss: 0.2618 - acc: 0.9031 - val_loss: 0.3727 - val_acc: 0.8801
Epoch 27/30
- 1s - loss: 0.2537 - acc: 0.9053 - val_loss: 0.3554 - val_acc: 0.8782
Epoch 28/30
- 1s - loss: 0.2592 - acc: 0.9014 - val_loss: 0.3716 - val_acc: 0.8821
Epoch 29/30
- 1s - loss: 0.2524 - acc: 0.9103 - val_loss: 0.3843 - val_acc: 0.8795
Epoch 30/30
- 1s - loss: 0.2638 - acc: 0.9053 - val_loss: 0.3758 - val_acc: 0.8654
Train accuracy 0.8805015982296533 Test accuracy: 0.8653846153846154
-----
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

Total params: 65,299

Trainable params: 65,299

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 20.1676 - acc: 0.8195 - val\_loss: 12.1608 - val\_acc: 0.8814

Epoch 2/30

- 1s - loss: 7.5587 - acc: 0.9075 - val\_loss: 4.0569 - val\_acc: 0.8885

Epoch 3/30

- 1s - loss: 2.2772 - acc: 0.9147 - val\_loss: 1.2692 - val\_acc: 0.8410

Epoch 4/30

- 1s - loss: 0.7602 - acc: 0.9137 - val\_loss: 0.6731 - val\_acc: 0.8558

Epoch 5/30

- 1s - loss: 0.4574 - acc: 0.9142 - val\_loss: 0.4755 - val\_acc: 0.8788

Epoch 6/30

- 1s - loss: 0.3703 - acc: 0.9132 - val\_loss: 0.3895 - val\_acc: 0.8795

Epoch 7/30

- 1s - loss: 0.3171 - acc: 0.9159 - val\_loss: 0.4396 - val\_acc: 0.8833

Epoch 8/30

- 1s - loss: 0.2942 - acc: 0.9218 - val\_loss: 0.3892 - val\_acc: 0.8756

Epoch 9/30

- 1s - loss: 0.2816 - acc: 0.9225 - val\_loss: 0.3432 - val\_acc: 0.8782

Epoch 10/30

- 1s - loss: 0.2678 - acc: 0.9201 - val\_loss: 0.3595 - val\_acc: 0.8750

Epoch 11/30

- 1s - loss: 0.2477 - acc: 0.9233 - val\_loss: 0.3044 - val\_acc: 0.8801

Epoch 12/30

- 1s - loss: 0.2514 - acc: 0.9243 - val\_loss: 0.3149 - val\_acc: 0.8897

Epoch 13/30

- 1s - loss: 0.2375 - acc: 0.9284 - val\_loss: 0.3314 - val\_acc: 0.8904



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Epoch 14/30
- 1s - loss: 0.2284 - acc: 0.9324 - val_loss: 0.3440 - val_acc: 0.8788
Epoch 15/30
- 1s - loss: 0.2318 - acc: 0.9297 - val_loss: 0.3010 - val_acc: 0.8904
Epoch 16/30
- 1s - loss: 0.2394 - acc: 0.9314 - val_loss: 0.2788 - val_acc: 0.8942
Epoch 17/30
- 1s - loss: 0.2280 - acc: 0.9299 - val_loss: 0.3001 - val_acc: 0.8859
Epoch 18/30
- 1s - loss: 0.2112 - acc: 0.9324 - val_loss: 0.3149 - val_acc: 0.8923
Epoch 19/30
- 1s - loss: 0.2209 - acc: 0.9287 - val_loss: 0.2559 - val_acc: 0.9282
Epoch 20/30
- 1s - loss: 0.2130 - acc: 0.9302 - val_loss: 0.2776 - val_acc: 0.8942
Epoch 21/30
- 1s - loss: 0.2069 - acc: 0.9356 - val_loss: 0.2749 - val_acc: 0.9109
Epoch 22/30
- 1s - loss: 0.2061 - acc: 0.9356 - val_loss: 0.2785 - val_acc: 0.8968
Epoch 23/30
- 1s - loss: 0.2095 - acc: 0.9343 - val_loss: 0.2510 - val_acc: 0.9250
Epoch 24/30
- 1s - loss: 0.2068 - acc: 0.9343 - val_loss: 0.2533 - val_acc: 0.9192
Epoch 25/30
- 1s - loss: 0.2019 - acc: 0.9361 - val_loss: 0.2791 - val_acc: 0.8865
Epoch 26/30
- 1s - loss: 0.1959 - acc: 0.9368 - val_loss: 0.2559 - val_acc: 0.9263
Epoch 27/30
- 1s - loss: 0.1983 - acc: 0.9366 - val_loss: 0.2942 - val_acc: 0.8846
Epoch 28/30
- 1s - loss: 0.1954 - acc: 0.9420 - val_loss: 0.2291 - val_acc: 0.9282
Epoch 29/30
- 1s - loss: 0.2069 - acc: 0.9400 - val_loss: 0.2365 - val_acc: 0.9276
Epoch 30/30
- 1s - loss: 0.1905 - acc: 0.9400 - val_loss: 0.2774 - val_acc: 0.9186
Train accuracy 0.929186132284239 Test accuracy: 0.9185897435897435

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0

---

```

-----
dense_1 (Dense)                (None, 16)                15376
-----
dense_2 (Dense)                (None, 3)                  51
=====
Total params: 19,027
Trainable params: 19,027
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 15.7528 - acc: 0.8264 - val_loss: 7.2308 - val_acc: 0.8872
Epoch 2/30
  - 1s - loss: 3.5738 - acc: 0.9026 - val_loss: 1.3650 - val_acc: 0.8776
Epoch 3/30
  - 1s - loss: 0.7648 - acc: 0.9036 - val_loss: 0.6155 - val_acc: 0.8269
Epoch 4/30
  - 1s - loss: 0.4270 - acc: 0.9068 - val_loss: 0.4895 - val_acc: 0.8353
Epoch 5/30
  - 1s - loss: 0.3540 - acc: 0.9073 - val_loss: 0.4180 - val_acc: 0.8878
Epoch 6/30
  - 1s - loss: 0.3276 - acc: 0.9085 - val_loss: 0.3443 - val_acc: 0.8904
Epoch 7/30
  - 1s - loss: 0.3088 - acc: 0.9103 - val_loss: 0.4154 - val_acc: 0.8782
Epoch 8/30
  - 1s - loss: 0.2805 - acc: 0.9191 - val_loss: 0.4772 - val_acc: 0.8340
Epoch 9/30
  - 1s - loss: 0.2973 - acc: 0.9103 - val_loss: 0.3851 - val_acc: 0.8654
Epoch 10/30
  - 1s - loss: 0.2680 - acc: 0.9149 - val_loss: 0.3100 - val_acc: 0.8865
Epoch 11/30
  - 1s - loss: 0.2537 - acc: 0.9142 - val_loss: 0.3697 - val_acc: 0.8692
Epoch 12/30
  - 1s - loss: 0.2649 - acc: 0.9152 - val_loss: 0.3314 - val_acc: 0.8929
Epoch 13/30
  - 1s - loss: 0.2539 - acc: 0.9208 - val_loss: 0.4494 - val_acc: 0.8654
Epoch 14/30
  - 1s - loss: 0.2456 - acc: 0.9233 - val_loss: 0.4232 - val_acc: 0.8532
Epoch 15/30
  - 1s - loss: 0.2437 - acc: 0.9162 - val_loss: 0.3855 - val_acc: 0.8756
Epoch 16/30
  - 1s - loss: 0.2313 - acc: 0.9257 - val_loss: 0.3500 - val_acc: 0.8731
Epoch 17/30
  - 1s - loss: 0.2329 - acc: 0.9250 - val_loss: 0.3903 - val_acc: 0.8692
Epoch 18/30
  - 1s - loss: 0.2281 - acc: 0.9270 - val_loss: 0.3893 - val_acc: 0.9045
Epoch 19/30

```

```

- 1s - loss: 0.2453 - acc: 0.9179 - val_loss: 0.3011 - val_acc: 0.9135
Epoch 20/30
- 1s - loss: 0.2280 - acc: 0.9265 - val_loss: 0.3024 - val_acc: 0.8878
Epoch 21/30
- 1s - loss: 0.2312 - acc: 0.9270 - val_loss: 0.4253 - val_acc: 0.8776
Epoch 22/30
- 1s - loss: 0.2238 - acc: 0.9260 - val_loss: 0.3246 - val_acc: 0.9096
Epoch 23/30
- 1s - loss: 0.2304 - acc: 0.9260 - val_loss: 0.2906 - val_acc: 0.9122
Epoch 24/30
- 1s - loss: 0.2246 - acc: 0.9275 - val_loss: 0.3034 - val_acc: 0.9096
Epoch 25/30
- 1s - loss: 0.2180 - acc: 0.9284 - val_loss: 0.3963 - val_acc: 0.8673
Epoch 26/30
- 1s - loss: 0.2218 - acc: 0.9277 - val_loss: 0.3037 - val_acc: 0.9045
Epoch 27/30
- 1s - loss: 0.2208 - acc: 0.9289 - val_loss: 0.3251 - val_acc: 0.8891
Epoch 28/30
- 1s - loss: 0.2164 - acc: 0.9336 - val_loss: 0.2786 - val_acc: 0.9179
Epoch 29/30
- 1s - loss: 0.2096 - acc: 0.9302 - val_loss: 0.2692 - val_acc: 0.9115
Epoch 30/30
- 1s - loss: 0.2201 - acc: 0.9309 - val_loss: 0.3849 - val_acc: 0.8756
Train accuracy 0.9242685025817556 Test accuracy: 0.8756410256410256

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples

```

Epoch 1/30  
 - 2s - loss: 23.6532 - acc: 0.8190 - val\_loss: 12.1490 - val\_acc: 0.8718

Epoch 2/30  
 - 1s - loss: 6.5479 - acc: 0.9002 - val\_loss: 2.7941 - val\_acc: 0.8808

Epoch 3/30  
 - 1s - loss: 1.4933 - acc: 0.9048 - val\_loss: 0.9421 - val\_acc: 0.8410

Epoch 4/30  
 - 1s - loss: 0.6547 - acc: 0.9127 - val\_loss: 0.7080 - val\_acc: 0.8340

Epoch 5/30  
 - 1s - loss: 0.4958 - acc: 0.9110 - val\_loss: 0.5537 - val\_acc: 0.8609

Epoch 6/30  
 - 1s - loss: 0.4110 - acc: 0.9144 - val\_loss: 0.5045 - val\_acc: 0.8750

Epoch 7/30  
 - 1s - loss: 0.3609 - acc: 0.9134 - val\_loss: 0.4677 - val\_acc: 0.8712

Epoch 8/30  
 - 1s - loss: 0.3214 - acc: 0.9253 - val\_loss: 0.5251 - val\_acc: 0.8526

Epoch 9/30  
 - 1s - loss: 0.3031 - acc: 0.9253 - val\_loss: 0.3474 - val\_acc: 0.8974

Epoch 10/30  
 - 1s - loss: 0.3106 - acc: 0.9230 - val\_loss: 0.4111 - val\_acc: 0.8782

Epoch 11/30  
 - 1s - loss: 0.2623 - acc: 0.9329 - val\_loss: 0.3150 - val\_acc: 0.8968

Epoch 12/30  
 - 1s - loss: 0.2667 - acc: 0.9265 - val\_loss: 0.3016 - val\_acc: 0.9237

Epoch 13/30  
 - 1s - loss: 0.2551 - acc: 0.9331 - val\_loss: 0.3220 - val\_acc: 0.8955

Epoch 14/30  
 - 1s - loss: 0.2450 - acc: 0.9390 - val\_loss: 0.3132 - val\_acc: 0.9263

Epoch 15/30  
 - 1s - loss: 0.2371 - acc: 0.9378 - val\_loss: 0.3328 - val\_acc: 0.8878

Epoch 16/30  
 - 1s - loss: 0.2316 - acc: 0.9358 - val\_loss: 0.3208 - val\_acc: 0.8865

Epoch 17/30  
 - 1s - loss: 0.2305 - acc: 0.9366 - val\_loss: 0.2932 - val\_acc: 0.8929

Epoch 18/30  
 - 1s - loss: 0.2145 - acc: 0.9393 - val\_loss: 0.2637 - val\_acc: 0.9103

Epoch 19/30  
 - 1s - loss: 0.2192 - acc: 0.9316 - val\_loss: 0.2600 - val\_acc: 0.9365

Epoch 20/30  
 - 1s - loss: 0.2156 - acc: 0.9407 - val\_loss: 0.5189 - val\_acc: 0.7872

Epoch 21/30  
 - 1s - loss: 0.2113 - acc: 0.9398 - val\_loss: 0.2431 - val\_acc: 0.9269

Epoch 22/30  
 - 1s - loss: 0.2003 - acc: 0.9427 - val\_loss: 0.2712 - val\_acc: 0.8968

Epoch 23/30  
 - 1s - loss: 0.2031 - acc: 0.9403 - val\_loss: 0.2327 - val\_acc: 0.9359

Epoch 24/30  
 - 1s - loss: 0.2010 - acc: 0.9420 - val\_loss: 0.2344 - val\_acc: 0.9385

Epoch 25/30  
 - 1s - loss: 0.1952 - acc: 0.9430 - val\_loss: 0.2654 - val\_acc: 0.8968  
 Epoch 26/30  
 - 1s - loss: 0.1947 - acc: 0.9439 - val\_loss: 0.2209 - val\_acc: 0.9436  
 Epoch 27/30  
 - 1s - loss: 0.1870 - acc: 0.9427 - val\_loss: 0.2639 - val\_acc: 0.8974  
 Epoch 28/30  
 - 1s - loss: 0.2050 - acc: 0.9452 - val\_loss: 0.2256 - val\_acc: 0.9423  
 Epoch 29/30  
 - 1s - loss: 0.1926 - acc: 0.9454 - val\_loss: 0.2427 - val\_acc: 0.9308  
 Epoch 30/30  
 - 1s - loss: 0.1882 - acc: 0.9457 - val\_loss: 0.2380 - val\_acc: 0.9372  
 Train accuracy 0.9402507991148267 Test accuracy: 0.9371794871794872

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

---

Total params: 65,299  
 Trainable params: 65,299  
 Non-trainable params: 0

---

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/30  
 - 2s - loss: 17.9677 - acc: 0.8284 - val\_loss: 4.9731 - val\_acc: 0.8000  
 Epoch 2/30  
 - 1s - loss: 1.9262 - acc: 0.8835 - val\_loss: 0.7557 - val\_acc: 0.8763  
 Epoch 3/30  
 - 1s - loss: 0.6134 - acc: 0.8955 - val\_loss: 0.8107 - val\_acc: 0.8385  
 Epoch 4/30  
 - 1s - loss: 0.4918 - acc: 0.9024 - val\_loss: 0.4840 - val\_acc: 0.8660  
 Epoch 5/30  
 - 1s - loss: 0.3834 - acc: 0.9048 - val\_loss: 0.4472 - val\_acc: 0.8724  
 Epoch 6/30

- 1s - loss: 0.3802 - acc: 0.9009 - val\_loss: 0.3854 - val\_acc: 0.8686  
 Epoch 7/30  
 - 1s - loss: 0.3115 - acc: 0.9090 - val\_loss: 0.3631 - val\_acc: 0.8859  
 Epoch 8/30  
 - 1s - loss: 0.2908 - acc: 0.9152 - val\_loss: 0.3974 - val\_acc: 0.8756  
 Epoch 9/30  
 - 1s - loss: 0.2969 - acc: 0.9144 - val\_loss: 0.3832 - val\_acc: 0.8699  
 Epoch 10/30  
 - 1s - loss: 0.2744 - acc: 0.9201 - val\_loss: 0.3076 - val\_acc: 0.9006  
 Epoch 11/30  
 - 1s - loss: 0.2970 - acc: 0.9149 - val\_loss: 0.3276 - val\_acc: 0.8808  
 Epoch 12/30  
 - 1s - loss: 0.2914 - acc: 0.9152 - val\_loss: 0.3533 - val\_acc: 0.8974  
 Epoch 13/30  
 - 1s - loss: 0.2475 - acc: 0.9211 - val\_loss: 0.3058 - val\_acc: 0.8929  
 Epoch 14/30  
 - 1s - loss: 0.2497 - acc: 0.9245 - val\_loss: 0.2987 - val\_acc: 0.9173  
 Epoch 15/30  
 - 1s - loss: 0.2369 - acc: 0.9265 - val\_loss: 0.3861 - val\_acc: 0.8795  
 Epoch 16/30  
 - 1s - loss: 0.2329 - acc: 0.9272 - val\_loss: 0.2732 - val\_acc: 0.9135  
 Epoch 17/30  
 - 1s - loss: 0.2306 - acc: 0.9262 - val\_loss: 0.2879 - val\_acc: 0.8981  
 Epoch 18/30  
 - 1s - loss: 0.2359 - acc: 0.9265 - val\_loss: 0.2749 - val\_acc: 0.9019  
 Epoch 19/30  
 - 1s - loss: 0.2264 - acc: 0.9235 - val\_loss: 0.2562 - val\_acc: 0.9237  
 Epoch 20/30  
 - 1s - loss: 0.2224 - acc: 0.9321 - val\_loss: 0.2663 - val\_acc: 0.8981  
 Epoch 21/30  
 - 1s - loss: 0.2072 - acc: 0.9378 - val\_loss: 0.2707 - val\_acc: 0.9090  
 Epoch 22/30  
 - 1s - loss: 0.2216 - acc: 0.9312 - val\_loss: 0.3145 - val\_acc: 0.9109  
 Epoch 23/30  
 - 1s - loss: 0.2101 - acc: 0.9393 - val\_loss: 0.2662 - val\_acc: 0.9135  
 Epoch 24/30  
 - 1s - loss: 0.2123 - acc: 0.9358 - val\_loss: 0.2668 - val\_acc: 0.9199  
 Epoch 25/30  
 - 1s - loss: 0.2111 - acc: 0.9351 - val\_loss: 0.2757 - val\_acc: 0.9013  
 Epoch 26/30  
 - 1s - loss: 0.2172 - acc: 0.9378 - val\_loss: 0.2605 - val\_acc: 0.9276  
 Epoch 27/30  
 - 1s - loss: 0.1982 - acc: 0.9358 - val\_loss: 0.2438 - val\_acc: 0.9346  
 Epoch 28/30  
 - 1s - loss: 0.2131 - acc: 0.9412 - val\_loss: 0.2485 - val\_acc: 0.9244  
 Epoch 29/30  
 - 1s - loss: 0.1959 - acc: 0.9410 - val\_loss: 0.2885 - val\_acc: 0.8891  
 Epoch 30/30

- 1s - loss: 0.1971 - acc: 0.9388 - val\_loss: 0.3031 - val\_acc: 0.9250  
Train accuracy 0.9343496434718466 Test accuracy: 0.925

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 64)	24640
dense_2 (Dense)	(None, 3)	195

Total params: 28,435  
Trainable params: 28,435  
Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 17.8459 - acc: 0.8124 - val\_loss: 3.8668 - val\_acc: 0.8308

Epoch 2/30

- 1s - loss: 1.2830 - acc: 0.8798 - val\_loss: 0.5506 - val\_acc: 0.8609

Epoch 3/30

- 1s - loss: 0.3792 - acc: 0.8876 - val\_loss: 0.5167 - val\_acc: 0.8173

Epoch 4/30

- 1s - loss: 0.3521 - acc: 0.8938 - val\_loss: 0.4659 - val\_acc: 0.8147

Epoch 5/30

- 1s - loss: 0.3245 - acc: 0.8921 - val\_loss: 0.4412 - val\_acc: 0.8462

Epoch 6/30

- 1s - loss: 0.3144 - acc: 0.8913 - val\_loss: 0.3906 - val\_acc: 0.8699

Epoch 7/30

- 1s - loss: 0.3093 - acc: 0.8908 - val\_loss: 0.3858 - val\_acc: 0.8731

Epoch 8/30

- 1s - loss: 0.3049 - acc: 0.8987 - val\_loss: 0.4253 - val\_acc: 0.8417

Epoch 9/30

- 1s - loss: 0.2944 - acc: 0.9009 - val\_loss: 0.3703 - val\_acc: 0.8686

Epoch 10/30

- 1s - loss: 0.2955 - acc: 0.8965 - val\_loss: 0.5077 - val\_acc: 0.8308

Epoch 11/30

- 1s - loss: 0.2904 - acc: 0.8953 - val\_loss: 0.3701 - val\_acc: 0.8795

```

Epoch 12/30
- 1s - loss: 0.2981 - acc: 0.8975 - val_loss: 0.3461 - val_acc: 0.8808
Epoch 13/30
- 1s - loss: 0.2790 - acc: 0.9061 - val_loss: 0.3267 - val_acc: 0.8769
Epoch 14/30
- 1s - loss: 0.2726 - acc: 0.9002 - val_loss: 0.4684 - val_acc: 0.8224
Epoch 15/30
- 1s - loss: 0.2821 - acc: 0.8972 - val_loss: 0.4553 - val_acc: 0.8051
Epoch 16/30
- 1s - loss: 0.2821 - acc: 0.8962 - val_loss: 0.3361 - val_acc: 0.8795
Epoch 17/30
- 1s - loss: 0.2796 - acc: 0.9014 - val_loss: 0.3614 - val_acc: 0.8571
Epoch 18/30
- 1s - loss: 0.2751 - acc: 0.8997 - val_loss: 0.3240 - val_acc: 0.8846
Epoch 19/30
- 1s - loss: 0.2799 - acc: 0.8982 - val_loss: 0.3558 - val_acc: 0.8827
Epoch 20/30
- 1s - loss: 0.2748 - acc: 0.9036 - val_loss: 0.3383 - val_acc: 0.8821
Epoch 21/30
- 1s - loss: 0.2636 - acc: 0.9048 - val_loss: 0.3341 - val_acc: 0.8731
Epoch 22/30
- 1s - loss: 0.2685 - acc: 0.8992 - val_loss: 0.3233 - val_acc: 0.8833
Epoch 23/30
- 1s - loss: 0.2688 - acc: 0.8950 - val_loss: 0.3434 - val_acc: 0.8859
Epoch 24/30
- 1s - loss: 0.2663 - acc: 0.9048 - val_loss: 0.3605 - val_acc: 0.8654
Epoch 25/30
- 1s - loss: 0.2678 - acc: 0.8987 - val_loss: 0.3372 - val_acc: 0.8660
Epoch 26/30
- 1s - loss: 0.2662 - acc: 0.9036 - val_loss: 0.4112 - val_acc: 0.8724
Epoch 27/30
- 1s - loss: 0.2597 - acc: 0.9029 - val_loss: 0.3379 - val_acc: 0.8885
Epoch 28/30
- 1s - loss: 0.2614 - acc: 0.9031 - val_loss: 0.3741 - val_acc: 0.8353
Epoch 29/30
- 1s - loss: 0.2709 - acc: 0.9012 - val_loss: 0.3549 - val_acc: 0.8769
Epoch 30/30
- 1s - loss: 0.2654 - acc: 0.9046 - val_loss: 0.3947 - val_acc: 0.8250
Train accuracy 0.8003442340791739 Test accuracy: 0.825

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 16)	3600
dropout_1 (Dropout)	(None, 116, 16)	0

---



```

-----
max_pooling1d_1 (MaxPooling1 (None, 58, 16)          0
-----
flatten_1 (Flatten)          (None, 928)          0
-----
dense_1 (Dense)              (None, 64)          59456
-----
dense_2 (Dense)              (None, 3)           195
=====
Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 84.7366 - acc: 0.7930 - val_loss: 42.7749 - val_acc: 0.8506
Epoch 2/30
  - 1s - loss: 23.4535 - acc: 0.8576 - val_loss: 9.8637 - val_acc: 0.8686
Epoch 3/30
  - 1s - loss: 4.4119 - acc: 0.8692 - val_loss: 1.2871 - val_acc: 0.8199
Epoch 4/30
  - 1s - loss: 0.5961 - acc: 0.8803 - val_loss: 0.5557 - val_acc: 0.7885
Epoch 5/30
  - 1s - loss: 0.3853 - acc: 0.8810 - val_loss: 0.4862 - val_acc: 0.8417
Epoch 6/30
  - 1s - loss: 0.3467 - acc: 0.8844 - val_loss: 0.4178 - val_acc: 0.8577
Epoch 7/30
  - 1s - loss: 0.3497 - acc: 0.8862 - val_loss: 0.4084 - val_acc: 0.8622
Epoch 8/30
  - 1s - loss: 0.3115 - acc: 0.8945 - val_loss: 0.4429 - val_acc: 0.8205
Epoch 9/30
  - 1s - loss: 0.3175 - acc: 0.8940 - val_loss: 0.3595 - val_acc: 0.8705
Epoch 10/30
  - 1s - loss: 0.3286 - acc: 0.8889 - val_loss: 0.4158 - val_acc: 0.8577
Epoch 11/30
  - 1s - loss: 0.3150 - acc: 0.8898 - val_loss: 0.4255 - val_acc: 0.8577
Epoch 12/30
  - 1s - loss: 0.3062 - acc: 0.8955 - val_loss: 0.3926 - val_acc: 0.8692
Epoch 13/30
  - 1s - loss: 0.3172 - acc: 0.8955 - val_loss: 0.3504 - val_acc: 0.8814
Epoch 14/30
  - 1s - loss: 0.2966 - acc: 0.9019 - val_loss: 0.4086 - val_acc: 0.8487
Epoch 15/30
  - 1s - loss: 0.3066 - acc: 0.8957 - val_loss: 0.3661 - val_acc: 0.8731
Epoch 16/30
  - 1s - loss: 0.2995 - acc: 0.8948 - val_loss: 0.3637 - val_acc: 0.8718
Epoch 17/30

```

```

- 1s - loss: 0.3005 - acc: 0.8989 - val_loss: 0.3617 - val_acc: 0.8705
Epoch 18/30
- 1s - loss: 0.3027 - acc: 0.8950 - val_loss: 0.3962 - val_acc: 0.8641
Epoch 19/30
- 1s - loss: 0.3043 - acc: 0.8913 - val_loss: 0.3537 - val_acc: 0.8853
Epoch 20/30
- 1s - loss: 0.3044 - acc: 0.8906 - val_loss: 0.3772 - val_acc: 0.8628
Epoch 21/30
- 1s - loss: 0.2901 - acc: 0.9002 - val_loss: 0.3615 - val_acc: 0.8654
Epoch 22/30
- 1s - loss: 0.3358 - acc: 0.8849 - val_loss: 0.3795 - val_acc: 0.8603
Epoch 23/30
- 1s - loss: 0.2889 - acc: 0.8935 - val_loss: 0.3484 - val_acc: 0.8724
Epoch 24/30
- 1s - loss: 0.2957 - acc: 0.8911 - val_loss: 0.3619 - val_acc: 0.8686
Epoch 25/30
- 1s - loss: 0.3077 - acc: 0.8921 - val_loss: 0.3853 - val_acc: 0.8494
Epoch 26/30
- 1s - loss: 0.2974 - acc: 0.8894 - val_loss: 0.3773 - val_acc: 0.8756
Epoch 27/30
- 1s - loss: 0.2942 - acc: 0.8933 - val_loss: 0.3383 - val_acc: 0.8840
Epoch 28/30
- 1s - loss: 0.2997 - acc: 0.8908 - val_loss: 0.3629 - val_acc: 0.8705
Epoch 29/30
- 1s - loss: 0.2872 - acc: 0.8967 - val_loss: 0.3476 - val_acc: 0.8808
Epoch 30/30
- 1s - loss: 0.2902 - acc: 0.8977 - val_loss: 0.3635 - val_acc: 0.8744
Train accuracy 0.8905827391197443 Test accuracy: 0.8743589743589744

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 120, 16)	1552
-----		
dropout_1 (Dropout)	(None, 120, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
-----		
flatten_1 (Flatten)	(None, 960)	0
-----		
dense_1 (Dense)	(None, 16)	15376
-----		
dense_2 (Dense)	(None, 3)	51
=====		

```

Total params: 19,027
Trainable params: 19,027

```

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 47.2555 - acc: 0.8021 - val\_loss: 18.8068 - val\_acc: 0.8590

Epoch 2/30

- 1s - loss: 7.9943 - acc: 0.8650 - val\_loss: 1.9137 - val\_acc: 0.8340

Epoch 3/30

- 1s - loss: 0.7499 - acc: 0.8726 - val\_loss: 0.5727 - val\_acc: 0.7814

Epoch 4/30

- 1s - loss: 0.3950 - acc: 0.8778 - val\_loss: 0.4976 - val\_acc: 0.8160

Epoch 5/30

- 1s - loss: 0.3736 - acc: 0.8815 - val\_loss: 0.4252 - val\_acc: 0.8564

Epoch 6/30

- 1s - loss: 0.3552 - acc: 0.8852 - val\_loss: 0.4247 - val\_acc: 0.8513

Epoch 7/30

- 1s - loss: 0.3425 - acc: 0.8862 - val\_loss: 0.4039 - val\_acc: 0.8564

Epoch 8/30

- 1s - loss: 0.3454 - acc: 0.8857 - val\_loss: 0.4762 - val\_acc: 0.8096

Epoch 9/30

- 1s - loss: 0.3303 - acc: 0.8935 - val\_loss: 0.3795 - val\_acc: 0.8750

Epoch 10/30

- 1s - loss: 0.3361 - acc: 0.8830 - val\_loss: 0.3767 - val\_acc: 0.8724

Epoch 11/30

- 1s - loss: 0.3188 - acc: 0.8913 - val\_loss: 0.4124 - val\_acc: 0.8577

Epoch 12/30

- 1s - loss: 0.3225 - acc: 0.8901 - val\_loss: 0.4381 - val\_acc: 0.8295

Epoch 13/30

- 1s - loss: 0.3047 - acc: 0.8992 - val\_loss: 0.3577 - val\_acc: 0.8776

Epoch 14/30

- 1s - loss: 0.3039 - acc: 0.8992 - val\_loss: 0.4024 - val\_acc: 0.8673

Epoch 15/30

- 1s - loss: 0.3097 - acc: 0.8923 - val\_loss: 0.4158 - val\_acc: 0.8647

Epoch 16/30

- 1s - loss: 0.3122 - acc: 0.8901 - val\_loss: 0.3546 - val\_acc: 0.8737

Epoch 17/30

- 1s - loss: 0.2961 - acc: 0.8980 - val\_loss: 0.3481 - val\_acc: 0.8737

Epoch 18/30

- 1s - loss: 0.3007 - acc: 0.8962 - val\_loss: 0.3696 - val\_acc: 0.8686

Epoch 19/30

- 1s - loss: 0.2945 - acc: 0.8935 - val\_loss: 0.3453 - val\_acc: 0.8673

Epoch 20/30

- 1s - loss: 0.3083 - acc: 0.8921 - val\_loss: 0.4327 - val\_acc: 0.8340

Epoch 21/30

- 1s - loss: 0.2870 - acc: 0.8982 - val\_loss: 0.3653 - val\_acc: 0.8532

Epoch 22/30

- 1s - loss: 0.3026 - acc: 0.8925 - val\_loss: 0.3633 - val\_acc: 0.8628

```

Epoch 23/30
- 1s - loss: 0.3036 - acc: 0.8874 - val_loss: 0.3669 - val_acc: 0.8705
Epoch 24/30
- 1s - loss: 0.2981 - acc: 0.8916 - val_loss: 0.3592 - val_acc: 0.8744
Epoch 25/30
- 1s - loss: 0.2924 - acc: 0.8923 - val_loss: 0.3675 - val_acc: 0.8603
Epoch 26/30
- 1s - loss: 0.2917 - acc: 0.8957 - val_loss: 0.3520 - val_acc: 0.8692
Epoch 27/30
- 1s - loss: 0.2958 - acc: 0.8913 - val_loss: 0.3254 - val_acc: 0.8814
Epoch 28/30
- 1s - loss: 0.2950 - acc: 0.8913 - val_loss: 0.3569 - val_acc: 0.8795
Epoch 29/30
- 1s - loss: 0.2906 - acc: 0.8960 - val_loss: 0.3488 - val_acc: 0.8776
Epoch 30/30
- 1s - loss: 0.2932 - acc: 0.8960 - val_loss: 0.4023 - val_acc: 0.8647
Train accuracy 0.8748463240717974 Test accuracy: 0.8647435897435898

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 32)	5152
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 32)	0
flatten_1 (Flatten)	(None, 1888)	0
dense_1 (Dense)	(None, 64)	120896
dense_2 (Dense)	(None, 3)	195

```

Total params: 128,291
Trainable params: 128,291
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 3s - loss: 31.2619 - acc: 0.8407 - val_loss: 1.3416 - val_acc: 0.8353
Epoch 2/30
- 3s - loss: 0.5084 - acc: 0.8896 - val_loss: 0.4401 - val_acc: 0.8737
Epoch 3/30
- 3s - loss: 0.3682 - acc: 0.8894 - val_loss: 0.4127 - val_acc: 0.8538
Epoch 4/30

```

- 3s - loss: 0.3994 - acc: 0.8793 - val\_loss: 0.4589 - val\_acc: 0.8397  
Epoch 5/30  
- 3s - loss: 0.3363 - acc: 0.8898 - val\_loss: 0.3903 - val\_acc: 0.8603  
Epoch 6/30  
- 3s - loss: 0.3162 - acc: 0.8948 - val\_loss: 0.3801 - val\_acc: 0.8712  
Epoch 7/30  
- 3s - loss: 0.3273 - acc: 0.8938 - val\_loss: 0.3757 - val\_acc: 0.8750  
Epoch 8/30  
- 3s - loss: 0.3455 - acc: 0.8906 - val\_loss: 0.4143 - val\_acc: 0.8526  
Epoch 9/30  
- 2s - loss: 0.3089 - acc: 0.8970 - val\_loss: 0.4480 - val\_acc: 0.8564  
Epoch 10/30  
- 3s - loss: 0.3374 - acc: 0.8945 - val\_loss: 0.3678 - val\_acc: 0.8750  
Epoch 11/30  
- 3s - loss: 0.3495 - acc: 0.8847 - val\_loss: 0.4096 - val\_acc: 0.8551  
Epoch 12/30  
- 3s - loss: 0.3420 - acc: 0.8864 - val\_loss: 0.3727 - val\_acc: 0.8583  
Epoch 13/30  
- 3s - loss: 0.3146 - acc: 0.8953 - val\_loss: 0.3920 - val\_acc: 0.8455  
Epoch 14/30  
- 3s - loss: 0.3005 - acc: 0.8943 - val\_loss: 0.3884 - val\_acc: 0.8712  
Epoch 15/30  
- 3s - loss: 0.3320 - acc: 0.8903 - val\_loss: 0.3868 - val\_acc: 0.8750  
Epoch 16/30  
- 3s - loss: 0.3299 - acc: 0.8891 - val\_loss: 0.4659 - val\_acc: 0.8487  
Epoch 17/30  
- 3s - loss: 0.3278 - acc: 0.8908 - val\_loss: 0.3562 - val\_acc: 0.8615  
Epoch 18/30  
- 3s - loss: 0.3117 - acc: 0.8894 - val\_loss: 0.3813 - val\_acc: 0.8635  
Epoch 19/30  
- 3s - loss: 0.3649 - acc: 0.8906 - val\_loss: 0.3806 - val\_acc: 0.8647  
Epoch 20/30  
- 2s - loss: 0.2972 - acc: 0.9014 - val\_loss: 0.3349 - val\_acc: 0.8679  
Epoch 21/30  
- 2s - loss: 0.2960 - acc: 0.8992 - val\_loss: 0.4548 - val\_acc: 0.8545  
Epoch 22/30  
- 3s - loss: 0.3177 - acc: 0.8940 - val\_loss: 0.3551 - val\_acc: 0.8756  
Epoch 23/30  
- 3s - loss: 0.3020 - acc: 0.8982 - val\_loss: 0.3545 - val\_acc: 0.8705  
Epoch 24/30  
- 3s - loss: 0.3236 - acc: 0.8894 - val\_loss: 0.3881 - val\_acc: 0.8538  
Epoch 25/30  
- 3s - loss: 0.3175 - acc: 0.8923 - val\_loss: 0.3685 - val\_acc: 0.8609  
Epoch 26/30  
- 3s - loss: 0.2944 - acc: 0.8960 - val\_loss: 0.3484 - val\_acc: 0.8846  
Epoch 27/30  
- 3s - loss: 0.3039 - acc: 0.9004 - val\_loss: 0.3771 - val\_acc: 0.8647  
Epoch 28/30

```

- 2s - loss: 0.2982 - acc: 0.8908 - val_loss: 0.3398 - val_acc: 0.8763
Epoch 29/30
- 3s - loss: 0.3031 - acc: 0.9039 - val_loss: 0.3862 - val_acc: 0.8622
Epoch 30/30
- 3s - loss: 0.3145 - acc: 0.8908 - val_loss: 0.3743 - val_acc: 0.8756
Train accuracy 0.8908286206048684 Test accuracy: 0.8756410256410256
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 16)	1360
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 64)	41024
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 44,371
Trainable params: 44,371
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 1s - loss: 37.5219 - acc: 0.8058 - val_loss: 6.0895 - val_acc: 0.8282
Epoch 2/30
- 1s - loss: 1.5991 - acc: 0.8591 - val_loss: 0.5299 - val_acc: 0.8500
Epoch 3/30
- 1s - loss: 0.4068 - acc: 0.8694 - val_loss: 0.5146 - val_acc: 0.7897
Epoch 4/30
- 1s - loss: 0.3839 - acc: 0.8790 - val_loss: 0.5348 - val_acc: 0.7718
Epoch 5/30
- 1s - loss: 0.3788 - acc: 0.8771 - val_loss: 0.4374 - val_acc: 0.8532
Epoch 6/30
- 1s - loss: 0.3648 - acc: 0.8798 - val_loss: 0.4019 - val_acc: 0.8673
Epoch 7/30
- 1s - loss: 0.3708 - acc: 0.8793 - val_loss: 0.4038 - val_acc: 0.8660
Epoch 8/30
- 1s - loss: 0.3642 - acc: 0.8817 - val_loss: 0.4298 - val_acc: 0.8308
Epoch 9/30
- 1s - loss: 0.3577 - acc: 0.8866 - val_loss: 0.4517 - val_acc: 0.8551

```

Epoch 10/30  
 - 1s - loss: 0.3499 - acc: 0.8803 - val\_loss: 0.4122 - val\_acc: 0.8654  
 Epoch 11/30  
 - 1s - loss: 0.3456 - acc: 0.8817 - val\_loss: 0.3822 - val\_acc: 0.8686  
 Epoch 12/30  
 - 1s - loss: 0.3466 - acc: 0.8859 - val\_loss: 0.4333 - val\_acc: 0.8603  
 Epoch 13/30  
 - 1s - loss: 0.3602 - acc: 0.8884 - val\_loss: 0.3722 - val\_acc: 0.8776  
 Epoch 14/30  
 - 1s - loss: 0.3546 - acc: 0.8889 - val\_loss: 0.4182 - val\_acc: 0.8647  
 Epoch 15/30  
 - 1s - loss: 0.3597 - acc: 0.8832 - val\_loss: 0.4108 - val\_acc: 0.8667  
 Epoch 16/30  
 - 1s - loss: 0.3537 - acc: 0.8837 - val\_loss: 0.3782 - val\_acc: 0.8679  
 Epoch 17/30  
 - 1s - loss: 0.3388 - acc: 0.8881 - val\_loss: 0.4218 - val\_acc: 0.8538  
 Epoch 18/30  
 - 1s - loss: 0.3423 - acc: 0.8849 - val\_loss: 0.3913 - val\_acc: 0.8641  
 Epoch 19/30  
 - 1s - loss: 0.3439 - acc: 0.8869 - val\_loss: 0.4014 - val\_acc: 0.8462  
 Epoch 20/30  
 - 1s - loss: 0.3388 - acc: 0.8898 - val\_loss: 0.4162 - val\_acc: 0.8609  
 Epoch 21/30  
 - 1s - loss: 0.3417 - acc: 0.8830 - val\_loss: 0.3876 - val\_acc: 0.8635  
 Epoch 22/30  
 - 1s - loss: 0.3364 - acc: 0.8889 - val\_loss: 0.4116 - val\_acc: 0.8532  
 Epoch 23/30  
 - 1s - loss: 0.3505 - acc: 0.8803 - val\_loss: 0.3980 - val\_acc: 0.8795  
 Epoch 24/30  
 - 1s - loss: 0.3393 - acc: 0.8886 - val\_loss: 0.4690 - val\_acc: 0.8526  
 Epoch 25/30  
 - 1s - loss: 0.3443 - acc: 0.8874 - val\_loss: 0.7069 - val\_acc: 0.7808  
 Epoch 26/30  
 - 1s - loss: 0.3397 - acc: 0.8827 - val\_loss: 0.3804 - val\_acc: 0.8718  
 Epoch 27/30  
 - 1s - loss: 0.3309 - acc: 0.8866 - val\_loss: 0.3633 - val\_acc: 0.8731  
 Epoch 28/30  
 - 1s - loss: 0.3408 - acc: 0.8815 - val\_loss: 0.3893 - val\_acc: 0.8718  
 Epoch 29/30  
 - 1s - loss: 0.3454 - acc: 0.8849 - val\_loss: 0.3933 - val\_acc: 0.8712  
 Epoch 30/30  
 - 1s - loss: 0.3296 - acc: 0.8884 - val\_loss: 0.4333 - val\_acc: 0.8199  
 Train accuracy 0.810671256454389 Test accuracy: 0.8198717948717948

```
-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 122, 32)           2048
```

```

-----
conv1d_2 (Conv1D)                (None, 116, 16)                3600
-----
dropout_1 (Dropout)              (None, 116, 16)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 23, 16)                0
-----
flatten_1 (Flatten)              (None, 368)                    0
-----
dense_1 (Dense)                  (None, 16)                     5904
-----
dense_2 (Dense)                  (None, 3)                      51
=====
Total params: 11,603
Trainable params: 11,603
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
  - 2s - loss: 9.1968 - acc: 0.8358 - val_loss: 0.5610 - val_acc: 0.8346
Epoch 2/25
  - 1s - loss: 0.3637 - acc: 0.8776 - val_loss: 0.4332 - val_acc: 0.8667
Epoch 3/25
  - 1s - loss: 0.3234 - acc: 0.8906 - val_loss: 0.4245 - val_acc: 0.8487
Epoch 4/25
  - 1s - loss: 0.3092 - acc: 0.8933 - val_loss: 0.4070 - val_acc: 0.8647
Epoch 5/25
  - 1s - loss: 0.3163 - acc: 0.8913 - val_loss: 0.3815 - val_acc: 0.8686
Epoch 6/25
  - 1s - loss: 0.3106 - acc: 0.8889 - val_loss: 0.4453 - val_acc: 0.8263
Epoch 7/25
  - 1s - loss: 0.3013 - acc: 0.8930 - val_loss: 0.3769 - val_acc: 0.8686
Epoch 8/25
  - 1s - loss: 0.2998 - acc: 0.8911 - val_loss: 0.4105 - val_acc: 0.8551
Epoch 9/25
  - 1s - loss: 0.2979 - acc: 0.8965 - val_loss: 0.3796 - val_acc: 0.8641
Epoch 10/25
  - 1s - loss: 0.2994 - acc: 0.8925 - val_loss: 0.3739 - val_acc: 0.8769
Epoch 11/25
  - 1s - loss: 0.2913 - acc: 0.8972 - val_loss: 0.4680 - val_acc: 0.7205
Epoch 12/25
  - 1s - loss: 0.2990 - acc: 0.8891 - val_loss: 0.3748 - val_acc: 0.8635
Epoch 13/25
  - 1s - loss: 0.2983 - acc: 0.8889 - val_loss: 0.3914 - val_acc: 0.8532
Epoch 14/25
  - 1s - loss: 0.2916 - acc: 0.8923 - val_loss: 0.4211 - val_acc: 0.8397
Epoch 15/25

```



```

- 1s - loss: 0.2918 - acc: 0.8953 - val_loss: 0.3818 - val_acc: 0.8712
Epoch 16/25
- 1s - loss: 0.2870 - acc: 0.8989 - val_loss: 0.3556 - val_acc: 0.8769
Epoch 17/25
- 1s - loss: 0.3022 - acc: 0.8903 - val_loss: 0.3353 - val_acc: 0.8788
Epoch 18/25
- 1s - loss: 0.3002 - acc: 0.8923 - val_loss: 0.3581 - val_acc: 0.8904
Epoch 19/25
- 1s - loss: 0.2860 - acc: 0.8957 - val_loss: 0.3559 - val_acc: 0.8808
Epoch 20/25
- 1s - loss: 0.2895 - acc: 0.8918 - val_loss: 0.3646 - val_acc: 0.8840
Epoch 21/25
- 1s - loss: 0.2913 - acc: 0.8960 - val_loss: 0.3476 - val_acc: 0.8686
Epoch 22/25
- 1s - loss: 0.2909 - acc: 0.8940 - val_loss: 0.5283 - val_acc: 0.7115
Epoch 23/25
- 1s - loss: 0.2910 - acc: 0.8898 - val_loss: 0.3805 - val_acc: 0.8532
Epoch 24/25
- 1s - loss: 0.2918 - acc: 0.8918 - val_loss: 0.3489 - val_acc: 0.8917
Epoch 25/25
- 1s - loss: 0.3073 - acc: 0.8901 - val_loss: 0.3616 - val_acc: 0.8808
Train accuracy 0.922055569215638 Test accuracy: 0.8807692307692307
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 124, 32)	4064
dropout_1 (Dropout)	(None, 124, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 62, 32)	0
flatten_1 (Flatten)	(None, 1984)	0
dense_1 (Dense)	(None, 64)	127040
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 132,475
Trainable params: 132,475
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 165.0868 - acc: 0.8176 - val_loss: 81.4208 - val_acc: 0.8949

```

Epoch 2/30  
- 1s - loss: 45.3164 - acc: 0.8633 - val\_loss: 19.8192 - val\_acc: 0.8494

Epoch 3/30  
- 1s - loss: 8.9950 - acc: 0.8741 - val\_loss: 2.3976 - val\_acc: 0.8019

Epoch 4/30  
- 1s - loss: 0.8805 - acc: 0.8655 - val\_loss: 0.6133 - val\_acc: 0.7750

Epoch 5/30  
- 1s - loss: 0.4447 - acc: 0.8689 - val\_loss: 0.5137 - val\_acc: 0.8468

Epoch 6/30  
- 1s - loss: 0.3929 - acc: 0.8744 - val\_loss: 0.4423 - val\_acc: 0.8519

Epoch 7/30  
- 1s - loss: 0.3894 - acc: 0.8741 - val\_loss: 0.4184 - val\_acc: 0.8647

Epoch 8/30  
- 1s - loss: 0.3629 - acc: 0.8776 - val\_loss: 0.4746 - val\_acc: 0.8038

Epoch 9/30  
- 1s - loss: 0.3510 - acc: 0.8857 - val\_loss: 0.4199 - val\_acc: 0.8628

Epoch 10/30  
- 1s - loss: 0.3483 - acc: 0.8825 - val\_loss: 0.3896 - val\_acc: 0.8756

Epoch 11/30  
- 1s - loss: 0.3456 - acc: 0.8884 - val\_loss: 0.3756 - val\_acc: 0.8705

Epoch 12/30  
- 1s - loss: 0.3390 - acc: 0.8835 - val\_loss: 0.3951 - val\_acc: 0.8590

Epoch 13/30  
- 1s - loss: 0.3351 - acc: 0.8869 - val\_loss: 0.3753 - val\_acc: 0.8788

Epoch 14/30  
- 1s - loss: 0.3365 - acc: 0.8886 - val\_loss: 0.5048 - val\_acc: 0.7859

Epoch 15/30  
- 1s - loss: 0.3350 - acc: 0.8871 - val\_loss: 0.4946 - val\_acc: 0.8167

Epoch 16/30  
- 1s - loss: 0.3482 - acc: 0.8839 - val\_loss: 0.3830 - val\_acc: 0.8737

Epoch 17/30  
- 1s - loss: 0.3368 - acc: 0.8894 - val\_loss: 0.3686 - val\_acc: 0.8699

Epoch 18/30  
- 1s - loss: 0.3393 - acc: 0.8898 - val\_loss: 0.4460 - val\_acc: 0.8583

Epoch 19/30  
- 1s - loss: 0.3433 - acc: 0.8839 - val\_loss: 0.3731 - val\_acc: 0.8692

Epoch 20/30  
- 1s - loss: 0.3335 - acc: 0.8911 - val\_loss: 0.7182 - val\_acc: 0.7109

Epoch 21/30  
- 1s - loss: 0.3484 - acc: 0.8879 - val\_loss: 0.4030 - val\_acc: 0.8532

Epoch 22/30  
- 1s - loss: 0.3109 - acc: 0.8972 - val\_loss: 0.4523 - val\_acc: 0.8308

Epoch 23/30  
- 1s - loss: 0.3313 - acc: 0.8847 - val\_loss: 0.3923 - val\_acc: 0.8705

Epoch 24/30  
- 1s - loss: 0.3326 - acc: 0.8894 - val\_loss: 0.3858 - val\_acc: 0.8788

Epoch 25/30  
- 1s - loss: 0.3331 - acc: 0.8862 - val\_loss: 0.4117 - val\_acc: 0.8340

Epoch 26/30  
 - 1s - loss: 0.3336 - acc: 0.8898 - val\_loss: 0.3775 - val\_acc: 0.8686  
 Epoch 27/30  
 - 1s - loss: 0.3235 - acc: 0.8901 - val\_loss: 0.3681 - val\_acc: 0.8667  
 Epoch 28/30  
 - 1s - loss: 0.3275 - acc: 0.8879 - val\_loss: 0.3869 - val\_acc: 0.8769  
 Epoch 29/30  
 - 1s - loss: 0.3204 - acc: 0.8953 - val\_loss: 0.3764 - val\_acc: 0.8744  
 Epoch 30/30  
 - 1s - loss: 0.3325 - acc: 0.8879 - val\_loss: 0.4088 - val\_acc: 0.8487  
 Train accuracy 0.8519793459552496 Test accuracy: 0.8487179487179487

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 16)	2576
dropout_1 (Dropout)	(None, 118, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 16)	0
flatten_1 (Flatten)	(None, 944)	0
dense_1 (Dense)	(None, 64)	60480
dense_2 (Dense)	(None, 3)	195

Total params: 65,299  
 Trainable params: 65,299  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/30  
 - 3s - loss: 8.3180 - acc: 0.8667 - val\_loss: 0.6862 - val\_acc: 0.8494  
 Epoch 2/30  
 - 2s - loss: 0.4286 - acc: 0.8911 - val\_loss: 0.3810 - val\_acc: 0.8731  
 Epoch 3/30  
 - 2s - loss: 0.3195 - acc: 0.8975 - val\_loss: 0.4216 - val\_acc: 0.8455  
 Epoch 4/30  
 - 2s - loss: 0.4222 - acc: 0.8790 - val\_loss: 0.4983 - val\_acc: 0.8654  
 Epoch 5/30  
 - 2s - loss: 0.3265 - acc: 0.8955 - val\_loss: 0.3516 - val\_acc: 0.8763  
 Epoch 6/30  
 - 2s - loss: 0.3251 - acc: 0.8948 - val\_loss: 0.4026 - val\_acc: 0.8654  
 Epoch 7/30

```

- 2s - loss: 0.3175 - acc: 0.8960 - val_loss: 0.4091 - val_acc: 0.8667
Epoch 8/30
- 2s - loss: 0.3519 - acc: 0.8970 - val_loss: 0.4375 - val_acc: 0.8494
Epoch 9/30
- 2s - loss: 0.2967 - acc: 0.8994 - val_loss: 0.3840 - val_acc: 0.8506
Epoch 10/30
- 2s - loss: 0.2863 - acc: 0.9029 - val_loss: 0.3923 - val_acc: 0.8654
Epoch 11/30
- 2s - loss: 0.3219 - acc: 0.8891 - val_loss: 0.3826 - val_acc: 0.8686
Epoch 12/30
- 2s - loss: 0.3614 - acc: 0.8771 - val_loss: 0.4203 - val_acc: 0.8776
Epoch 13/30
- 2s - loss: 0.3215 - acc: 0.8960 - val_loss: 0.3496 - val_acc: 0.8692
Epoch 14/30
- 2s - loss: 0.2738 - acc: 0.9063 - val_loss: 0.3514 - val_acc: 0.8840
Epoch 15/30
- 2s - loss: 0.2927 - acc: 0.8999 - val_loss: 0.3686 - val_acc: 0.8788
Epoch 16/30
- 2s - loss: 0.3115 - acc: 0.8955 - val_loss: 0.4002 - val_acc: 0.8577
Epoch 17/30
- 2s - loss: 0.2939 - acc: 0.8955 - val_loss: 0.3275 - val_acc: 0.8699
Epoch 18/30
- 2s - loss: 0.2762 - acc: 0.8992 - val_loss: 0.3786 - val_acc: 0.8647
Epoch 19/30
- 2s - loss: 0.3176 - acc: 0.8918 - val_loss: 0.3370 - val_acc: 0.8750
Epoch 20/30
- 2s - loss: 0.3053 - acc: 0.8994 - val_loss: 0.3311 - val_acc: 0.8737
Epoch 21/30
- 2s - loss: 0.2800 - acc: 0.9036 - val_loss: 0.4189 - val_acc: 0.8468
Epoch 22/30
- 2s - loss: 0.2930 - acc: 0.8977 - val_loss: 0.3453 - val_acc: 0.8769
Epoch 23/30
- 2s - loss: 0.3177 - acc: 0.8911 - val_loss: 0.3951 - val_acc: 0.8609
Epoch 24/30
- 2s - loss: 0.2832 - acc: 0.8999 - val_loss: 0.3927 - val_acc: 0.8571
Epoch 25/30
- 2s - loss: 0.2933 - acc: 0.8943 - val_loss: 0.4962 - val_acc: 0.8545
Epoch 26/30
- 2s - loss: 0.2869 - acc: 0.9026 - val_loss: 0.3804 - val_acc: 0.8667
Epoch 27/30
- 2s - loss: 0.2709 - acc: 0.9044 - val_loss: 0.4343 - val_acc: 0.8282
Epoch 28/30
- 2s - loss: 0.2958 - acc: 0.8925 - val_loss: 0.3463 - val_acc: 0.8756
Epoch 29/30
- 2s - loss: 0.2594 - acc: 0.9066 - val_loss: 0.3151 - val_acc: 0.8821
Epoch 30/30
- 2s - loss: 0.3010 - acc: 0.8982 - val_loss: 0.3233 - val_acc: 0.8795
Train accuracy 0.9014015244652077 Test accuracy: 0.8794871794871795

```

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```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 124, 16)	2032
dropout_1 (Dropout)	(None, 124, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 41, 16)	0
flatten_1 (Flatten)	(None, 656)	0
dense_1 (Dense)	(None, 16)	10512
dense_2 (Dense)	(None, 3)	51

```
=====
```

Total params: 13,771  
Trainable params: 13,771  
Non-trainable params: 0

```
-----
```

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30  
- 2s - loss: 8.6805 - acc: 0.8294 - val\_loss: 0.5643 - val\_acc: 0.8173

Epoch 2/30  
- 1s - loss: 0.4044 - acc: 0.8729 - val\_loss: 0.4557 - val\_acc: 0.8590

Epoch 3/30  
- 1s - loss: 0.3709 - acc: 0.8780 - val\_loss: 0.4844 - val\_acc: 0.8071

Epoch 4/30  
- 1s - loss: 0.3483 - acc: 0.8852 - val\_loss: 0.4062 - val\_acc: 0.8699

Epoch 5/30  
- 1s - loss: 0.3464 - acc: 0.8832 - val\_loss: 0.3996 - val\_acc: 0.8673

Epoch 6/30  
- 1s - loss: 0.3338 - acc: 0.8862 - val\_loss: 0.4489 - val\_acc: 0.8186

Epoch 7/30  
- 1s - loss: 0.3212 - acc: 0.8884 - val\_loss: 0.3982 - val\_acc: 0.8526

Epoch 8/30  
- 1s - loss: 0.3190 - acc: 0.8925 - val\_loss: 0.4333 - val\_acc: 0.8269

Epoch 9/30  
- 1s - loss: 0.3245 - acc: 0.8908 - val\_loss: 0.3881 - val\_acc: 0.8731

Epoch 10/30  
- 1s - loss: 0.3188 - acc: 0.8820 - val\_loss: 0.3849 - val\_acc: 0.8744

Epoch 11/30  
- 1s - loss: 0.3142 - acc: 0.8972 - val\_loss: 0.4716 - val\_acc: 0.7269

Epoch 12/30  
- 1s - loss: 0.3376 - acc: 0.8805 - val\_loss: 0.4590 - val\_acc: 0.8353

```

Epoch 13/30
- 1s - loss: 0.3175 - acc: 0.8923 - val_loss: 0.3824 - val_acc: 0.8577
Epoch 14/30
- 1s - loss: 0.3162 - acc: 0.8913 - val_loss: 0.3845 - val_acc: 0.8750
Epoch 15/30
- 1s - loss: 0.3156 - acc: 0.8916 - val_loss: 0.3673 - val_acc: 0.8776
Epoch 16/30
- 1s - loss: 0.3131 - acc: 0.8906 - val_loss: 0.3620 - val_acc: 0.8885
Epoch 17/30
- 1s - loss: 0.3250 - acc: 0.8874 - val_loss: 0.4495 - val_acc: 0.8551
Epoch 18/30
- 1s - loss: 0.3234 - acc: 0.8918 - val_loss: 0.4664 - val_acc: 0.8519
Epoch 19/30
- 1s - loss: 0.3174 - acc: 0.8916 - val_loss: 0.4767 - val_acc: 0.8481
Epoch 20/30
- 1s - loss: 0.3136 - acc: 0.8918 - val_loss: 0.4061 - val_acc: 0.8224
Epoch 21/30
- 1s - loss: 0.3109 - acc: 0.8928 - val_loss: 0.4937 - val_acc: 0.8532
Epoch 22/30
- 1s - loss: 0.3147 - acc: 0.8918 - val_loss: 0.5302 - val_acc: 0.6987
Epoch 23/30
- 1s - loss: 0.3165 - acc: 0.8874 - val_loss: 0.4137 - val_acc: 0.8647
Epoch 24/30
- 1s - loss: 0.3046 - acc: 0.8992 - val_loss: 0.3572 - val_acc: 0.8827
Epoch 25/30
- 1s - loss: 0.3267 - acc: 0.8884 - val_loss: 0.4078 - val_acc: 0.8327
Epoch 26/30
- 1s - loss: 0.3068 - acc: 0.8994 - val_loss: 0.4278 - val_acc: 0.8192
Epoch 27/30
- 1s - loss: 0.3229 - acc: 0.8928 - val_loss: 0.3839 - val_acc: 0.8763
Epoch 28/30
- 1s - loss: 0.3228 - acc: 0.8906 - val_loss: 0.4514 - val_acc: 0.7404
Epoch 29/30
- 1s - loss: 0.3060 - acc: 0.8989 - val_loss: 0.5171 - val_acc: 0.8372
Epoch 30/30
- 1s - loss: 0.3182 - acc: 0.8957 - val_loss: 0.3570 - val_acc: 0.8891
Train accuracy 0.9043521022866978 Test accuracy: 0.889102564102564

```

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
<hr/>		
conv1d_2 (Conv1D)	(None, 116, 32)	6304
<hr/>		
dropout_1 (Dropout)	(None, 116, 32)	0
<hr/>		
max_pooling1d_1 (MaxPooling1	(None, 23, 32)	0

flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 64)	47168
dense_2 (Dense)	(None, 3)	195

=====  
Total params: 55,459

Trainable params: 55,459

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/25

- 2s - loss: 63.6339 - acc: 0.8274 - val\_loss: 16.1166 - val\_acc: 0.8782

Epoch 2/25

- 1s - loss: 6.7424 - acc: 0.8970 - val\_loss: 2.3685 - val\_acc: 0.8667

Epoch 3/25

- 1s - loss: 1.1357 - acc: 0.8957 - val\_loss: 0.7379 - val\_acc: 0.8564

Epoch 4/25

- 1s - loss: 0.4183 - acc: 0.8960 - val\_loss: 0.5041 - val\_acc: 0.8628

Epoch 5/25

- 1s - loss: 0.3472 - acc: 0.8896 - val\_loss: 0.5217 - val\_acc: 0.8577

Epoch 6/25

- 1s - loss: 0.3191 - acc: 0.8987 - val\_loss: 0.5115 - val\_acc: 0.8545

Epoch 7/25

- 1s - loss: 0.4000 - acc: 0.8825 - val\_loss: 0.5036 - val\_acc: 0.8705

Epoch 8/25

- 1s - loss: 0.3369 - acc: 0.8928 - val\_loss: 0.4741 - val\_acc: 0.8641

Epoch 9/25

- 1s - loss: 0.2923 - acc: 0.9036 - val\_loss: 0.4394 - val\_acc: 0.8577

Epoch 10/25

- 1s - loss: 0.2873 - acc: 0.9002 - val\_loss: 0.4306 - val\_acc: 0.8679

Epoch 11/25

- 1s - loss: 0.3046 - acc: 0.8992 - val\_loss: 0.5108 - val\_acc: 0.8417

Epoch 12/25

- 1s - loss: 0.2926 - acc: 0.8972 - val\_loss: 0.4162 - val\_acc: 0.8756

Epoch 13/25

- 1s - loss: 0.3039 - acc: 0.8999 - val\_loss: 0.4025 - val\_acc: 0.8724

Epoch 14/25

- 1s - loss: 0.3172 - acc: 0.8943 - val\_loss: 0.4524 - val\_acc: 0.8603

Epoch 15/25

- 1s - loss: 0.3318 - acc: 0.8955 - val\_loss: 0.4818 - val\_acc: 0.8481

Epoch 16/25

- 1s - loss: 0.2905 - acc: 0.9021 - val\_loss: 0.4544 - val\_acc: 0.8564

Epoch 17/25

- 1s - loss: 0.3010 - acc: 0.8935 - val\_loss: 0.3925 - val\_acc: 0.8865

Epoch 18/25

```

- 1s - loss: 0.3145 - acc: 0.8933 - val_loss: 0.3998 - val_acc: 0.8782
Epoch 19/25
- 1s - loss: 0.2974 - acc: 0.8962 - val_loss: 0.4349 - val_acc: 0.8462
Epoch 20/25
- 1s - loss: 0.2906 - acc: 0.8972 - val_loss: 0.4846 - val_acc: 0.8519
Epoch 21/25
- 1s - loss: 0.2916 - acc: 0.9004 - val_loss: 0.4728 - val_acc: 0.8481
Epoch 22/25
- 1s - loss: 0.2927 - acc: 0.8921 - val_loss: 0.3978 - val_acc: 0.8615
Epoch 23/25
- 1s - loss: 0.3087 - acc: 0.8925 - val_loss: 0.4777 - val_acc: 0.8404
Epoch 24/25
- 1s - loss: 0.3316 - acc: 0.8948 - val_loss: 0.4213 - val_acc: 0.8699
Epoch 25/25
- 1s - loss: 0.2797 - acc: 0.9016 - val_loss: 0.4171 - val_acc: 0.8609
Train accuracy 0.907548561593312 Test accuracy: 0.860897435897436
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 122, 16)	2576
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 32)	31264
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 34,835
Trainable params: 34,835
Non-trainable params: 0
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```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
- 4s - loss: 55.1424 - acc: 0.8817 - val_loss: 14.8734 - val_acc: 0.8692
Epoch 2/35
- 3s - loss: 4.2249 - acc: 0.8953 - val_loss: 0.5487 - val_acc: 0.8474
Epoch 3/35
- 3s - loss: 0.3591 - acc: 0.8938 - val_loss: 0.4563 - val_acc: 0.8378
Epoch 4/35
- 3s - loss: 0.3078 - acc: 0.8987 - val_loss: 0.3586 - val_acc: 0.8641

```



Epoch 5/35  
- 3s - loss: 0.2979 - acc: 0.9007 - val\_loss: 0.3391 - val\_acc: 0.8737  
Epoch 6/35  
- 3s - loss: 0.2972 - acc: 0.8955 - val\_loss: 0.4411 - val\_acc: 0.8205  
Epoch 7/35  
- 3s - loss: 0.2888 - acc: 0.9034 - val\_loss: 0.3595 - val\_acc: 0.8647  
Epoch 8/35  
- 3s - loss: 0.2833 - acc: 0.9034 - val\_loss: 0.3719 - val\_acc: 0.8494  
Epoch 9/35  
- 3s - loss: 0.2788 - acc: 0.9036 - val\_loss: 0.3091 - val\_acc: 0.8788  
Epoch 10/35  
- 3s - loss: 0.2761 - acc: 0.9048 - val\_loss: 0.3024 - val\_acc: 0.8987  
Epoch 11/35  
- 3s - loss: 0.2720 - acc: 0.9098 - val\_loss: 0.3705 - val\_acc: 0.8538  
Epoch 12/35  
- 3s - loss: 0.2730 - acc: 0.9012 - val\_loss: 0.3583 - val\_acc: 0.8615  
Epoch 13/35  
- 3s - loss: 0.2709 - acc: 0.9063 - val\_loss: 0.3644 - val\_acc: 0.8590  
Epoch 14/35  
- 3s - loss: 0.2604 - acc: 0.9100 - val\_loss: 0.3079 - val\_acc: 0.8929  
Epoch 15/35  
- 3s - loss: 0.2616 - acc: 0.9105 - val\_loss: 0.2956 - val\_acc: 0.8936  
Epoch 16/35  
- 3s - loss: 0.2576 - acc: 0.9152 - val\_loss: 0.2938 - val\_acc: 0.9006  
Epoch 17/35  
- 3s - loss: 0.2685 - acc: 0.9068 - val\_loss: 0.3065 - val\_acc: 0.8942  
Epoch 18/35  
- 3s - loss: 0.2590 - acc: 0.9093 - val\_loss: 0.3730 - val\_acc: 0.8519  
Epoch 19/35  
- 3s - loss: 0.2598 - acc: 0.9090 - val\_loss: 0.3153 - val\_acc: 0.8897  
Epoch 20/35  
- 3s - loss: 0.2581 - acc: 0.9085 - val\_loss: 0.2898 - val\_acc: 0.9013  
Epoch 21/35  
- 3s - loss: 0.2576 - acc: 0.9115 - val\_loss: 0.3318 - val\_acc: 0.8821  
Epoch 22/35  
- 3s - loss: 0.2560 - acc: 0.9166 - val\_loss: 0.3311 - val\_acc: 0.8853  
Epoch 23/35  
- 3s - loss: 0.2657 - acc: 0.9083 - val\_loss: 0.3493 - val\_acc: 0.8776  
Epoch 24/35  
- 3s - loss: 0.2596 - acc: 0.9125 - val\_loss: 0.3102 - val\_acc: 0.8853  
Epoch 25/35  
- 3s - loss: 0.2629 - acc: 0.9098 - val\_loss: 0.2958 - val\_acc: 0.8929  
Epoch 26/35  
- 3s - loss: 0.2562 - acc: 0.9112 - val\_loss: 0.2846 - val\_acc: 0.9045  
Epoch 27/35  
- 3s - loss: 0.2648 - acc: 0.9132 - val\_loss: 0.3138 - val\_acc: 0.8840  
Epoch 28/35  
- 3s - loss: 0.2617 - acc: 0.9134 - val\_loss: 0.3143 - val\_acc: 0.8962

```

Epoch 29/35
- 3s - loss: 0.2577 - acc: 0.9152 - val_loss: 0.2909 - val_acc: 0.8955
Epoch 30/35
- 3s - loss: 0.2512 - acc: 0.9149 - val_loss: 0.3047 - val_acc: 0.8840
Epoch 31/35
- 3s - loss: 0.2613 - acc: 0.9134 - val_loss: 0.3741 - val_acc: 0.8705
Epoch 32/35
- 3s - loss: 0.2681 - acc: 0.9132 - val_loss: 0.3910 - val_acc: 0.8724
Epoch 33/35
- 3s - loss: 0.2539 - acc: 0.9134 - val_loss: 0.2869 - val_acc: 0.9103
Epoch 34/35
- 3s - loss: 0.2797 - acc: 0.9093 - val_loss: 0.3479 - val_acc: 0.8769
Epoch 35/35
- 3s - loss: 0.2608 - acc: 0.9120 - val_loss: 0.2993 - val_acc: 0.9000
Train accuracy 0.8986968281288419 Test accuracy: 0.9
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 16)	2032
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 66,687
Trainable params: 66,687
Non-trainable params: 0
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```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 23.9586 - acc: 0.8119 - val_loss: 0.5178 - val_acc: 0.8077
Epoch 2/30
- 1s - loss: 0.5181 - acc: 0.8444 - val_loss: 0.5187 - val_acc: 0.8064
Epoch 3/30
- 1s - loss: 0.4157 - acc: 0.8734 - val_loss: 0.4548 - val_acc: 0.8410
Epoch 4/30
- 1s - loss: 0.4211 - acc: 0.8709 - val_loss: 0.4661 - val_acc: 0.8378
Epoch 5/30

```

- 1s - loss: 0.4151 - acc: 0.8756 - val\_loss: 0.6996 - val\_acc: 0.7808  
 Epoch 6/30  
 - 1s - loss: 0.4072 - acc: 0.8793 - val\_loss: 0.5690 - val\_acc: 0.7987  
 Epoch 7/30  
 - 1s - loss: 0.4019 - acc: 0.8704 - val\_loss: 0.4100 - val\_acc: 0.8442  
 Epoch 8/30  
 - 1s - loss: 0.3855 - acc: 0.8716 - val\_loss: 0.5002 - val\_acc: 0.8000  
 Epoch 9/30  
 - 1s - loss: 0.3865 - acc: 0.8783 - val\_loss: 0.4032 - val\_acc: 0.8628  
 Epoch 10/30  
 - 1s - loss: 0.4131 - acc: 0.8682 - val\_loss: 0.4255 - val\_acc: 0.8583  
 Epoch 11/30  
 - 1s - loss: 0.3847 - acc: 0.8790 - val\_loss: 1.0428 - val\_acc: 0.6571  
 Epoch 12/30  
 - 1s - loss: 0.3843 - acc: 0.8739 - val\_loss: 0.4681 - val\_acc: 0.8051  
 Epoch 13/30  
 - 1s - loss: 0.3946 - acc: 0.8702 - val\_loss: 0.5023 - val\_acc: 0.7987  
 Epoch 14/30  
 - 1s - loss: 0.3939 - acc: 0.8771 - val\_loss: 0.8017 - val\_acc: 0.6776  
 Epoch 15/30  
 - 1s - loss: 0.3794 - acc: 0.8793 - val\_loss: 0.3920 - val\_acc: 0.8737  
 Epoch 16/30  
 - 1s - loss: 0.4092 - acc: 0.8748 - val\_loss: 0.4107 - val\_acc: 0.8603  
 Epoch 17/30  
 - 1s - loss: 0.3793 - acc: 0.8780 - val\_loss: 0.5499 - val\_acc: 0.8474  
 Epoch 18/30  
 - 1s - loss: 0.3720 - acc: 0.8790 - val\_loss: 0.9118 - val\_acc: 0.6686  
 Epoch 19/30  
 - 1s - loss: 0.3839 - acc: 0.8768 - val\_loss: 0.4188 - val\_acc: 0.8628  
 Epoch 20/30  
 - 1s - loss: 0.3948 - acc: 0.8842 - val\_loss: 0.6932 - val\_acc: 0.8635  
 Epoch 21/30  
 - 1s - loss: 0.3808 - acc: 0.8854 - val\_loss: 0.3894 - val\_acc: 0.8724  
 Epoch 22/30  
 - 1s - loss: 0.3846 - acc: 0.8778 - val\_loss: 0.8336 - val\_acc: 0.6545  
 Epoch 23/30  
 - 1s - loss: 0.3756 - acc: 0.8788 - val\_loss: 0.3876 - val\_acc: 0.8750  
 Epoch 24/30  
 - 1s - loss: 0.3718 - acc: 0.8783 - val\_loss: 0.7235 - val\_acc: 0.8455  
 Epoch 25/30  
 - 1s - loss: 0.3762 - acc: 0.8798 - val\_loss: 0.4360 - val\_acc: 0.8423  
 Epoch 26/30  
 - 1s - loss: 0.3968 - acc: 0.8800 - val\_loss: 0.4368 - val\_acc: 0.8731  
 Epoch 27/30  
 - 1s - loss: 0.3681 - acc: 0.8812 - val\_loss: 0.4681 - val\_acc: 0.8545  
 Epoch 28/30  
 - 1s - loss: 0.3733 - acc: 0.8800 - val\_loss: 0.5176 - val\_acc: 0.8045  
 Epoch 29/30

- 1s - loss: 0.3742 - acc: 0.8822 - val\_loss: 0.4207 - val\_acc: 0.8635  
Epoch 30/30  
- 1s - loss: 0.3657 - acc: 0.8803 - val\_loss: 0.4086 - val\_acc: 0.8692  
Train accuracy 0.8718957462503073 Test accuracy: 0.8692307692307693

---

Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
<hr/>		
conv1d_2 (Conv1D)	(None, 120, 16)	1360
<hr/>		
dropout_1 (Dropout)	(None, 120, 16)	0
<hr/>		
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
<hr/>		
flatten_1 (Flatten)	(None, 640)	0
<hr/>		
dense_1 (Dense)	(None, 32)	20512
<hr/>		
dense_2 (Dense)	(None, 3)	99
<hr/>		

Total params: 23,763  
Trainable params: 23,763  
Non-trainable params: 0

---

None  
Train on 4067 samples, validate on 1560 samples  
Epoch 1/35  
- 2s - loss: 98.3156 - acc: 0.7974 - val\_loss: 42.2039 - val\_acc: 0.8301  
Epoch 2/35  
- 1s - loss: 21.1776 - acc: 0.8871 - val\_loss: 8.1589 - val\_acc: 0.8545  
Epoch 3/35  
- 1s - loss: 3.8611 - acc: 0.8950 - val\_loss: 1.5964 - val\_acc: 0.8500  
Epoch 4/35  
- 1s - loss: 0.8289 - acc: 0.8950 - val\_loss: 0.6180 - val\_acc: 0.8462  
Epoch 5/35  
- 1s - loss: 0.4261 - acc: 0.8862 - val\_loss: 0.5087 - val\_acc: 0.8545  
Epoch 6/35  
- 1s - loss: 0.3534 - acc: 0.8989 - val\_loss: 0.5660 - val\_acc: 0.8263  
Epoch 7/35  
- 1s - loss: 0.3833 - acc: 0.8790 - val\_loss: 0.4810 - val\_acc: 0.8577  
Epoch 8/35  
- 1s - loss: 0.3347 - acc: 0.8977 - val\_loss: 0.4576 - val\_acc: 0.8564  
Epoch 9/35  
- 1s - loss: 0.3355 - acc: 0.8950 - val\_loss: 0.4594 - val\_acc: 0.8494  
Epoch 10/35  
- 1s - loss: 0.3316 - acc: 0.8948 - val\_loss: 0.4596 - val\_acc: 0.8372

Epoch 11/35  
- 1s - loss: 0.3310 - acc: 0.8935 - val\_loss: 0.4394 - val\_acc: 0.8615  
Epoch 12/35  
- 1s - loss: 0.3300 - acc: 0.8950 - val\_loss: 0.4053 - val\_acc: 0.8667  
Epoch 13/35  
- 1s - loss: 0.3185 - acc: 0.8950 - val\_loss: 0.3896 - val\_acc: 0.8705  
Epoch 14/35  
- 1s - loss: 0.3240 - acc: 0.8901 - val\_loss: 0.4030 - val\_acc: 0.8641  
Epoch 15/35  
- 1s - loss: 0.3173 - acc: 0.8977 - val\_loss: 0.4054 - val\_acc: 0.8769  
Epoch 16/35  
- 1s - loss: 0.3096 - acc: 0.8977 - val\_loss: 0.4072 - val\_acc: 0.8417  
Epoch 17/35  
- 1s - loss: 0.3152 - acc: 0.8921 - val\_loss: 0.3654 - val\_acc: 0.8827  
Epoch 18/35  
- 1s - loss: 0.3102 - acc: 0.8889 - val\_loss: 0.3850 - val\_acc: 0.8705  
Epoch 19/35  
- 1s - loss: 0.3164 - acc: 0.8940 - val\_loss: 0.3874 - val\_acc: 0.8635  
Epoch 20/35  
- 1s - loss: 0.3066 - acc: 0.8970 - val\_loss: 0.4197 - val\_acc: 0.8577  
Epoch 21/35  
- 1s - loss: 0.2999 - acc: 0.8975 - val\_loss: 0.3920 - val\_acc: 0.8526  
Epoch 22/35  
- 1s - loss: 0.3004 - acc: 0.8957 - val\_loss: 0.3654 - val\_acc: 0.8692  
Epoch 23/35  
- 1s - loss: 0.3008 - acc: 0.8930 - val\_loss: 0.3902 - val\_acc: 0.8538  
Epoch 24/35  
- 1s - loss: 0.3063 - acc: 0.8933 - val\_loss: 0.3859 - val\_acc: 0.8788  
Epoch 25/35  
- 1s - loss: 0.3007 - acc: 0.8933 - val\_loss: 0.3675 - val\_acc: 0.8814  
Epoch 26/35  
- 1s - loss: 0.2960 - acc: 0.8975 - val\_loss: 0.3598 - val\_acc: 0.8814  
Epoch 27/35  
- 1s - loss: 0.2765 - acc: 0.9063 - val\_loss: 0.4239 - val\_acc: 0.8231  
Epoch 28/35  
- 1s - loss: 0.3148 - acc: 0.8901 - val\_loss: 0.3735 - val\_acc: 0.8795  
Epoch 29/35  
- 1s - loss: 0.3054 - acc: 0.8989 - val\_loss: 0.3616 - val\_acc: 0.8814  
Epoch 30/35  
- 1s - loss: 0.3029 - acc: 0.8911 - val\_loss: 0.3685 - val\_acc: 0.8718  
Epoch 31/35  
- 1s - loss: 0.2825 - acc: 0.9029 - val\_loss: 0.3763 - val\_acc: 0.8628  
Epoch 32/35  
- 1s - loss: 0.2918 - acc: 0.8982 - val\_loss: 0.3556 - val\_acc: 0.8776  
Epoch 33/35  
- 1s - loss: 0.3010 - acc: 0.8967 - val\_loss: 0.4036 - val\_acc: 0.8558  
Epoch 34/35  
- 1s - loss: 0.3350 - acc: 0.8844 - val\_loss: 0.3819 - val\_acc: 0.8737

Epoch 35/35

- 1s - loss: 0.2853 - acc: 0.8982 - val\_loss: 0.3580 - val\_acc: 0.8628

Train accuracy 0.890090976149496 Test accuracy: 0.8628205128205129

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 32)	7200
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 16)	11792
dense_2 (Dense)	(None, 3)	51

---

Total params: 20,515

Trainable params: 20,515

Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/25

- 2s - loss: 28.3069 - acc: 0.7991 - val\_loss: 7.1424 - val\_acc: 0.8686

Epoch 2/25

- 1s - loss: 2.7912 - acc: 0.8628 - val\_loss: 0.9277 - val\_acc: 0.8487

Epoch 3/25

- 1s - loss: 0.4968 - acc: 0.8721 - val\_loss: 0.6212 - val\_acc: 0.7910

Epoch 4/25

- 1s - loss: 0.3805 - acc: 0.8849 - val\_loss: 0.5867 - val\_acc: 0.8032

Epoch 5/25

- 1s - loss: 0.3498 - acc: 0.8884 - val\_loss: 0.5896 - val\_acc: 0.8327

Epoch 6/25

- 1s - loss: 0.3464 - acc: 0.8862 - val\_loss: 0.4605 - val\_acc: 0.8538

Epoch 7/25

- 1s - loss: 0.3276 - acc: 0.8918 - val\_loss: 0.4513 - val\_acc: 0.8628

Epoch 8/25

- 1s - loss: 0.3158 - acc: 0.8977 - val\_loss: 0.4758 - val\_acc: 0.8186

Epoch 9/25

- 1s - loss: 0.3112 - acc: 0.8955 - val\_loss: 0.4620 - val\_acc: 0.8603

Epoch 10/25

- 1s - loss: 0.3190 - acc: 0.8935 - val\_loss: 0.4491 - val\_acc: 0.8756

Epoch 11/25

```

- 1s - loss: 0.3127 - acc: 0.8945 - val_loss: 0.4407 - val_acc: 0.8654
Epoch 12/25
- 1s - loss: 0.3101 - acc: 0.8913 - val_loss: 0.4230 - val_acc: 0.8731
Epoch 13/25
- 1s - loss: 0.3117 - acc: 0.8994 - val_loss: 0.4087 - val_acc: 0.8865
Epoch 14/25
- 1s - loss: 0.3024 - acc: 0.8994 - val_loss: 0.5393 - val_acc: 0.8429
Epoch 15/25
- 1s - loss: 0.3179 - acc: 0.8886 - val_loss: 0.4468 - val_acc: 0.8731
Epoch 16/25
- 1s - loss: 0.3022 - acc: 0.8948 - val_loss: 0.4177 - val_acc: 0.8795
Epoch 17/25
- 1s - loss: 0.3229 - acc: 0.8945 - val_loss: 0.4456 - val_acc: 0.8538
Epoch 18/25
- 1s - loss: 0.3034 - acc: 0.8972 - val_loss: 0.3996 - val_acc: 0.8724
Epoch 19/25
- 1s - loss: 0.3020 - acc: 0.8955 - val_loss: 0.4095 - val_acc: 0.8795
Epoch 20/25
- 1s - loss: 0.3028 - acc: 0.8948 - val_loss: 0.7896 - val_acc: 0.6282
Epoch 21/25
- 1s - loss: 0.3024 - acc: 0.8960 - val_loss: 0.4102 - val_acc: 0.8686
Epoch 22/25
- 1s - loss: 0.2996 - acc: 0.8957 - val_loss: 0.4019 - val_acc: 0.8814
Epoch 23/25
- 1s - loss: 0.2980 - acc: 0.8903 - val_loss: 0.4219 - val_acc: 0.8718
Epoch 24/25
- 1s - loss: 0.2947 - acc: 0.8980 - val_loss: 0.4129 - val_acc: 0.8654
Epoch 25/25
- 1s - loss: 0.2977 - acc: 0.8953 - val_loss: 0.5524 - val_acc: 0.8391
Train accuracy 0.8573887386279813 Test accuracy: 0.8391025641025641

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 122, 16)	3376
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

Total params: 67,275  
Trainable params: 67,275  
Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 52.5465 - acc: 0.8552 - val\_loss: 0.6564 - val\_acc: 0.8090

Epoch 2/30

- 2s - loss: 0.4335 - acc: 0.8640 - val\_loss: 0.4309 - val\_acc: 0.8564

Epoch 3/30

- 2s - loss: 0.3753 - acc: 0.8741 - val\_loss: 0.4580 - val\_acc: 0.8276

Epoch 4/30

- 2s - loss: 0.3516 - acc: 0.8832 - val\_loss: 0.3662 - val\_acc: 0.8718

Epoch 5/30

- 2s - loss: 0.3548 - acc: 0.8756 - val\_loss: 0.3697 - val\_acc: 0.8615

Epoch 6/30

- 2s - loss: 0.3460 - acc: 0.8798 - val\_loss: 0.4409 - val\_acc: 0.8103

Epoch 7/30

- 2s - loss: 0.3392 - acc: 0.8847 - val\_loss: 0.3772 - val\_acc: 0.8692

Epoch 8/30

- 2s - loss: 0.3387 - acc: 0.8859 - val\_loss: 0.5056 - val\_acc: 0.8321

Epoch 9/30

- 2s - loss: 0.3362 - acc: 0.8830 - val\_loss: 0.4326 - val\_acc: 0.8519

Epoch 10/30

- 2s - loss: 0.3456 - acc: 0.8807 - val\_loss: 0.3775 - val\_acc: 0.8769

Epoch 11/30

- 2s - loss: 0.3418 - acc: 0.8913 - val\_loss: 0.6412 - val\_acc: 0.6962

Epoch 12/30

- 2s - loss: 0.3384 - acc: 0.8847 - val\_loss: 0.3659 - val\_acc: 0.8622

Epoch 13/30

- 2s - loss: 0.3363 - acc: 0.8822 - val\_loss: 0.4465 - val\_acc: 0.8397

Epoch 14/30

- 2s - loss: 0.3300 - acc: 0.8876 - val\_loss: 0.5270 - val\_acc: 0.7417

Epoch 15/30

- 2s - loss: 0.3244 - acc: 0.8906 - val\_loss: 0.3348 - val\_acc: 0.8737

Epoch 16/30

- 2s - loss: 0.3306 - acc: 0.8884 - val\_loss: 0.3609 - val\_acc: 0.8782

Epoch 17/30

- 2s - loss: 0.3214 - acc: 0.8884 - val\_loss: 0.5083 - val\_acc: 0.8545

Epoch 18/30

- 2s - loss: 0.3165 - acc: 0.8898 - val\_loss: 0.5304 - val\_acc: 0.8596

Epoch 19/30

- 2s - loss: 0.3221 - acc: 0.8908 - val\_loss: 0.4412 - val\_acc: 0.8679

Epoch 20/30

- 2s - loss: 0.3177 - acc: 0.8930 - val\_loss: 0.3984 - val\_acc: 0.8667

Epoch 21/30

- 2s - loss: 0.3084 - acc: 0.8879 - val\_loss: 0.5146 - val\_acc: 0.8481



Epoch 22/30  
 - 2s - loss: 0.3205 - acc: 0.8876 - val\_loss: 0.5759 - val\_acc: 0.8199  
 Epoch 23/30  
 - 2s - loss: 0.3208 - acc: 0.8898 - val\_loss: 0.3520 - val\_acc: 0.8731  
 Epoch 24/30  
 - 2s - loss: 0.3187 - acc: 0.8871 - val\_loss: 0.3750 - val\_acc: 0.8692  
 Epoch 25/30  
 - 2s - loss: 0.3104 - acc: 0.8889 - val\_loss: 0.3379 - val\_acc: 0.8904  
 Epoch 26/30  
 - 2s - loss: 0.3168 - acc: 0.8950 - val\_loss: 0.3811 - val\_acc: 0.8724  
 Epoch 27/30  
 - 2s - loss: 0.3353 - acc: 0.8879 - val\_loss: 0.3406 - val\_acc: 0.8718  
 Epoch 28/30  
 - 2s - loss: 0.3238 - acc: 0.8930 - val\_loss: 0.4613 - val\_acc: 0.8224  
 Epoch 29/30  
 - 2s - loss: 0.3173 - acc: 0.8935 - val\_loss: 0.3759 - val\_acc: 0.8718  
 Epoch 30/30  
 - 2s - loss: 0.3249 - acc: 0.8935 - val\_loss: 0.3380 - val\_acc: 0.8827  
 Train accuracy 0.9141873616916646 Test accuracy: 0.8826923076923077

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 16)	1360
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 32)	30752
dense_2 (Dense)	(None, 3)	99

Total params: 34,003  
 Trainable params: 34,003  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/35  
 - 2s - loss: 45.8780 - acc: 0.8321 - val\_loss: 2.4164 - val\_acc: 0.8545  
 Epoch 2/35  
 - 1s - loss: 0.7405 - acc: 0.8780 - val\_loss: 0.4873 - val\_acc: 0.8500  
 Epoch 3/35

- 1s - loss: 0.4056 - acc: 0.8748 - val\_loss: 0.4593 - val\_acc: 0.8538  
 Epoch 4/35  
 - 1s - loss: 0.4136 - acc: 0.8613 - val\_loss: 0.4638 - val\_acc: 0.8455  
 Epoch 5/35  
 - 1s - loss: 0.3844 - acc: 0.8817 - val\_loss: 0.4388 - val\_acc: 0.8564  
 Epoch 6/35  
 - 1s - loss: 0.3396 - acc: 0.8891 - val\_loss: 0.3843 - val\_acc: 0.8705  
 Epoch 7/35  
 - 1s - loss: 0.3619 - acc: 0.8849 - val\_loss: 0.4112 - val\_acc: 0.8782  
 Epoch 8/35  
 - 1s - loss: 0.3953 - acc: 0.8805 - val\_loss: 0.4559 - val\_acc: 0.8353  
 Epoch 9/35  
 - 1s - loss: 0.4188 - acc: 0.8849 - val\_loss: 0.3881 - val\_acc: 0.8660  
 Epoch 10/35  
 - 1s - loss: 0.3376 - acc: 0.8906 - val\_loss: 0.3924 - val\_acc: 0.8660  
 Epoch 11/35  
 - 1s - loss: 0.3819 - acc: 0.8748 - val\_loss: 0.4235 - val\_acc: 0.8532  
 Epoch 12/35  
 - 1s - loss: 0.3517 - acc: 0.8822 - val\_loss: 0.4019 - val\_acc: 0.8654  
 Epoch 13/35  
 - 1s - loss: 0.3412 - acc: 0.8857 - val\_loss: 0.3997 - val\_acc: 0.8577  
 Epoch 14/35  
 - 1s - loss: 0.3434 - acc: 0.8876 - val\_loss: 0.4417 - val\_acc: 0.8282  
 Epoch 15/35  
 - 1s - loss: 0.3508 - acc: 0.8756 - val\_loss: 0.3992 - val\_acc: 0.8660  
 Epoch 16/35  
 - 1s - loss: 0.3615 - acc: 0.8891 - val\_loss: 0.4111 - val\_acc: 0.8397  
 Epoch 17/35  
 - 1s - loss: 0.3576 - acc: 0.8898 - val\_loss: 0.4121 - val\_acc: 0.8615  
 Epoch 18/35  
 - 1s - loss: 0.3539 - acc: 0.8768 - val\_loss: 0.4246 - val\_acc: 0.8436  
 Epoch 19/35  
 - 1s - loss: 0.3425 - acc: 0.8839 - val\_loss: 0.4360 - val\_acc: 0.8365  
 Epoch 20/35  
 - 1s - loss: 0.3288 - acc: 0.8921 - val\_loss: 0.4256 - val\_acc: 0.8526  
 Epoch 21/35  
 - 1s - loss: 0.3389 - acc: 0.8854 - val\_loss: 0.3892 - val\_acc: 0.8667  
 Epoch 22/35  
 - 1s - loss: 0.3450 - acc: 0.8871 - val\_loss: 0.3797 - val\_acc: 0.8622  
 Epoch 23/35  
 - 1s - loss: 0.5197 - acc: 0.8301 - val\_loss: 0.4272 - val\_acc: 0.8692  
 Epoch 24/35  
 - 1s - loss: 0.3337 - acc: 0.8812 - val\_loss: 0.3985 - val\_acc: 0.8603  
 Epoch 25/35  
 - 1s - loss: 0.3279 - acc: 0.8962 - val\_loss: 0.3604 - val\_acc: 0.8603  
 Epoch 26/35  
 - 1s - loss: 0.3440 - acc: 0.8857 - val\_loss: 0.4227 - val\_acc: 0.8365  
 Epoch 27/35

```

- 1s - loss: 0.3158 - acc: 0.8967 - val_loss: 0.3776 - val_acc: 0.8731
Epoch 28/35
- 1s - loss: 0.3277 - acc: 0.8894 - val_loss: 0.4105 - val_acc: 0.8692
Epoch 29/35
- 1s - loss: 0.3337 - acc: 0.8906 - val_loss: 0.5340 - val_acc: 0.7955
Epoch 30/35
- 1s - loss: 0.3752 - acc: 0.8660 - val_loss: 0.3709 - val_acc: 0.8782
Epoch 31/35
- 1s - loss: 0.3132 - acc: 0.8901 - val_loss: 0.4068 - val_acc: 0.8596
Epoch 32/35
- 1s - loss: 0.3069 - acc: 0.8953 - val_loss: 0.3925 - val_acc: 0.8609
Epoch 33/35
- 1s - loss: 0.3195 - acc: 0.8871 - val_loss: 0.3845 - val_acc: 0.8615
Epoch 34/35
- 1s - loss: 0.3372 - acc: 0.8854 - val_loss: 0.4420 - val_acc: 0.8391
Epoch 35/35
- 1s - loss: 0.3808 - acc: 0.8832 - val_loss: 0.3866 - val_acc: 0.8551
Train accuracy 0.8812392426850258 Test accuracy: 0.8551282051282051

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 32)	3104
dropout_1 (Dropout)	(None, 122, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 32)	0
flatten_1 (Flatten)	(None, 1280)	0
dense_1 (Dense)	(None, 64)	81984
dense_2 (Dense)	(None, 3)	195

```

Total params: 86,755
Trainable params: 86,755
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
- 2s - loss: 46.6903 - acc: 0.8291 - val_loss: 21.6544 - val_acc: 0.8667
Epoch 2/25
- 1s - loss: 10.5558 - acc: 0.8982 - val_loss: 3.5127 - val_acc: 0.8814
Epoch 3/25
- 1s - loss: 1.6898 - acc: 0.8923 - val_loss: 0.9691 - val_acc: 0.8359

```

```

Epoch 4/25
  - 2s - loss: 0.6299 - acc: 0.9026 - val_loss: 0.6433 - val_acc: 0.8301
Epoch 5/25
  - 1s - loss: 0.4345 - acc: 0.9007 - val_loss: 0.5532 - val_acc: 0.8583
Epoch 6/25
  - 1s - loss: 0.3595 - acc: 0.9056 - val_loss: 0.4813 - val_acc: 0.8609
Epoch 7/25
  - 1s - loss: 0.3353 - acc: 0.8987 - val_loss: 0.4140 - val_acc: 0.8769
Epoch 8/25
  - 1s - loss: 0.2969 - acc: 0.9127 - val_loss: 0.4302 - val_acc: 0.8321
Epoch 9/25
  - 1s - loss: 0.2823 - acc: 0.9125 - val_loss: 0.3604 - val_acc: 0.8782
Epoch 10/25
  - 1s - loss: 0.2867 - acc: 0.9071 - val_loss: 0.3587 - val_acc: 0.8654
Epoch 11/25
  - 1s - loss: 0.2623 - acc: 0.9139 - val_loss: 0.3386 - val_acc: 0.8846
Epoch 12/25
  - 1s - loss: 0.2689 - acc: 0.9083 - val_loss: 0.3312 - val_acc: 0.8878
Epoch 13/25
  - 1s - loss: 0.2604 - acc: 0.9169 - val_loss: 0.3235 - val_acc: 0.8936
Epoch 14/25
  - 1s - loss: 0.2529 - acc: 0.9176 - val_loss: 0.3551 - val_acc: 0.8859
Epoch 15/25
  - 1s - loss: 0.2555 - acc: 0.9191 - val_loss: 0.3550 - val_acc: 0.8628
Epoch 16/25
  - 1s - loss: 0.2528 - acc: 0.9162 - val_loss: 0.3100 - val_acc: 0.8942
Epoch 17/25
  - 1s - loss: 0.2545 - acc: 0.9166 - val_loss: 0.3230 - val_acc: 0.8833
Epoch 18/25
  - 1s - loss: 0.2442 - acc: 0.9164 - val_loss: 0.3139 - val_acc: 0.8737
Epoch 19/25
  - 1s - loss: 0.2471 - acc: 0.9115 - val_loss: 0.2999 - val_acc: 0.9000
Epoch 20/25
  - 1s - loss: 0.2447 - acc: 0.9221 - val_loss: 0.5081 - val_acc: 0.7987
Epoch 21/25
  - 1s - loss: 0.2362 - acc: 0.9260 - val_loss: 0.3236 - val_acc: 0.8795
Epoch 22/25
  - 2s - loss: 0.2391 - acc: 0.9181 - val_loss: 0.3770 - val_acc: 0.8628
Epoch 23/25
  - 1s - loss: 0.2270 - acc: 0.9257 - val_loss: 0.2971 - val_acc: 0.8949
Epoch 24/25
  - 1s - loss: 0.2394 - acc: 0.9198 - val_loss: 0.2972 - val_acc: 0.9128
Epoch 25/25
  - 1s - loss: 0.2455 - acc: 0.9208 - val_loss: 0.3122 - val_acc: 0.8859
Train accuracy 0.9245143840668798 Test accuracy: 0.8858974358974359

```

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Layer (type)	Output Shape	Param #
--------------	--------------	---------

```

=====
conv1d_1 (Conv1D)                (None, 122, 32)                2048
-----
conv1d_2 (Conv1D)                (None, 116, 16)                3600
-----
dropout_1 (Dropout)              (None, 116, 16)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 58, 16)                0
-----
flatten_1 (Flatten)              (None, 928)                    0
-----
dense_1 (Dense)                  (None, 64)                     59456
-----
dense_2 (Dense)                  (None, 3)                      195
=====
Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 4s - loss: 4.2722 - acc: 0.8439 - val_loss: 0.4968 - val_acc: 0.8397
Epoch 2/30
  - 3s - loss: 0.4019 - acc: 0.8805 - val_loss: 0.4921 - val_acc: 0.8449
Epoch 3/30
  - 3s - loss: 0.3703 - acc: 0.8822 - val_loss: 0.5092 - val_acc: 0.8256
Epoch 4/30
  - 3s - loss: 0.3571 - acc: 0.8911 - val_loss: 0.3577 - val_acc: 0.8647
Epoch 5/30
  - 3s - loss: 0.3494 - acc: 0.8918 - val_loss: 0.4539 - val_acc: 0.8506
Epoch 6/30
  - 3s - loss: 0.3295 - acc: 0.8911 - val_loss: 0.5556 - val_acc: 0.8385
Epoch 7/30
  - 3s - loss: 0.3057 - acc: 0.8896 - val_loss: 0.3597 - val_acc: 0.8468
Epoch 8/30
  - 3s - loss: 0.3543 - acc: 0.8847 - val_loss: 0.4036 - val_acc: 0.8385
Epoch 9/30
  - 3s - loss: 0.3250 - acc: 0.8854 - val_loss: 0.5840 - val_acc: 0.8538
Epoch 10/30
  - 3s - loss: 0.3429 - acc: 0.8857 - val_loss: 0.5319 - val_acc: 0.8628
Epoch 11/30
  - 3s - loss: 0.3379 - acc: 0.8903 - val_loss: 0.4500 - val_acc: 0.7462
Epoch 12/30
  - 3s - loss: 0.3100 - acc: 0.8886 - val_loss: 0.3369 - val_acc: 0.8660
Epoch 13/30
  - 3s - loss: 0.3230 - acc: 0.8876 - val_loss: 0.3687 - val_acc: 0.8558
Epoch 14/30

```

```

- 3s - loss: 0.3439 - acc: 0.8896 - val_loss: 0.4574 - val_acc: 0.7705
Epoch 15/30
- 3s - loss: 0.3081 - acc: 0.8935 - val_loss: 0.3982 - val_acc: 0.8590
Epoch 16/30
- 3s - loss: 0.3398 - acc: 0.8908 - val_loss: 0.3592 - val_acc: 0.8833
Epoch 17/30
- 3s - loss: 0.3165 - acc: 0.8923 - val_loss: 0.6060 - val_acc: 0.8545
Epoch 18/30
- 3s - loss: 0.3094 - acc: 0.8955 - val_loss: 0.6460 - val_acc: 0.8506
Epoch 19/30
- 3s - loss: 0.3141 - acc: 0.8948 - val_loss: 0.3548 - val_acc: 0.8814
Epoch 20/30
- 3s - loss: 0.3229 - acc: 0.8916 - val_loss: 0.4887 - val_acc: 0.8558
Epoch 21/30
- 3s - loss: 0.3283 - acc: 0.8940 - val_loss: 0.5115 - val_acc: 0.8590
Epoch 22/30
- 3s - loss: 0.3070 - acc: 0.8891 - val_loss: 0.6118 - val_acc: 0.6878
Epoch 23/30
- 3s - loss: 0.3187 - acc: 0.8896 - val_loss: 0.3359 - val_acc: 0.8679
Epoch 24/30
- 3s - loss: 0.3231 - acc: 0.8940 - val_loss: 0.6078 - val_acc: 0.8603
Epoch 25/30
- 3s - loss: 0.3373 - acc: 0.8871 - val_loss: 0.3849 - val_acc: 0.8667
Epoch 26/30
- 3s - loss: 0.3189 - acc: 0.8876 - val_loss: 0.5632 - val_acc: 0.8449
Epoch 27/30
- 3s - loss: 0.3333 - acc: 0.8906 - val_loss: 0.5917 - val_acc: 0.8564
Epoch 28/30
- 3s - loss: 0.3210 - acc: 0.8913 - val_loss: 0.4286 - val_acc: 0.8462
Epoch 29/30
- 3s - loss: 0.3077 - acc: 0.8957 - val_loss: 0.3517 - val_acc: 0.8724
Epoch 30/30
- 3s - loss: 0.3057 - acc: 0.8985 - val_loss: 0.5813 - val_acc: 0.8628
Train accuracy 0.9112367838701746 Test accuracy: 0.8628205128205129

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 122, 16)	3376
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0

dense_1 (Dense)	(None, 32)	12320
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dense_2 (Dense)	(None, 3)	99
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Total params: 16,971  
 Trainable params: 16,971  
 Non-trainable params: 0

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None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35

- 2s - loss: 41.7235 - acc: 0.8483 - val\_loss: 13.4304 - val\_acc: 0.8673

Epoch 2/35

- 1s - loss: 5.7498 - acc: 0.9014 - val\_loss: 1.9041 - val\_acc: 0.8538

Epoch 3/35

- 1s - loss: 0.8308 - acc: 0.8987 - val\_loss: 0.5992 - val\_acc: 0.8654

Epoch 4/35

- 1s - loss: 0.3762 - acc: 0.8975 - val\_loss: 0.4779 - val\_acc: 0.8526

Epoch 5/35

- 1s - loss: 0.3388 - acc: 0.8908 - val\_loss: 0.4659 - val\_acc: 0.8583

Epoch 6/35

- 1s - loss: 0.3239 - acc: 0.8953 - val\_loss: 0.7361 - val\_acc: 0.6974

Epoch 7/35

- 1s - loss: 0.3957 - acc: 0.8839 - val\_loss: 0.5072 - val\_acc: 0.8474

Epoch 8/35

- 1s - loss: 0.3332 - acc: 0.8930 - val\_loss: 0.4585 - val\_acc: 0.8782

Epoch 9/35

- 1s - loss: 0.3091 - acc: 0.9036 - val\_loss: 0.4323 - val\_acc: 0.8692

Epoch 10/35

- 1s - loss: 0.3091 - acc: 0.8999 - val\_loss: 0.4502 - val\_acc: 0.8590

Epoch 11/35

- 1s - loss: 0.3146 - acc: 0.9007 - val\_loss: 0.4536 - val\_acc: 0.8801

Epoch 12/35

- 1s - loss: 0.3014 - acc: 0.8975 - val\_loss: 0.4331 - val\_acc: 0.8667

Epoch 13/35

- 1s - loss: 0.2938 - acc: 0.9073 - val\_loss: 0.3960 - val\_acc: 0.8846

Epoch 14/35

- 1s - loss: 0.2842 - acc: 0.9029 - val\_loss: 0.4344 - val\_acc: 0.8609

Epoch 15/35

- 1s - loss: 0.2899 - acc: 0.9021 - val\_loss: 0.4369 - val\_acc: 0.8628

Epoch 16/35

- 1s - loss: 0.3358 - acc: 0.8980 - val\_loss: 0.4143 - val\_acc: 0.8679

Epoch 17/35

- 1s - loss: 0.3120 - acc: 0.8925 - val\_loss: 0.3912 - val\_acc: 0.8731

Epoch 18/35

- 1s - loss: 0.3092 - acc: 0.8987 - val\_loss: 0.4243 - val\_acc: 0.8776

Epoch 19/35

- 1s - loss: 0.2864 - acc: 0.9007 - val\_loss: 0.4309 - val\_acc: 0.8654

Epoch 20/35  
 - 1s - loss: 0.2886 - acc: 0.9090 - val\_loss: 0.4394 - val\_acc: 0.8763  
 Epoch 21/35  
 - 1s - loss: 0.2754 - acc: 0.9085 - val\_loss: 0.4333 - val\_acc: 0.8500  
 Epoch 22/35  
 - 1s - loss: 0.2853 - acc: 0.9034 - val\_loss: 0.4497 - val\_acc: 0.8660  
 Epoch 23/35  
 - 1s - loss: 0.3028 - acc: 0.9012 - val\_loss: 0.3857 - val\_acc: 0.8853  
 Epoch 24/35  
 - 1s - loss: 0.3190 - acc: 0.9002 - val\_loss: 0.3917 - val\_acc: 0.8724  
 Epoch 25/35  
 - 1s - loss: 0.2840 - acc: 0.9021 - val\_loss: 0.3642 - val\_acc: 0.8840  
 Epoch 26/35  
 - 1s - loss: 0.2804 - acc: 0.9046 - val\_loss: 0.3831 - val\_acc: 0.8782  
 Epoch 27/35  
 - 1s - loss: 0.2630 - acc: 0.9107 - val\_loss: 0.4150 - val\_acc: 0.8577  
 Epoch 28/35  
 - 1s - loss: 0.3237 - acc: 0.8903 - val\_loss: 0.3801 - val\_acc: 0.8878  
 Epoch 29/35  
 - 1s - loss: 0.2813 - acc: 0.9100 - val\_loss: 0.3727 - val\_acc: 0.8865  
 Epoch 30/35  
 - 1s - loss: 0.2768 - acc: 0.9053 - val\_loss: 0.4320 - val\_acc: 0.8571  
 Epoch 31/35  
 - 1s - loss: 0.2788 - acc: 0.9110 - val\_loss: 0.4100 - val\_acc: 0.8686  
 Epoch 32/35  
 - 1s - loss: 0.2631 - acc: 0.9098 - val\_loss: 0.4241 - val\_acc: 0.8301  
 Epoch 33/35  
 - 1s - loss: 0.2849 - acc: 0.9088 - val\_loss: 0.4756 - val\_acc: 0.8032  
 Epoch 34/35  
 - 1s - loss: 0.2914 - acc: 0.9026 - val\_loss: 0.4020 - val\_acc: 0.8795  
 Epoch 35/35  
 - 1s - loss: 0.2728 - acc: 0.9107 - val\_loss: 0.4020 - val\_acc: 0.8769  
 Train accuracy 0.8969756577329727 Test accuracy: 0.8769230769230769

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 32)	3104
dropout_1 (Dropout)	(None, 122, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 32)	0
flatten_1 (Flatten)	(None, 1952)	0
dense_1 (Dense)	(None, 16)	31248



```

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dense_2 (Dense)                (None, 3)                51
=====
Total params: 35,875
Trainable params: 35,875
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 3s - loss: 19.4982 - acc: 0.8360 - val_loss: 0.9021 - val_acc: 0.7244
Epoch 2/30
  - 2s - loss: 0.4458 - acc: 0.8618 - val_loss: 0.5058 - val_acc: 0.8474
Epoch 3/30
  - 2s - loss: 0.3918 - acc: 0.8746 - val_loss: 0.4610 - val_acc: 0.8333
Epoch 4/30
  - 2s - loss: 0.3691 - acc: 0.8864 - val_loss: 0.4135 - val_acc: 0.8423
Epoch 5/30
  - 2s - loss: 0.3640 - acc: 0.8842 - val_loss: 0.4855 - val_acc: 0.8128
Epoch 6/30
  - 2s - loss: 0.3469 - acc: 0.8854 - val_loss: 0.4867 - val_acc: 0.8000
Epoch 7/30
  - 2s - loss: 0.3520 - acc: 0.8866 - val_loss: 0.3838 - val_acc: 0.8628
Epoch 8/30
  - 2s - loss: 0.3661 - acc: 0.8780 - val_loss: 0.4235 - val_acc: 0.8346
Epoch 9/30
  - 2s - loss: 0.3347 - acc: 0.8898 - val_loss: 0.3832 - val_acc: 0.8782
Epoch 10/30
  - 2s - loss: 0.3440 - acc: 0.8842 - val_loss: 0.3684 - val_acc: 0.8776
Epoch 11/30
  - 2s - loss: 0.3299 - acc: 0.8874 - val_loss: 0.6600 - val_acc: 0.6853
Epoch 12/30
  - 2s - loss: 0.3413 - acc: 0.8874 - val_loss: 0.4796 - val_acc: 0.7968
Epoch 13/30
  - 2s - loss: 0.3597 - acc: 0.8785 - val_loss: 0.4552 - val_acc: 0.8045
Epoch 14/30
  - 2s - loss: 0.3473 - acc: 0.8830 - val_loss: 0.6236 - val_acc: 0.7071
Epoch 15/30
  - 2s - loss: 0.3320 - acc: 0.8884 - val_loss: 0.3361 - val_acc: 0.8731
Epoch 16/30
  - 2s - loss: 0.3479 - acc: 0.8842 - val_loss: 0.4142 - val_acc: 0.8538
Epoch 17/30
  - 2s - loss: 0.3374 - acc: 0.8847 - val_loss: 0.4251 - val_acc: 0.8571
Epoch 18/30
  - 2s - loss: 0.3406 - acc: 0.8866 - val_loss: 0.3728 - val_acc: 0.8827
Epoch 19/30
  - 2s - loss: 0.3275 - acc: 0.8866 - val_loss: 0.3588 - val_acc: 0.8731
Epoch 20/30

```

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- 2s - loss: 0.3214 - acc: 0.8928 - val_loss: 0.3749 - val_acc: 0.8641
Epoch 21/30
- 2s - loss: 0.3295 - acc: 0.8857 - val_loss: 0.3679 - val_acc: 0.8686
Epoch 22/30
- 2s - loss: 0.3290 - acc: 0.8842 - val_loss: 0.4216 - val_acc: 0.8333
Epoch 23/30
- 2s - loss: 0.3414 - acc: 0.8805 - val_loss: 0.3559 - val_acc: 0.8724
Epoch 24/30
- 2s - loss: 0.3270 - acc: 0.8869 - val_loss: 0.3590 - val_acc: 0.8692
Epoch 25/30
- 2s - loss: 0.3269 - acc: 0.8805 - val_loss: 0.3393 - val_acc: 0.8718
Epoch 26/30
- 2s - loss: 0.3343 - acc: 0.8835 - val_loss: 0.3589 - val_acc: 0.8776
Epoch 27/30
- 2s - loss: 0.3307 - acc: 0.8852 - val_loss: 0.4721 - val_acc: 0.8481
Epoch 28/30
- 2s - loss: 0.3318 - acc: 0.8869 - val_loss: 0.5002 - val_acc: 0.7353
Epoch 29/30
- 2s - loss: 0.3237 - acc: 0.8876 - val_loss: 0.3974 - val_acc: 0.8635
Epoch 30/30
- 2s - loss: 0.3231 - acc: 0.8854 - val_loss: 0.3540 - val_acc: 0.8699
Train accuracy 0.9117285468404229 Test accuracy: 0.8698717948717949
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 28)	1288
conv1d_2 (Conv1D)	(None, 122, 16)	1360
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 64)	41024
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 43,867

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Trainable params: 43,867

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Non-trainable params: 0
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```

```

None

```

```

Train on 4067 samples, validate on 1560 samples

```

```

Epoch 1/25

```

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- 1s - loss: 96.6573 - acc: 0.7846 - val_loss: 34.2556 - val_acc: 0.8583

```

Epoch 2/25  
- 1s - loss: 13.4513 - acc: 0.8473 - val\_loss: 2.4480 - val\_acc: 0.8006  
Epoch 3/25  
- 1s - loss: 0.8474 - acc: 0.8539 - val\_loss: 0.5500 - val\_acc: 0.8141  
Epoch 4/25  
- 1s - loss: 0.4364 - acc: 0.8716 - val\_loss: 0.5517 - val\_acc: 0.7750  
Epoch 5/25  
- 1s - loss: 0.4180 - acc: 0.8744 - val\_loss: 0.5910 - val\_acc: 0.7981  
Epoch 6/25  
- 1s - loss: 0.3970 - acc: 0.8744 - val\_loss: 0.4580 - val\_acc: 0.8724  
Epoch 7/25  
- 1s - loss: 0.3861 - acc: 0.8761 - val\_loss: 0.4195 - val\_acc: 0.8609  
Epoch 8/25  
- 1s - loss: 0.3791 - acc: 0.8734 - val\_loss: 0.4660 - val\_acc: 0.8417  
Epoch 9/25  
- 1s - loss: 0.3722 - acc: 0.8822 - val\_loss: 0.4663 - val\_acc: 0.8359  
Epoch 10/25  
- 1s - loss: 0.3751 - acc: 0.8785 - val\_loss: 0.4009 - val\_acc: 0.8756  
Epoch 11/25  
- 1s - loss: 0.3641 - acc: 0.8790 - val\_loss: 0.4369 - val\_acc: 0.8487  
Epoch 12/25  
- 1s - loss: 0.3606 - acc: 0.8825 - val\_loss: 0.3942 - val\_acc: 0.8737  
Epoch 13/25  
- 1s - loss: 0.3538 - acc: 0.8857 - val\_loss: 0.3865 - val\_acc: 0.8814  
Epoch 14/25  
- 1s - loss: 0.3543 - acc: 0.8886 - val\_loss: 0.5749 - val\_acc: 0.8077  
Epoch 15/25  
- 1s - loss: 0.3548 - acc: 0.8812 - val\_loss: 0.4317 - val\_acc: 0.8628  
Epoch 16/25  
- 1s - loss: 0.3629 - acc: 0.8854 - val\_loss: 0.4031 - val\_acc: 0.8654  
Epoch 17/25  
- 1s - loss: 0.3446 - acc: 0.8871 - val\_loss: 0.3834 - val\_acc: 0.8724  
Epoch 18/25  
- 1s - loss: 0.3694 - acc: 0.8771 - val\_loss: 0.4248 - val\_acc: 0.8795  
Epoch 19/25  
- 1s - loss: 0.3385 - acc: 0.8874 - val\_loss: 0.4589 - val\_acc: 0.8417  
Epoch 20/25  
- 1s - loss: 0.3447 - acc: 0.8832 - val\_loss: 0.9289 - val\_acc: 0.6468  
Epoch 21/25  
- 1s - loss: 0.3490 - acc: 0.8839 - val\_loss: 0.3921 - val\_acc: 0.8577  
Epoch 22/25  
- 1s - loss: 0.3359 - acc: 0.8891 - val\_loss: 0.4704 - val\_acc: 0.8564  
Epoch 23/25  
- 1s - loss: 0.3546 - acc: 0.8795 - val\_loss: 0.4421 - val\_acc: 0.8577  
Epoch 24/25  
- 1s - loss: 0.3437 - acc: 0.8827 - val\_loss: 0.4323 - val\_acc: 0.8609  
Epoch 25/25  
- 1s - loss: 0.3402 - acc: 0.8839 - val\_loss: 0.5807 - val\_acc: 0.8417

Train accuracy 0.8728792721908041 Test accuracy: 0.8416666666666667

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 24)	5400
dropout_1 (Dropout)	(None, 116, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 58, 24)	0
flatten_1 (Flatten)	(None, 1392)	0
dense_1 (Dense)	(None, 64)	89152
dense_2 (Dense)	(None, 3)	195

Total params: 96,795

Trainable params: 96,795

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 80.7895 - acc: 0.8097 - val\_loss: 40.2483 - val\_acc: 0.8474

Epoch 2/30

- 1s - loss: 22.3255 - acc: 0.8716 - val\_loss: 10.2429 - val\_acc: 0.8647

Epoch 3/30

- 1s - loss: 5.3971 - acc: 0.8783 - val\_loss: 2.2388 - val\_acc: 0.8128

Epoch 4/30

- 1s - loss: 1.0119 - acc: 0.8852 - val\_loss: 0.6936 - val\_acc: 0.7936

Epoch 5/30

- 1s - loss: 0.3791 - acc: 0.8923 - val\_loss: 0.4846 - val\_acc: 0.8474

Epoch 6/30

- 1s - loss: 0.3220 - acc: 0.8933 - val\_loss: 0.3741 - val\_acc: 0.8699

Epoch 7/30

- 1s - loss: 0.3080 - acc: 0.8930 - val\_loss: 0.3646 - val\_acc: 0.8853

Epoch 8/30

- 1s - loss: 0.2945 - acc: 0.8997 - val\_loss: 0.4360 - val\_acc: 0.8308

Epoch 9/30

- 1s - loss: 0.2951 - acc: 0.9034 - val\_loss: 0.3705 - val\_acc: 0.8564

Epoch 10/30

- 1s - loss: 0.2957 - acc: 0.8967 - val\_loss: 0.4394 - val\_acc: 0.8660

Epoch 11/30

- 1s - loss: 0.2922 - acc: 0.8948 - val\_loss: 0.3827 - val\_acc: 0.8744

Epoch 12/30

```

- 1s - loss: 0.2816 - acc: 0.9014 - val_loss: 0.3454 - val_acc: 0.8744
Epoch 13/30
- 1s - loss: 0.2775 - acc: 0.9036 - val_loss: 0.3364 - val_acc: 0.8808
Epoch 14/30
- 1s - loss: 0.2769 - acc: 0.9039 - val_loss: 0.3716 - val_acc: 0.8679
Epoch 15/30
- 1s - loss: 0.2818 - acc: 0.8972 - val_loss: 0.3593 - val_acc: 0.8686
Epoch 16/30
- 1s - loss: 0.2834 - acc: 0.8994 - val_loss: 0.3387 - val_acc: 0.8776
Epoch 17/30
- 1s - loss: 0.2726 - acc: 0.9061 - val_loss: 0.3338 - val_acc: 0.8731
Epoch 18/30
- 1s - loss: 0.2727 - acc: 0.9019 - val_loss: 0.3534 - val_acc: 0.8564
Epoch 19/30
- 1s - loss: 0.2819 - acc: 0.8955 - val_loss: 0.3407 - val_acc: 0.8763
Epoch 20/30
- 1s - loss: 0.2700 - acc: 0.8977 - val_loss: 0.3633 - val_acc: 0.8692
Epoch 21/30
- 1s - loss: 0.2717 - acc: 0.9026 - val_loss: 0.3397 - val_acc: 0.8699
Epoch 22/30
- 1s - loss: 0.2720 - acc: 0.8975 - val_loss: 0.3513 - val_acc: 0.8699
Epoch 23/30
- 1s - loss: 0.2738 - acc: 0.8957 - val_loss: 0.3350 - val_acc: 0.8763
Epoch 24/30
- 1s - loss: 0.2692 - acc: 0.9014 - val_loss: 0.3397 - val_acc: 0.8692
Epoch 25/30
- 1s - loss: 0.2786 - acc: 0.8982 - val_loss: 0.3711 - val_acc: 0.8686
Epoch 26/30
- 1s - loss: 0.2741 - acc: 0.8985 - val_loss: 0.3366 - val_acc: 0.8788
Epoch 27/30
- 1s - loss: 0.2761 - acc: 0.8982 - val_loss: 0.3363 - val_acc: 0.8641
Epoch 28/30
- 1s - loss: 0.2689 - acc: 0.8987 - val_loss: 0.3610 - val_acc: 0.8712
Epoch 29/30
- 1s - loss: 0.2774 - acc: 0.8980 - val_loss: 0.3314 - val_acc: 0.8795
Epoch 30/30
- 1s - loss: 0.2761 - acc: 0.8999 - val_loss: 0.3622 - val_acc: 0.8660
Train accuracy 0.8805015982296533 Test accuracy: 0.8660256410256411

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0

```

max_pooling1d_1 (MaxPooling1 (None, 61, 16)          0
-----
flatten_1 (Flatten)          (None, 976)          0
-----
dense_1 (Dense)              (None, 32)          31264
-----
dense_2 (Dense)              (None, 3)           99
=====
Total params: 34,387
Trainable params: 34,387
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 4s - loss: 16.7903 - acc: 0.8446 - val_loss: 1.0139 - val_acc: 0.8205
Epoch 2/30
  - 4s - loss: 0.4400 - acc: 0.8935 - val_loss: 0.3968 - val_acc: 0.8801
Epoch 3/30
  - 3s - loss: 0.3617 - acc: 0.8866 - val_loss: 0.4102 - val_acc: 0.8699
Epoch 4/30
  - 3s - loss: 0.3498 - acc: 0.8889 - val_loss: 0.4056 - val_acc: 0.8635
Epoch 5/30
  - 3s - loss: 0.3198 - acc: 0.8916 - val_loss: 0.4604 - val_acc: 0.8346
Epoch 6/30
  - 3s - loss: 0.2951 - acc: 0.8989 - val_loss: 0.3493 - val_acc: 0.8737
Epoch 7/30
  - 3s - loss: 0.3283 - acc: 0.8938 - val_loss: 0.3657 - val_acc: 0.8744
Epoch 8/30
  - 3s - loss: 0.3310 - acc: 0.8948 - val_loss: 0.4252 - val_acc: 0.8449
Epoch 9/30
  - 3s - loss: 0.3004 - acc: 0.8999 - val_loss: 0.4440 - val_acc: 0.8340
Epoch 10/30
  - 3s - loss: 0.3068 - acc: 0.8985 - val_loss: 0.3439 - val_acc: 0.8801
Epoch 11/30
  - 3s - loss: 0.2968 - acc: 0.8965 - val_loss: 0.3549 - val_acc: 0.8635
Epoch 12/30
  - 3s - loss: 0.2947 - acc: 0.8938 - val_loss: 0.3372 - val_acc: 0.8808
Epoch 13/30
  - 3s - loss: 0.2934 - acc: 0.9012 - val_loss: 0.3355 - val_acc: 0.8763
Epoch 14/30
  - 3s - loss: 0.2943 - acc: 0.8992 - val_loss: 0.3936 - val_acc: 0.8532
Epoch 15/30
  - 3s - loss: 0.2998 - acc: 0.8997 - val_loss: 0.3552 - val_acc: 0.8788
Epoch 16/30
  - 3s - loss: 0.3060 - acc: 0.8943 - val_loss: 0.3562 - val_acc: 0.8692
Epoch 17/30
  - 3s - loss: 0.2871 - acc: 0.9026 - val_loss: 0.3270 - val_acc: 0.8756

```

```

Epoch 18/30
- 3s - loss: 0.2815 - acc: 0.8975 - val_loss: 0.3816 - val_acc: 0.8628
Epoch 19/30
- 3s - loss: 0.3059 - acc: 0.8896 - val_loss: 0.3353 - val_acc: 0.8750
Epoch 20/30
- 3s - loss: 0.2699 - acc: 0.9080 - val_loss: 0.3252 - val_acc: 0.8737
Epoch 21/30
- 3s - loss: 0.2771 - acc: 0.9031 - val_loss: 0.3367 - val_acc: 0.8686
Epoch 22/30
- 3s - loss: 0.3104 - acc: 0.8903 - val_loss: 0.3443 - val_acc: 0.8782
Epoch 23/30
- 3s - loss: 0.2853 - acc: 0.8994 - val_loss: 0.3356 - val_acc: 0.8769
Epoch 24/30
- 3s - loss: 0.2943 - acc: 0.8953 - val_loss: 0.3362 - val_acc: 0.8744
Epoch 25/30
- 4s - loss: 0.2792 - acc: 0.8980 - val_loss: 0.3499 - val_acc: 0.8551
Epoch 26/30
- 3s - loss: 0.2889 - acc: 0.9002 - val_loss: 0.3564 - val_acc: 0.8718
Epoch 27/30
- 3s - loss: 0.2833 - acc: 0.8953 - val_loss: 0.3469 - val_acc: 0.8718
Epoch 28/30
- 3s - loss: 0.2791 - acc: 0.8972 - val_loss: 0.3675 - val_acc: 0.8692
Epoch 29/30
- 3s - loss: 0.2775 - acc: 0.8997 - val_loss: 0.3426 - val_acc: 0.8679
Epoch 30/30
- 3s - loss: 0.2900 - acc: 0.8994 - val_loss: 0.4086 - val_acc: 0.8795
Train accuracy 0.904597983771822 Test accuracy: 0.8794871794871795

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 122, 16)	3376
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 64)	24640
dense_2 (Dense)	(None, 3)	195

```

Total params: 29,387
Trainable params: 29,387
Non-trainable params: 0

```

```

-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
  - 1s - loss: 88.3123 - acc: 0.8380 - val_loss: 65.8523 - val_acc: 0.8795
Epoch 2/35
  - 1s - loss: 50.5570 - acc: 0.8992 - val_loss: 37.2190 - val_acc: 0.8936
Epoch 3/35
  - 1s - loss: 27.8650 - acc: 0.9053 - val_loss: 19.7581 - val_acc: 0.8788
Epoch 4/35
  - 1s - loss: 14.0072 - acc: 0.9125 - val_loss: 9.2594 - val_acc: 0.8705
Epoch 5/35
  - 1s - loss: 6.0161 - acc: 0.9031 - val_loss: 3.5882 - val_acc: 0.8673
Epoch 6/35
  - 1s - loss: 2.0215 - acc: 0.9075 - val_loss: 1.1131 - val_acc: 0.8801
Epoch 7/35
  - 1s - loss: 0.6072 - acc: 0.9009 - val_loss: 0.4822 - val_acc: 0.8769
Epoch 8/35
  - 1s - loss: 0.3417 - acc: 0.8967 - val_loss: 0.4498 - val_acc: 0.8410
Epoch 9/35
  - 1s - loss: 0.3204 - acc: 0.9016 - val_loss: 0.4311 - val_acc: 0.8641
Epoch 10/35
  - 1s - loss: 0.3076 - acc: 0.8960 - val_loss: 0.3939 - val_acc: 0.8853
Epoch 11/35
  - 1s - loss: 0.2954 - acc: 0.9007 - val_loss: 0.3817 - val_acc: 0.8769
Epoch 12/35
  - 1s - loss: 0.2942 - acc: 0.8982 - val_loss: 0.3821 - val_acc: 0.8833
Epoch 13/35
  - 1s - loss: 0.2863 - acc: 0.9056 - val_loss: 0.3624 - val_acc: 0.8801
Epoch 14/35
  - 1s - loss: 0.2747 - acc: 0.9071 - val_loss: 0.5354 - val_acc: 0.7936
Epoch 15/35
  - 1s - loss: 0.2811 - acc: 0.9021 - val_loss: 0.4567 - val_acc: 0.8462
Epoch 16/35
  - 1s - loss: 0.2750 - acc: 0.9073 - val_loss: 0.3726 - val_acc: 0.8647
Epoch 17/35
  - 1s - loss: 0.2688 - acc: 0.9083 - val_loss: 0.3671 - val_acc: 0.8628
Epoch 18/35
  - 1s - loss: 0.2680 - acc: 0.9073 - val_loss: 0.3798 - val_acc: 0.8731
Epoch 19/35
  - 1s - loss: 0.2700 - acc: 0.9051 - val_loss: 0.3890 - val_acc: 0.8750
Epoch 20/35
  - 1s - loss: 0.2625 - acc: 0.9073 - val_loss: 0.5366 - val_acc: 0.7859
Epoch 21/35
  - 1s - loss: 0.2559 - acc: 0.9139 - val_loss: 0.3662 - val_acc: 0.8609
Epoch 22/35
  - 1s - loss: 0.2556 - acc: 0.9073 - val_loss: 0.3524 - val_acc: 0.8910
Epoch 23/35

```



```

- 1s - loss: 0.2591 - acc: 0.9078 - val_loss: 0.3824 - val_acc: 0.8731
Epoch 24/35
- 1s - loss: 0.2545 - acc: 0.9112 - val_loss: 0.3795 - val_acc: 0.8821
Epoch 25/35
- 1s - loss: 0.2575 - acc: 0.9083 - val_loss: 0.3457 - val_acc: 0.8814
Epoch 26/35
- 1s - loss: 0.2485 - acc: 0.9132 - val_loss: 0.3581 - val_acc: 0.8821
Epoch 27/35
- 1s - loss: 0.2473 - acc: 0.9103 - val_loss: 0.3729 - val_acc: 0.8827
Epoch 28/35
- 1s - loss: 0.2471 - acc: 0.9093 - val_loss: 0.3715 - val_acc: 0.8744
Epoch 29/35
- 1s - loss: 0.2457 - acc: 0.9169 - val_loss: 0.3473 - val_acc: 0.8923
Epoch 30/35
- 1s - loss: 0.2494 - acc: 0.9184 - val_loss: 0.3720 - val_acc: 0.8679
Epoch 31/35
- 1s - loss: 0.2480 - acc: 0.9159 - val_loss: 0.3271 - val_acc: 0.8897
Epoch 32/35
- 1s - loss: 0.2431 - acc: 0.9149 - val_loss: 0.3357 - val_acc: 0.8750
Epoch 33/35
- 1s - loss: 0.2404 - acc: 0.9203 - val_loss: 0.3416 - val_acc: 0.8853
Epoch 34/35
- 1s - loss: 0.2420 - acc: 0.9184 - val_loss: 0.3462 - val_acc: 0.8872
Epoch 35/35
- 1s - loss: 0.2409 - acc: 0.9169 - val_loss: 0.3571 - val_acc: 0.8827
Train accuracy 0.904597983771822 Test accuracy: 0.8826923076923077

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 124, 32)          1472
-----
conv1d_2 (Conv1D)            (None, 122, 24)          2328
-----
dropout_1 (Dropout)          (None, 122, 24)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 61, 24)          0
-----
flatten_1 (Flatten)          (None, 1464)              0
-----
dense_1 (Dense)              (None, 16)                23440
-----
dense_2 (Dense)              (None, 3)                  51
=====
Total params: 27,291
Trainable params: 27,291
Non-trainable params: 0
-----

```

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 26.6547 - acc: 0.8549 - val\_loss: 3.8163 - val\_acc: 0.7910

Epoch 2/30

- 2s - loss: 1.1559 - acc: 0.8898 - val\_loss: 0.5383 - val\_acc: 0.8487

Epoch 3/30

- 2s - loss: 0.3711 - acc: 0.8896 - val\_loss: 0.4926 - val\_acc: 0.8423

Epoch 4/30

- 2s - loss: 0.3315 - acc: 0.8921 - val\_loss: 0.3869 - val\_acc: 0.8538

Epoch 5/30

- 2s - loss: 0.3170 - acc: 0.8960 - val\_loss: 0.3781 - val\_acc: 0.8641

Epoch 6/30

- 2s - loss: 0.3130 - acc: 0.8935 - val\_loss: 0.4571 - val\_acc: 0.8128

Epoch 7/30

- 2s - loss: 0.3003 - acc: 0.8911 - val\_loss: 0.3922 - val\_acc: 0.8526

Epoch 8/30

- 2s - loss: 0.2985 - acc: 0.8906 - val\_loss: 0.4293 - val\_acc: 0.8308

Epoch 9/30

- 2s - loss: 0.2967 - acc: 0.8977 - val\_loss: 0.3474 - val\_acc: 0.8763

Epoch 10/30

- 2s - loss: 0.2883 - acc: 0.8977 - val\_loss: 0.3338 - val\_acc: 0.8788

Epoch 11/30

- 2s - loss: 0.2827 - acc: 0.8972 - val\_loss: 0.5226 - val\_acc: 0.7083

Epoch 12/30

- 2s - loss: 0.2879 - acc: 0.8965 - val\_loss: 0.4005 - val\_acc: 0.8282

Epoch 13/30

- 2s - loss: 0.2836 - acc: 0.8970 - val\_loss: 0.3814 - val\_acc: 0.8359

Epoch 14/30

- 2s - loss: 0.2779 - acc: 0.9019 - val\_loss: 0.4220 - val\_acc: 0.8250

Epoch 15/30

- 2s - loss: 0.2713 - acc: 0.9031 - val\_loss: 0.3198 - val\_acc: 0.8795

Epoch 16/30

- 2s - loss: 0.2797 - acc: 0.9048 - val\_loss: 0.3243 - val\_acc: 0.8814

Epoch 17/30

- 2s - loss: 0.2769 - acc: 0.8985 - val\_loss: 0.3767 - val\_acc: 0.8596

Epoch 18/30

- 2s - loss: 0.2694 - acc: 0.9034 - val\_loss: 0.4402 - val\_acc: 0.8090

Epoch 19/30

- 2s - loss: 0.2735 - acc: 0.8965 - val\_loss: 0.3139 - val\_acc: 0.8756

Epoch 20/30

- 2s - loss: 0.2701 - acc: 0.9068 - val\_loss: 0.3086 - val\_acc: 0.8788

Epoch 21/30

- 2s - loss: 0.2580 - acc: 0.9046 - val\_loss: 0.3336 - val\_acc: 0.8801

Epoch 22/30

- 2s - loss: 0.2684 - acc: 0.9019 - val\_loss: 0.3954 - val\_acc: 0.8603

Epoch 23/30

- 2s - loss: 0.2653 - acc: 0.8994 - val\_loss: 0.3112 - val\_acc: 0.8872

Epoch 24/30  
 - 2s - loss: 0.2676 - acc: 0.9026 - val\_loss: 0.3631 - val\_acc: 0.8622  
 Epoch 25/30  
 - 2s - loss: 0.2717 - acc: 0.8985 - val\_loss: 0.3126 - val\_acc: 0.8872  
 Epoch 26/30  
 - 2s - loss: 0.2756 - acc: 0.8997 - val\_loss: 0.3151 - val\_acc: 0.8801  
 Epoch 27/30  
 - 2s - loss: 0.2692 - acc: 0.9053 - val\_loss: 0.3444 - val\_acc: 0.8699  
 Epoch 28/30  
 - 2s - loss: 0.2624 - acc: 0.9019 - val\_loss: 0.3491 - val\_acc: 0.8737  
 Epoch 29/30  
 - 2s - loss: 0.2642 - acc: 0.9044 - val\_loss: 0.3755 - val\_acc: 0.8647  
 Epoch 30/30  
 - 2s - loss: 0.2586 - acc: 0.9044 - val\_loss: 0.3316 - val\_acc: 0.8686  
 Train accuracy 0.9085320875338087 Test accuracy: 0.8685897435897436

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 16)	1360
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 64)	41024
dense_2 (Dense)	(None, 3)	195

Total params: 44,371  
 Trainable params: 44,371  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/25  
 - 1s - loss: 32.2318 - acc: 0.7976 - val\_loss: 19.2997 - val\_acc: 0.8327  
 Epoch 2/25  
 - 1s - loss: 11.7204 - acc: 0.8879 - val\_loss: 6.0006 - val\_acc: 0.8622  
 Epoch 3/25  
 - 1s - loss: 3.1424 - acc: 0.8975 - val\_loss: 1.4425 - val\_acc: 0.8391  
 Epoch 4/25  
 - 1s - loss: 0.7016 - acc: 0.9026 - val\_loss: 0.5836 - val\_acc: 0.8167  
 Epoch 5/25

```

- 1s - loss: 0.3632 - acc: 0.8950 - val_loss: 0.4525 - val_acc: 0.8551
Epoch 6/25
- 1s - loss: 0.3034 - acc: 0.8985 - val_loss: 0.3797 - val_acc: 0.8609
Epoch 7/25
- 1s - loss: 0.2925 - acc: 0.8992 - val_loss: 0.3646 - val_acc: 0.8712
Epoch 8/25
- 1s - loss: 0.2749 - acc: 0.9004 - val_loss: 0.3680 - val_acc: 0.8628
Epoch 9/25
- 1s - loss: 0.2769 - acc: 0.9066 - val_loss: 0.3639 - val_acc: 0.8814
Epoch 10/25
- 1s - loss: 0.2722 - acc: 0.8989 - val_loss: 0.3334 - val_acc: 0.8865
Epoch 11/25
- 1s - loss: 0.2714 - acc: 0.9019 - val_loss: 0.3905 - val_acc: 0.8545
Epoch 12/25
- 1s - loss: 0.2623 - acc: 0.9029 - val_loss: 0.3299 - val_acc: 0.8769
Epoch 13/25
- 1s - loss: 0.2640 - acc: 0.9085 - val_loss: 0.3264 - val_acc: 0.8885
Epoch 14/25
- 1s - loss: 0.2557 - acc: 0.9046 - val_loss: 0.3682 - val_acc: 0.8801
Epoch 15/25
- 1s - loss: 0.2635 - acc: 0.9058 - val_loss: 0.3446 - val_acc: 0.8712
Epoch 16/25
- 1s - loss: 0.2550 - acc: 0.9063 - val_loss: 0.3381 - val_acc: 0.8827
Epoch 17/25
- 1s - loss: 0.2554 - acc: 0.9056 - val_loss: 0.3273 - val_acc: 0.8737
Epoch 18/25
- 1s - loss: 0.2577 - acc: 0.9093 - val_loss: 0.3187 - val_acc: 0.8827
Epoch 19/25
- 1s - loss: 0.2547 - acc: 0.9066 - val_loss: 0.3149 - val_acc: 0.8968
Epoch 20/25
- 1s - loss: 0.2594 - acc: 0.9068 - val_loss: 0.3196 - val_acc: 0.8897
Epoch 21/25
- 1s - loss: 0.2454 - acc: 0.9139 - val_loss: 0.3244 - val_acc: 0.8756
Epoch 22/25
- 1s - loss: 0.2494 - acc: 0.9058 - val_loss: 0.3194 - val_acc: 0.8872
Epoch 23/25
- 1s - loss: 0.2476 - acc: 0.9130 - val_loss: 0.3184 - val_acc: 0.8968
Epoch 24/25
- 1s - loss: 0.2517 - acc: 0.9093 - val_loss: 0.3210 - val_acc: 0.8936
Epoch 25/25
- 1s - loss: 0.2490 - acc: 0.9088 - val_loss: 0.3281 - val_acc: 0.8699
Train accuracy 0.8996803540693386 Test accuracy: 0.8698717948717949

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 124, 32)            1472
-----

```

conv1d_2 (Conv1D)	(None, 122, 32)	3104
-----		
dropout_1 (Dropout)	(None, 122, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 61, 32)	0
-----		
flatten_1 (Flatten)	(None, 1952)	0
-----		
dense_1 (Dense)	(None, 64)	124992
-----		
dense_2 (Dense)	(None, 3)	195
=====		
Total params: 129,763		
Trainable params: 129,763		
Non-trainable params: 0		
-----		
None		
Train on 4067 samples, validate on 1560 samples		
Epoch 1/30		
- 2s - loss: 10.0057 - acc: 0.8687 - val_loss: 3.4167 - val_acc: 0.8814		
Epoch 2/30		
- 1s - loss: 1.7159 - acc: 0.9019 - val_loss: 0.9507 - val_acc: 0.8769		
Epoch 3/30		
- 1s - loss: 0.5528 - acc: 0.9107 - val_loss: 0.4761 - val_acc: 0.8788		
Epoch 4/30		
- 1s - loss: 0.3398 - acc: 0.9090 - val_loss: 0.4049 - val_acc: 0.8679		
Epoch 5/30		
- 1s - loss: 0.3185 - acc: 0.9078 - val_loss: 0.4680 - val_acc: 0.8660		
Epoch 6/30		
- 1s - loss: 0.2707 - acc: 0.9196 - val_loss: 0.3481 - val_acc: 0.8801		
Epoch 7/30		
- 1s - loss: 0.2572 - acc: 0.9139 - val_loss: 0.3454 - val_acc: 0.8622		
Epoch 8/30		
- 1s - loss: 0.2525 - acc: 0.9134 - val_loss: 0.3320 - val_acc: 0.8814		
Epoch 9/30		
- 1s - loss: 0.2641 - acc: 0.9147 - val_loss: 0.3624 - val_acc: 0.8737		
Epoch 10/30		
- 1s - loss: 0.2770 - acc: 0.9157 - val_loss: 0.3432 - val_acc: 0.8840		
Epoch 11/30		
- 1s - loss: 0.2424 - acc: 0.9233 - val_loss: 0.3154 - val_acc: 0.8821		
Epoch 12/30		
- 1s - loss: 0.2566 - acc: 0.9196 - val_loss: 0.3218 - val_acc: 0.8917		
Epoch 13/30		
- 1s - loss: 0.2872 - acc: 0.9225 - val_loss: 0.3443 - val_acc: 0.8827		
Epoch 14/30		
- 1s - loss: 0.2373 - acc: 0.9270 - val_loss: 0.3226 - val_acc: 0.8840		
Epoch 15/30		
- 1s - loss: 0.2281 - acc: 0.9316 - val_loss: 0.3231 - val_acc: 0.9071		

```

Epoch 16/30
  - 1s - loss: 0.2516 - acc: 0.9245 - val_loss: 0.3656 - val_acc: 0.8622
Epoch 17/30
  - 1s - loss: 0.2481 - acc: 0.9267 - val_loss: 0.2809 - val_acc: 0.9096
Epoch 18/30
  - 1s - loss: 0.2389 - acc: 0.9280 - val_loss: 0.2919 - val_acc: 0.8955
Epoch 19/30
  - 1s - loss: 0.2218 - acc: 0.9326 - val_loss: 0.3749 - val_acc: 0.8923
Epoch 20/30
  - 1s - loss: 0.2398 - acc: 0.9324 - val_loss: 0.2885 - val_acc: 0.9013
Epoch 21/30
  - 1s - loss: 0.2194 - acc: 0.9353 - val_loss: 0.3267 - val_acc: 0.8712
Epoch 22/30
  - 1s - loss: 0.2420 - acc: 0.9287 - val_loss: 0.2816 - val_acc: 0.9128
Epoch 23/30
  - 1s - loss: 0.2297 - acc: 0.9302 - val_loss: 0.2955 - val_acc: 0.8936
Epoch 24/30
  - 1s - loss: 0.2278 - acc: 0.9307 - val_loss: 0.2616 - val_acc: 0.9115
Epoch 25/30
  - 1s - loss: 0.2326 - acc: 0.9297 - val_loss: 0.2706 - val_acc: 0.9103
Epoch 26/30
  - 1s - loss: 0.2326 - acc: 0.9275 - val_loss: 0.2897 - val_acc: 0.9103
Epoch 27/30
  - 1s - loss: 0.2368 - acc: 0.9312 - val_loss: 0.2979 - val_acc: 0.8872
Epoch 28/30
  - 1s - loss: 0.2135 - acc: 0.9368 - val_loss: 0.2558 - val_acc: 0.9154
Epoch 29/30
  - 1s - loss: 0.2027 - acc: 0.9398 - val_loss: 0.2627 - val_acc: 0.9237
Epoch 30/30
  - 1s - loss: 0.2334 - acc: 0.9312 - val_loss: 0.2833 - val_acc: 0.9064
Train accuracy 0.9326284730759774 Test accuracy: 0.9064102564102564

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 24)	5400
dropout_1 (Dropout)	(None, 118, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 24)	0
flatten_1 (Flatten)	(None, 1416)	0
dense_1 (Dense)	(None, 32)	45344
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 52,315
Trainable params: 52,315
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 22.4676 - acc: 0.8291 - val_loss: 7.0795 - val_acc: 0.8737
Epoch 2/30
  - 1s - loss: 3.4653 - acc: 0.8822 - val_loss: 1.6366 - val_acc: 0.8718
Epoch 3/30
  - 1s - loss: 0.9939 - acc: 0.8886 - val_loss: 0.7105 - val_acc: 0.8417
Epoch 4/30
  - 1s - loss: 0.4601 - acc: 0.9019 - val_loss: 0.5303 - val_acc: 0.8449
Epoch 5/30
  - 1s - loss: 0.3735 - acc: 0.8948 - val_loss: 0.4582 - val_acc: 0.8577
Epoch 6/30
  - 1s - loss: 0.3159 - acc: 0.9036 - val_loss: 0.4019 - val_acc: 0.8551
Epoch 7/30
  - 1s - loss: 0.3131 - acc: 0.8980 - val_loss: 0.4248 - val_acc: 0.8583
Epoch 8/30
  - 1s - loss: 0.2836 - acc: 0.9066 - val_loss: 0.4361 - val_acc: 0.8442
Epoch 9/30
  - 1s - loss: 0.2802 - acc: 0.9112 - val_loss: 0.3534 - val_acc: 0.8788
Epoch 10/30
  - 1s - loss: 0.2768 - acc: 0.9071 - val_loss: 0.3414 - val_acc: 0.8782
Epoch 11/30
  - 1s - loss: 0.2834 - acc: 0.9051 - val_loss: 0.3296 - val_acc: 0.8718
Epoch 12/30
  - 1s - loss: 0.2733 - acc: 0.9071 - val_loss: 0.3458 - val_acc: 0.8853
Epoch 13/30
  - 1s - loss: 0.2601 - acc: 0.9130 - val_loss: 0.3358 - val_acc: 0.8801
Epoch 14/30
  - 1s - loss: 0.2601 - acc: 0.9154 - val_loss: 0.3633 - val_acc: 0.8718
Epoch 15/30
  - 1s - loss: 0.2666 - acc: 0.9132 - val_loss: 0.3593 - val_acc: 0.8609
Epoch 16/30
  - 1s - loss: 0.2624 - acc: 0.9142 - val_loss: 0.3138 - val_acc: 0.8821
Epoch 17/30
  - 1s - loss: 0.2513 - acc: 0.9159 - val_loss: 0.3302 - val_acc: 0.8788
Epoch 18/30
  - 1s - loss: 0.2532 - acc: 0.9159 - val_loss: 0.3494 - val_acc: 0.8699
Epoch 19/30
  - 1s - loss: 0.2572 - acc: 0.9115 - val_loss: 0.3099 - val_acc: 0.8974
Epoch 20/30
  - 1s - loss: 0.2654 - acc: 0.9166 - val_loss: 0.3787 - val_acc: 0.8577
Epoch 21/30

```

```

- 1s - loss: 0.2489 - acc: 0.9191 - val_loss: 0.3299 - val_acc: 0.8705
Epoch 22/30
- 1s - loss: 0.2507 - acc: 0.9191 - val_loss: 0.2976 - val_acc: 0.8949
Epoch 23/30
- 1s - loss: 0.2514 - acc: 0.9169 - val_loss: 0.3026 - val_acc: 0.9058
Epoch 24/30
- 1s - loss: 0.2501 - acc: 0.9216 - val_loss: 0.2877 - val_acc: 0.9109
Epoch 25/30
- 1s - loss: 0.2538 - acc: 0.9238 - val_loss: 0.3303 - val_acc: 0.8756
Epoch 26/30
- 1s - loss: 0.2399 - acc: 0.9218 - val_loss: 0.3014 - val_acc: 0.9000
Epoch 27/30
- 1s - loss: 0.2391 - acc: 0.9255 - val_loss: 0.2931 - val_acc: 0.8936
Epoch 28/30
- 1s - loss: 0.2390 - acc: 0.9292 - val_loss: 0.2864 - val_acc: 0.9160
Epoch 29/30
- 1s - loss: 0.2570 - acc: 0.9243 - val_loss: 0.2950 - val_acc: 0.9109
Epoch 30/30
- 1s - loss: 0.2405 - acc: 0.9243 - val_loss: 0.3049 - val_acc: 0.8981
Train accuracy 0.9129579542660438 Test accuracy: 0.8980769230769231

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 16)	2576
dropout_1 (Dropout)	(None, 118, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 16)	0
flatten_1 (Flatten)	(None, 944)	0
dense_1 (Dense)	(None, 64)	60480
dense_2 (Dense)	(None, 3)	195

---

Total params: 65,299

Trainable params: 65,299

Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35

```
- 4s - loss: 15.9496 - acc: 0.8242 - val_loss: 0.5152 - val_acc: 0.8256
```

Epoch 2/35

```
- 3s - loss: 0.4211 - acc: 0.8702 - val_loss: 0.4228 - val_acc: 0.8545
```



Epoch 3/35  
- 3s - loss: 0.3833 - acc: 0.8741 - val\_loss: 0.5028 - val\_acc: 0.8019

Epoch 4/35  
- 3s - loss: 0.3824 - acc: 0.8758 - val\_loss: 0.3764 - val\_acc: 0.8647

Epoch 5/35  
- 3s - loss: 0.3600 - acc: 0.8773 - val\_loss: 0.4623 - val\_acc: 0.8417

Epoch 6/35  
- 3s - loss: 0.3547 - acc: 0.8803 - val\_loss: 0.4013 - val\_acc: 0.8423

Epoch 7/35  
- 3s - loss: 0.3557 - acc: 0.8825 - val\_loss: 0.3875 - val\_acc: 0.8615

Epoch 8/35  
- 3s - loss: 0.3529 - acc: 0.8842 - val\_loss: 0.6293 - val\_acc: 0.8295

Epoch 9/35  
- 3s - loss: 0.3678 - acc: 0.8773 - val\_loss: 0.4303 - val\_acc: 0.8538

Epoch 10/35  
- 3s - loss: 0.3496 - acc: 0.8837 - val\_loss: 0.4019 - val\_acc: 0.8615

Epoch 11/35  
- 3s - loss: 0.3453 - acc: 0.8862 - val\_loss: 0.5411 - val\_acc: 0.7340

Epoch 12/35  
- 3s - loss: 0.3481 - acc: 0.8847 - val\_loss: 0.4430 - val\_acc: 0.8436

Epoch 13/35  
- 3s - loss: 0.3409 - acc: 0.8839 - val\_loss: 0.5106 - val\_acc: 0.8538

Epoch 14/35  
- 3s - loss: 0.3381 - acc: 0.8854 - val\_loss: 0.4769 - val\_acc: 0.7596

Epoch 15/35  
- 3s - loss: 0.3469 - acc: 0.8913 - val\_loss: 0.3484 - val\_acc: 0.8737

Epoch 16/35  
- 3s - loss: 0.3406 - acc: 0.8884 - val\_loss: 0.4157 - val\_acc: 0.8660

Epoch 17/35  
- 3s - loss: 0.3460 - acc: 0.8827 - val\_loss: 0.3993 - val\_acc: 0.8558

Epoch 18/35  
- 3s - loss: 0.3502 - acc: 0.8876 - val\_loss: 0.5816 - val\_acc: 0.8558

Epoch 19/35  
- 3s - loss: 0.3290 - acc: 0.8869 - val\_loss: 0.3637 - val\_acc: 0.8769

Epoch 20/35  
- 3s - loss: 0.3339 - acc: 0.8943 - val\_loss: 0.3936 - val\_acc: 0.8750

Epoch 21/35  
- 3s - loss: 0.3513 - acc: 0.8876 - val\_loss: 0.3763 - val\_acc: 0.8609

Epoch 22/35  
- 3s - loss: 0.3349 - acc: 0.8903 - val\_loss: 0.4910 - val\_acc: 0.7474

Epoch 23/35  
- 3s - loss: 0.3481 - acc: 0.8830 - val\_loss: 0.3735 - val\_acc: 0.8827

Epoch 24/35  
- 3s - loss: 0.3336 - acc: 0.8866 - val\_loss: 0.4003 - val\_acc: 0.8705

Epoch 25/35  
- 3s - loss: 0.3714 - acc: 0.8810 - val\_loss: 0.4869 - val\_acc: 0.8609

Epoch 26/35  
- 3s - loss: 0.3415 - acc: 0.8839 - val\_loss: 0.4230 - val\_acc: 0.8686

```

Epoch 27/35
- 3s - loss: 0.3378 - acc: 0.8891 - val_loss: 0.5606 - val_acc: 0.8558
Epoch 28/35
- 3s - loss: 0.3443 - acc: 0.8889 - val_loss: 0.5335 - val_acc: 0.7417
Epoch 29/35
- 3s - loss: 0.3292 - acc: 0.8903 - val_loss: 0.3568 - val_acc: 0.8769
Epoch 30/35
- 3s - loss: 0.3719 - acc: 0.8820 - val_loss: 0.3863 - val_acc: 0.8808
Epoch 31/35
- 3s - loss: 0.3631 - acc: 0.8849 - val_loss: 0.4213 - val_acc: 0.8526
Epoch 32/35
- 3s - loss: 0.3326 - acc: 0.8815 - val_loss: 0.5157 - val_acc: 0.8519
Epoch 33/35
- 3s - loss: 0.3440 - acc: 0.8930 - val_loss: 0.7066 - val_acc: 0.7051
Epoch 34/35
- 3s - loss: 0.3439 - acc: 0.8857 - val_loss: 0.3625 - val_acc: 0.8923
Epoch 35/35
- 3s - loss: 0.3373 - acc: 0.8837 - val_loss: 0.4079 - val_acc: 0.8583
Train accuracy 0.8551758052618638 Test accuracy: 0.8583333333333333

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 124, 16)	2032
dropout_1 (Dropout)	(None, 124, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 64)	24640
dense_2 (Dense)	(None, 3)	195

```

Total params: 28,043
Trainable params: 28,043
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 1s - loss: 102.1896 - acc: 0.8021 - val_loss: 65.2995 - val_acc: 0.8635
Epoch 2/30
- 1s - loss: 43.6306 - acc: 0.8820 - val_loss: 26.3283 - val_acc: 0.8718
Epoch 3/30

```

- 1s - loss: 16.2827 - acc: 0.8933 - val\_loss: 8.6139 - val\_acc: 0.8314  
Epoch 4/30  
- 1s - loss: 4.4810 - acc: 0.8948 - val\_loss: 1.9211 - val\_acc: 0.8006  
Epoch 5/30  
- 1s - loss: 0.8381 - acc: 0.8803 - val\_loss: 0.5928 - val\_acc: 0.8494  
Epoch 6/30  
- 1s - loss: 0.3835 - acc: 0.8866 - val\_loss: 0.5036 - val\_acc: 0.8603  
Epoch 7/30  
- 1s - loss: 0.3634 - acc: 0.8889 - val\_loss: 0.4525 - val\_acc: 0.8750  
Epoch 8/30  
- 1s - loss: 0.3393 - acc: 0.8906 - val\_loss: 0.6429 - val\_acc: 0.7737  
Epoch 9/30  
- 1s - loss: 0.3384 - acc: 0.8918 - val\_loss: 0.4492 - val\_acc: 0.8603  
Epoch 10/30  
- 1s - loss: 0.3306 - acc: 0.8869 - val\_loss: 0.4883 - val\_acc: 0.8712  
Epoch 11/30  
- 1s - loss: 0.3178 - acc: 0.8930 - val\_loss: 0.4321 - val\_acc: 0.8583  
Epoch 12/30  
- 1s - loss: 0.3146 - acc: 0.8935 - val\_loss: 0.4328 - val\_acc: 0.8718  
Epoch 13/30  
- 1s - loss: 0.3155 - acc: 0.8962 - val\_loss: 0.4139 - val\_acc: 0.8769  
Epoch 14/30  
- 1s - loss: 0.2986 - acc: 0.9016 - val\_loss: 0.5129 - val\_acc: 0.8237  
Epoch 15/30  
- 1s - loss: 0.3094 - acc: 0.8965 - val\_loss: 0.4999 - val\_acc: 0.8429  
Epoch 16/30  
- 1s - loss: 0.3051 - acc: 0.8957 - val\_loss: 0.4087 - val\_acc: 0.8699  
Epoch 17/30  
- 1s - loss: 0.2908 - acc: 0.9061 - val\_loss: 0.4238 - val\_acc: 0.8609  
Epoch 18/30  
- 1s - loss: 0.2949 - acc: 0.8967 - val\_loss: 0.3962 - val\_acc: 0.8814  
Epoch 19/30  
- 1s - loss: 0.2910 - acc: 0.9019 - val\_loss: 0.4207 - val\_acc: 0.8712  
Epoch 20/30  
- 1s - loss: 0.2892 - acc: 0.8980 - val\_loss: 0.6593 - val\_acc: 0.7205  
Epoch 21/30  
- 1s - loss: 0.2855 - acc: 0.8992 - val\_loss: 0.3948 - val\_acc: 0.8571  
Epoch 22/30  
- 1s - loss: 0.2866 - acc: 0.8975 - val\_loss: 0.4282 - val\_acc: 0.8667  
Epoch 23/30  
- 1s - loss: 0.2913 - acc: 0.8945 - val\_loss: 0.4251 - val\_acc: 0.8667  
Epoch 24/30  
- 1s - loss: 0.2853 - acc: 0.8994 - val\_loss: 0.4170 - val\_acc: 0.8622  
Epoch 25/30  
- 1s - loss: 0.2868 - acc: 0.8962 - val\_loss: 0.4571 - val\_acc: 0.8314  
Epoch 26/30  
- 1s - loss: 0.2857 - acc: 0.8965 - val\_loss: 0.3839 - val\_acc: 0.8827  
Epoch 27/30

```

- 1s - loss: 0.2822 - acc: 0.9016 - val_loss: 0.4124 - val_acc: 0.8667
Epoch 28/30
- 1s - loss: 0.2823 - acc: 0.9009 - val_loss: 0.4114 - val_acc: 0.8635
Epoch 29/30
- 1s - loss: 0.2810 - acc: 0.9046 - val_loss: 0.4019 - val_acc: 0.8686
Epoch 30/30
- 1s - loss: 0.2826 - acc: 0.9026 - val_loss: 0.4549 - val_acc: 0.7936
Train accuracy 0.7855913449717237 Test accuracy: 0.7935897435897435
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 38.5988 - acc: 0.8001 - val_loss: 11.7248 - val_acc: 0.8468
Epoch 2/30
- 1s - loss: 4.1769 - acc: 0.8626 - val_loss: 0.8169 - val_acc: 0.8571
Epoch 3/30
- 1s - loss: 0.4792 - acc: 0.8761 - val_loss: 0.5424 - val_acc: 0.7904
Epoch 4/30
- 1s - loss: 0.3763 - acc: 0.8844 - val_loss: 0.5073 - val_acc: 0.7974
Epoch 5/30
- 1s - loss: 0.3405 - acc: 0.8874 - val_loss: 0.4136 - val_acc: 0.8468
Epoch 6/30
- 1s - loss: 0.3423 - acc: 0.8889 - val_loss: 0.3759 - val_acc: 0.8654
Epoch 7/30
- 1s - loss: 0.3292 - acc: 0.8852 - val_loss: 0.3997 - val_acc: 0.8660
Epoch 8/30
- 1s - loss: 0.3146 - acc: 0.8906 - val_loss: 0.4046 - val_acc: 0.8410

```

```

Epoch 9/30
  - 1s - loss: 0.3114 - acc: 0.8960 - val_loss: 0.3593 - val_acc: 0.8795
Epoch 10/30
  - 1s - loss: 0.3225 - acc: 0.8891 - val_loss: 0.3535 - val_acc: 0.8801
Epoch 11/30
  - 1s - loss: 0.3065 - acc: 0.8992 - val_loss: 0.3836 - val_acc: 0.8731
Epoch 12/30
  - 1s - loss: 0.3073 - acc: 0.8970 - val_loss: 0.3663 - val_acc: 0.8686
Epoch 13/30
  - 1s - loss: 0.3155 - acc: 0.8989 - val_loss: 0.3448 - val_acc: 0.8821
Epoch 14/30
  - 1s - loss: 0.2992 - acc: 0.9031 - val_loss: 0.4048 - val_acc: 0.8660
Epoch 15/30
  - 1s - loss: 0.3118 - acc: 0.8965 - val_loss: 0.3678 - val_acc: 0.8667
Epoch 16/30
  - 1s - loss: 0.2975 - acc: 0.8948 - val_loss: 0.3312 - val_acc: 0.8859
Epoch 17/30
  - 1s - loss: 0.3047 - acc: 0.9024 - val_loss: 0.3714 - val_acc: 0.8590
Epoch 18/30
  - 1s - loss: 0.2954 - acc: 0.9031 - val_loss: 0.3396 - val_acc: 0.8814
Epoch 19/30
  - 1s - loss: 0.3035 - acc: 0.8955 - val_loss: 0.3320 - val_acc: 0.8878
Epoch 20/30
  - 1s - loss: 0.2936 - acc: 0.9012 - val_loss: 0.3356 - val_acc: 0.8853
Epoch 21/30
  - 1s - loss: 0.3010 - acc: 0.8972 - val_loss: 0.3497 - val_acc: 0.8737
Epoch 22/30
  - 1s - loss: 0.3003 - acc: 0.9014 - val_loss: 0.3447 - val_acc: 0.8808
Epoch 23/30
  - 1s - loss: 0.2946 - acc: 0.8953 - val_loss: 0.3321 - val_acc: 0.8910
Epoch 24/30
  - 1s - loss: 0.2909 - acc: 0.8987 - val_loss: 0.3449 - val_acc: 0.8878
Epoch 25/30
  - 1s - loss: 0.2945 - acc: 0.8982 - val_loss: 0.5724 - val_acc: 0.8526
Epoch 26/30
  - 1s - loss: 0.3004 - acc: 0.8987 - val_loss: 0.3542 - val_acc: 0.8865
Epoch 27/30
  - 1s - loss: 0.2859 - acc: 0.9051 - val_loss: 0.3363 - val_acc: 0.8897
Epoch 28/30
  - 1s - loss: 0.2970 - acc: 0.9016 - val_loss: 0.3596 - val_acc: 0.8814
Epoch 29/30
  - 1s - loss: 0.2843 - acc: 0.9046 - val_loss: 0.3600 - val_acc: 0.8788
Epoch 30/30
  - 1s - loss: 0.2894 - acc: 0.9024 - val_loss: 0.3720 - val_acc: 0.8481
Train accuracy 0.8182935824932382 Test accuracy: 0.8480769230769231

```

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Layer (type)	Output Shape	Param #
--------------	--------------	---------

```

=====
conv1d_1 (Conv1D)                (None, 122, 32)                2048
-----
conv1d_2 (Conv1D)                (None, 120, 16)                1552
-----
dropout_1 (Dropout)              (None, 120, 16)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 60, 16)                0
-----
flatten_1 (Flatten)              (None, 960)                    0
-----
dense_1 (Dense)                  (None, 64)                     61504
-----
dense_2 (Dense)                  (None, 3)                      195
=====
Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 16.6819 - acc: 0.8308 - val_loss: 3.8002 - val_acc: 0.8006
Epoch 2/30
  - 1s - loss: 1.5202 - acc: 0.8785 - val_loss: 0.7406 - val_acc: 0.8724
Epoch 3/30
  - 1s - loss: 0.4934 - acc: 0.8945 - val_loss: 0.5887 - val_acc: 0.8250
Epoch 4/30
  - 1s - loss: 0.3732 - acc: 0.8982 - val_loss: 0.4533 - val_acc: 0.8462
Epoch 5/30
  - 1s - loss: 0.3298 - acc: 0.8992 - val_loss: 0.3826 - val_acc: 0.8692
Epoch 6/30
  - 1s - loss: 0.3023 - acc: 0.8980 - val_loss: 0.3871 - val_acc: 0.8814
Epoch 7/30
  - 1s - loss: 0.2899 - acc: 0.9071 - val_loss: 0.3595 - val_acc: 0.8853
Epoch 8/30
  - 1s - loss: 0.2898 - acc: 0.9041 - val_loss: 0.4025 - val_acc: 0.8590
Epoch 9/30
  - 1s - loss: 0.3064 - acc: 0.8980 - val_loss: 0.3395 - val_acc: 0.8731
Epoch 10/30
  - 1s - loss: 0.2719 - acc: 0.9034 - val_loss: 0.6688 - val_acc: 0.8090
Epoch 11/30
  - 1s - loss: 0.2748 - acc: 0.9009 - val_loss: 0.3566 - val_acc: 0.8827
Epoch 12/30
  - 1s - loss: 0.2721 - acc: 0.9036 - val_loss: 0.3198 - val_acc: 0.8814
Epoch 13/30
  - 1s - loss: 0.2676 - acc: 0.9041 - val_loss: 0.3260 - val_acc: 0.8865
Epoch 14/30

```

```

- 1s - loss: 0.2559 - acc: 0.9122 - val_loss: 0.3265 - val_acc: 0.8827
Epoch 15/30
- 1s - loss: 0.2771 - acc: 0.9056 - val_loss: 0.3431 - val_acc: 0.8795
Epoch 16/30
- 1s - loss: 0.2607 - acc: 0.9071 - val_loss: 0.3213 - val_acc: 0.8821
Epoch 17/30
- 1s - loss: 0.2515 - acc: 0.9093 - val_loss: 0.3047 - val_acc: 0.8840
Epoch 18/30
- 1s - loss: 0.2573 - acc: 0.9075 - val_loss: 0.3038 - val_acc: 0.8872
Epoch 19/30
- 1s - loss: 0.2626 - acc: 0.9044 - val_loss: 0.3275 - val_acc: 0.8872
Epoch 20/30
- 1s - loss: 0.2692 - acc: 0.9090 - val_loss: 0.3122 - val_acc: 0.8962
Epoch 21/30
- 1s - loss: 0.2513 - acc: 0.9149 - val_loss: 0.3205 - val_acc: 0.8821
Epoch 22/30
- 1s - loss: 0.2630 - acc: 0.9046 - val_loss: 0.3207 - val_acc: 0.8795
Epoch 23/30
- 1s - loss: 0.2563 - acc: 0.9061 - val_loss: 0.3069 - val_acc: 0.8981
Epoch 24/30
- 1s - loss: 0.2516 - acc: 0.9117 - val_loss: 0.3085 - val_acc: 0.8981
Epoch 25/30
- 1s - loss: 0.2629 - acc: 0.9115 - val_loss: 0.3033 - val_acc: 0.8936
Epoch 26/30
- 1s - loss: 0.2469 - acc: 0.9122 - val_loss: 0.2995 - val_acc: 0.9019
Epoch 27/30
- 1s - loss: 0.2498 - acc: 0.9134 - val_loss: 0.2796 - val_acc: 0.9186
Epoch 28/30
- 1s - loss: 0.2565 - acc: 0.9194 - val_loss: 0.3053 - val_acc: 0.9019
Epoch 29/30
- 1s - loss: 0.2481 - acc: 0.9196 - val_loss: 0.2967 - val_acc: 0.9167
Epoch 30/30
- 1s - loss: 0.2521 - acc: 0.9194 - val_loss: 0.2976 - val_acc: 0.9077
Train accuracy 0.9166461765429064 Test accuracy: 0.9076923076923077

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0

dense_1 (Dense)	(None, 64)	61504
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dense_2 (Dense)	(None, 3)	195
-----------------	-----------	-----

---

Total params: 65,299  
 Trainable params: 65,299  
 Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 26.0715 - acc: 0.8114 - val\_loss: 8.0125 - val\_acc: 0.8429

Epoch 2/30

- 1s - loss: 3.0103 - acc: 0.8778 - val\_loss: 0.8008 - val\_acc: 0.8859

Epoch 3/30

- 1s - loss: 0.4960 - acc: 0.8832 - val\_loss: 0.5324 - val\_acc: 0.8167

Epoch 4/30

- 1s - loss: 0.3484 - acc: 0.8940 - val\_loss: 0.5180 - val\_acc: 0.8071

Epoch 5/30

- 1s - loss: 0.3180 - acc: 0.8928 - val\_loss: 0.3853 - val\_acc: 0.8647

Epoch 6/30

- 1s - loss: 0.3083 - acc: 0.8943 - val\_loss: 0.3865 - val\_acc: 0.8583

Epoch 7/30

- 1s - loss: 0.2976 - acc: 0.8987 - val\_loss: 0.3398 - val\_acc: 0.8833

Epoch 8/30

- 1s - loss: 0.2922 - acc: 0.8980 - val\_loss: 0.4431 - val\_acc: 0.8308

Epoch 9/30

- 1s - loss: 0.2930 - acc: 0.9029 - val\_loss: 0.3940 - val\_acc: 0.8635

Epoch 10/30

- 1s - loss: 0.2857 - acc: 0.8933 - val\_loss: 0.3360 - val\_acc: 0.8859

Epoch 11/30

- 1s - loss: 0.2743 - acc: 0.9058 - val\_loss: 0.4205 - val\_acc: 0.8276

Epoch 12/30

- 1s - loss: 0.2778 - acc: 0.8982 - val\_loss: 0.3300 - val\_acc: 0.8840

Epoch 13/30

- 1s - loss: 0.2722 - acc: 0.9095 - val\_loss: 0.3322 - val\_acc: 0.8840

Epoch 14/30

- 1s - loss: 0.2846 - acc: 0.9063 - val\_loss: 0.3451 - val\_acc: 0.8795

Epoch 15/30

- 1s - loss: 0.2814 - acc: 0.9068 - val\_loss: 0.3576 - val\_acc: 0.8750

Epoch 16/30

- 1s - loss: 0.2675 - acc: 0.9085 - val\_loss: 0.3226 - val\_acc: 0.8891

Epoch 17/30

- 1s - loss: 0.2721 - acc: 0.9090 - val\_loss: 0.3670 - val\_acc: 0.8615

Epoch 18/30

- 1s - loss: 0.2706 - acc: 0.9071 - val\_loss: 0.3626 - val\_acc: 0.8673

Epoch 19/30

- 1s - loss: 0.2723 - acc: 0.9041 - val\_loss: 0.3227 - val\_acc: 0.8865



```

Epoch 20/30
- 1s - loss: 0.2642 - acc: 0.9088 - val_loss: 0.3231 - val_acc: 0.8846
Epoch 21/30
- 1s - loss: 0.2689 - acc: 0.9112 - val_loss: 0.3286 - val_acc: 0.8821
Epoch 22/30
- 1s - loss: 0.2625 - acc: 0.9068 - val_loss: 0.3246 - val_acc: 0.8904
Epoch 23/30
- 1s - loss: 0.2648 - acc: 0.9046 - val_loss: 0.3321 - val_acc: 0.8904
Epoch 24/30
- 1s - loss: 0.2581 - acc: 0.9103 - val_loss: 0.3206 - val_acc: 0.8962
Epoch 25/30
- 1s - loss: 0.2651 - acc: 0.9044 - val_loss: 0.4467 - val_acc: 0.8532
Epoch 26/30
- 1s - loss: 0.2726 - acc: 0.9066 - val_loss: 0.3296 - val_acc: 0.8840
Epoch 27/30
- 1s - loss: 0.2521 - acc: 0.9169 - val_loss: 0.3066 - val_acc: 0.8981
Epoch 28/30
- 1s - loss: 0.2579 - acc: 0.9134 - val_loss: 0.3241 - val_acc: 0.8872
Epoch 29/30
- 1s - loss: 0.2573 - acc: 0.9132 - val_loss: 0.3412 - val_acc: 0.8814
Epoch 30/30
- 1s - loss: 0.2579 - acc: 0.9125 - val_loss: 0.3310 - val_acc: 0.8885
Train accuracy 0.8851733464470125 Test accuracy: 0.8884615384615384

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

---

```

Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0

```

---

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30

```

- 2s - loss: 10.8029 - acc: 0.8232 - val\_loss: 1.8159 - val\_acc: 0.8590  
Epoch 2/30  
- 1s - loss: 1.0262 - acc: 0.8687 - val\_loss: 0.6634 - val\_acc: 0.8827  
Epoch 3/30  
- 1s - loss: 0.4958 - acc: 0.9004 - val\_loss: 0.4915 - val\_acc: 0.8615  
Epoch 4/30  
- 1s - loss: 0.3864 - acc: 0.8994 - val\_loss: 0.4591 - val\_acc: 0.8385  
Epoch 5/30  
- 1s - loss: 0.3364 - acc: 0.9021 - val\_loss: 0.4042 - val\_acc: 0.8699  
Epoch 6/30  
- 1s - loss: 0.3290 - acc: 0.8957 - val\_loss: 0.3584 - val\_acc: 0.8756  
Epoch 7/30  
- 1s - loss: 0.2975 - acc: 0.9063 - val\_loss: 0.4067 - val\_acc: 0.8731  
Epoch 8/30  
- 1s - loss: 0.2793 - acc: 0.9117 - val\_loss: 0.3541 - val\_acc: 0.8712  
Epoch 9/30  
- 1s - loss: 0.2857 - acc: 0.9093 - val\_loss: 0.3370 - val\_acc: 0.8942  
Epoch 10/30  
- 1s - loss: 0.2827 - acc: 0.9112 - val\_loss: 0.3098 - val\_acc: 0.8885  
Epoch 11/30  
- 1s - loss: 0.2988 - acc: 0.9014 - val\_loss: 0.3698 - val\_acc: 0.8923  
Epoch 12/30  
- 1s - loss: 0.2730 - acc: 0.9134 - val\_loss: 0.3395 - val\_acc: 0.8897  
Epoch 13/30  
- 1s - loss: 0.2666 - acc: 0.9112 - val\_loss: 0.3086 - val\_acc: 0.8865  
Epoch 14/30  
- 1s - loss: 0.2682 - acc: 0.9100 - val\_loss: 0.3977 - val\_acc: 0.8808  
Epoch 15/30  
- 1s - loss: 0.2571 - acc: 0.9147 - val\_loss: 0.3214 - val\_acc: 0.8923  
Epoch 16/30  
- 1s - loss: 0.2587 - acc: 0.9154 - val\_loss: 0.3164 - val\_acc: 0.8949  
Epoch 17/30  
- 1s - loss: 0.2657 - acc: 0.9184 - val\_loss: 0.3351 - val\_acc: 0.8859  
Epoch 18/30  
- 1s - loss: 0.2502 - acc: 0.9206 - val\_loss: 0.3054 - val\_acc: 0.8923  
Epoch 19/30  
- 1s - loss: 0.2500 - acc: 0.9186 - val\_loss: 0.2975 - val\_acc: 0.9077  
Epoch 20/30  
- 1s - loss: 0.2677 - acc: 0.9203 - val\_loss: 0.9886 - val\_acc: 0.7404  
Epoch 21/30  
- 1s - loss: 0.2628 - acc: 0.9216 - val\_loss: 0.2988 - val\_acc: 0.8910  
Epoch 22/30  
- 1s - loss: 0.2725 - acc: 0.9208 - val\_loss: 0.3164 - val\_acc: 0.8808  
Epoch 23/30  
- 1s - loss: 0.2430 - acc: 0.9230 - val\_loss: 0.2807 - val\_acc: 0.9103  
Epoch 24/30  
- 1s - loss: 0.2497 - acc: 0.9216 - val\_loss: 0.2737 - val\_acc: 0.9173  
Epoch 25/30

```

- 1s - loss: 0.2503 - acc: 0.9189 - val_loss: 0.3437 - val_acc: 0.8814
Epoch 26/30
- 1s - loss: 0.2483 - acc: 0.9189 - val_loss: 0.2838 - val_acc: 0.9179
Epoch 27/30
- 1s - loss: 0.2321 - acc: 0.9255 - val_loss: 0.2662 - val_acc: 0.9237
Epoch 28/30
- 1s - loss: 0.2393 - acc: 0.9299 - val_loss: 0.2793 - val_acc: 0.9173
Epoch 29/30
- 1s - loss: 0.2563 - acc: 0.9270 - val_loss: 0.3099 - val_acc: 0.8936
Epoch 30/30
- 1s - loss: 0.2461 - acc: 0.9253 - val_loss: 0.4254 - val_acc: 0.8814
Train accuracy 0.898942709613966 Test accuracy: 0.8814102564102564

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 30.9653 - acc: 0.8153 - val_loss: 5.8020 - val_acc: 0.8423
Epoch 2/30
- 1s - loss: 1.7216 - acc: 0.8618 - val_loss: 0.5674 - val_acc: 0.8545
Epoch 3/30
- 1s - loss: 0.4267 - acc: 0.8699 - val_loss: 0.4857 - val_acc: 0.8333
Epoch 4/30
- 1s - loss: 0.3928 - acc: 0.8832 - val_loss: 0.5152 - val_acc: 0.7846
Epoch 5/30
- 1s - loss: 0.3720 - acc: 0.8795 - val_loss: 0.5215 - val_acc: 0.8474
Epoch 6/30
- 1s - loss: 0.3634 - acc: 0.8832 - val_loss: 0.3808 - val_acc: 0.8776

```

Epoch 7/30  
- 1s - loss: 0.3504 - acc: 0.8805 - val\_loss: 0.3770 - val\_acc: 0.8763

Epoch 8/30  
- 1s - loss: 0.3383 - acc: 0.8871 - val\_loss: 0.4348 - val\_acc: 0.8199

Epoch 9/30  
- 1s - loss: 0.3181 - acc: 0.8928 - val\_loss: 0.3996 - val\_acc: 0.8583

Epoch 10/30  
- 1s - loss: 0.3321 - acc: 0.8842 - val\_loss: 0.3630 - val\_acc: 0.8801

Epoch 11/30  
- 1s - loss: 0.3180 - acc: 0.8923 - val\_loss: 0.3866 - val\_acc: 0.8795

Epoch 12/30  
- 1s - loss: 0.3132 - acc: 0.8921 - val\_loss: 0.3481 - val\_acc: 0.8756

Epoch 13/30  
- 1s - loss: 0.3341 - acc: 0.8913 - val\_loss: 0.3613 - val\_acc: 0.8833

Epoch 14/30  
- 1s - loss: 0.3186 - acc: 0.8945 - val\_loss: 0.4622 - val\_acc: 0.8571

Epoch 15/30  
- 1s - loss: 0.3251 - acc: 0.8925 - val\_loss: 0.4008 - val\_acc: 0.8622

Epoch 16/30  
- 1s - loss: 0.3135 - acc: 0.8916 - val\_loss: 0.3371 - val\_acc: 0.8750

Epoch 17/30  
- 1s - loss: 0.3173 - acc: 0.8933 - val\_loss: 0.3454 - val\_acc: 0.8724

Epoch 18/30  
- 1s - loss: 0.3106 - acc: 0.8913 - val\_loss: 0.3439 - val\_acc: 0.8782

Epoch 19/30  
- 1s - loss: 0.3006 - acc: 0.8923 - val\_loss: 0.3501 - val\_acc: 0.8744

Epoch 20/30  
- 1s - loss: 0.3034 - acc: 0.8957 - val\_loss: 0.4884 - val\_acc: 0.8346

Epoch 21/30  
- 1s - loss: 0.3146 - acc: 0.8965 - val\_loss: 0.3536 - val\_acc: 0.8705

Epoch 22/30  
- 1s - loss: 0.2971 - acc: 0.8975 - val\_loss: 0.3468 - val\_acc: 0.8686

Epoch 23/30  
- 1s - loss: 0.3167 - acc: 0.8925 - val\_loss: 0.3586 - val\_acc: 0.8769

Epoch 24/30  
- 1s - loss: 0.3032 - acc: 0.8972 - val\_loss: 0.4479 - val\_acc: 0.8513

Epoch 25/30  
- 1s - loss: 0.3204 - acc: 0.8913 - val\_loss: 0.3923 - val\_acc: 0.8404

Epoch 26/30  
- 1s - loss: 0.2935 - acc: 0.8997 - val\_loss: 0.3702 - val\_acc: 0.8737

Epoch 27/30  
- 1s - loss: 0.2950 - acc: 0.8903 - val\_loss: 0.3551 - val\_acc: 0.8673

Epoch 28/30  
- 1s - loss: 0.2983 - acc: 0.8935 - val\_loss: 0.3852 - val\_acc: 0.8635

Epoch 29/30  
- 1s - loss: 0.3017 - acc: 0.8987 - val\_loss: 0.3490 - val\_acc: 0.8782

Epoch 30/30  
- 1s - loss: 0.3063 - acc: 0.8950 - val\_loss: 0.4495 - val\_acc: 0.8333

Train accuracy 0.8374723383329236 Test accuracy: 0.8333333333333334

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

Total params: 65,299

Trainable params: 65,299

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 19.5192 - acc: 0.8119 - val\_loss: 5.2518 - val\_acc: 0.8128

Epoch 2/30

- 1s - loss: 1.8561 - acc: 0.8793 - val\_loss: 0.5971 - val\_acc: 0.8526

Epoch 3/30

- 1s - loss: 0.3928 - acc: 0.8832 - val\_loss: 0.4446 - val\_acc: 0.8353

Epoch 4/30

- 1s - loss: 0.3459 - acc: 0.8894 - val\_loss: 0.5246 - val\_acc: 0.8026

Epoch 5/30

- 1s - loss: 0.3234 - acc: 0.8903 - val\_loss: 0.3703 - val\_acc: 0.8641

Epoch 6/30

- 1s - loss: 0.3061 - acc: 0.8933 - val\_loss: 0.5315 - val\_acc: 0.8609

Epoch 7/30

- 1s - loss: 0.3076 - acc: 0.8925 - val\_loss: 0.3802 - val\_acc: 0.8660

Epoch 8/30

- 1s - loss: 0.3054 - acc: 0.8982 - val\_loss: 0.4429 - val\_acc: 0.8378

Epoch 9/30

- 1s - loss: 0.2963 - acc: 0.8987 - val\_loss: 0.3616 - val\_acc: 0.8615

Epoch 10/30

- 1s - loss: 0.2929 - acc: 0.8967 - val\_loss: 0.4813 - val\_acc: 0.8417

Epoch 11/30

- 1s - loss: 0.3009 - acc: 0.8955 - val\_loss: 0.4235 - val\_acc: 0.8462

Epoch 12/30

```

- 1s - loss: 0.2903 - acc: 0.8970 - val_loss: 0.3391 - val_acc: 0.8737
Epoch 13/30
- 1s - loss: 0.2879 - acc: 0.9009 - val_loss: 0.3381 - val_acc: 0.8788
Epoch 14/30
- 1s - loss: 0.2740 - acc: 0.9031 - val_loss: 0.3852 - val_acc: 0.8654
Epoch 15/30
- 1s - loss: 0.2953 - acc: 0.8953 - val_loss: 0.3911 - val_acc: 0.8705
Epoch 16/30
- 1s - loss: 0.2771 - acc: 0.8967 - val_loss: 0.3290 - val_acc: 0.8763
Epoch 17/30
- 1s - loss: 0.2820 - acc: 0.8977 - val_loss: 0.3547 - val_acc: 0.8583
Epoch 18/30
- 1s - loss: 0.2824 - acc: 0.8987 - val_loss: 0.3396 - val_acc: 0.8705
Epoch 19/30
- 1s - loss: 0.2851 - acc: 0.8960 - val_loss: 0.3313 - val_acc: 0.8763
Epoch 20/30
- 1s - loss: 0.2712 - acc: 0.8975 - val_loss: 0.3156 - val_acc: 0.8769
Epoch 21/30
- 1s - loss: 0.2777 - acc: 0.8975 - val_loss: 0.3492 - val_acc: 0.8635
Epoch 22/30
- 1s - loss: 0.2692 - acc: 0.8997 - val_loss: 0.3246 - val_acc: 0.8795
Epoch 23/30
- 1s - loss: 0.2929 - acc: 0.8925 - val_loss: 0.4272 - val_acc: 0.8564
Epoch 24/30
- 1s - loss: 0.2746 - acc: 0.8953 - val_loss: 0.4219 - val_acc: 0.8564
Epoch 25/30
- 1s - loss: 0.2820 - acc: 0.8982 - val_loss: 0.3748 - val_acc: 0.8551
Epoch 26/30
- 1s - loss: 0.2829 - acc: 0.8972 - val_loss: 0.3344 - val_acc: 0.8718
Epoch 27/30
- 1s - loss: 0.2649 - acc: 0.9019 - val_loss: 0.3207 - val_acc: 0.8763
Epoch 28/30
- 1s - loss: 0.2941 - acc: 0.9021 - val_loss: 0.3782 - val_acc: 0.8429
Epoch 29/30
- 1s - loss: 0.2990 - acc: 0.8992 - val_loss: 0.3503 - val_acc: 0.8705
Epoch 30/30
- 1s - loss: 0.2692 - acc: 0.9024 - val_loss: 0.4224 - val_acc: 0.8513
Train accuracy 0.8480452421932628 Test accuracy: 0.8512820512820513

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0

```

max_pooling1d_1 (MaxPooling1 (None, 60, 16)          0
-----
flatten_1 (Flatten)          (None, 960)          0
-----
dense_1 (Dense)              (None, 64)          61504
-----
dense_2 (Dense)              (None, 3)           195
=====
Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 23.5383 - acc: 0.8210 - val_loss: 5.7818 - val_acc: 0.8167
Epoch 2/30
  - 1s - loss: 2.0037 - acc: 0.8758 - val_loss: 0.6015 - val_acc: 0.8821
Epoch 3/30
  - 1s - loss: 0.4384 - acc: 0.8788 - val_loss: 0.5451 - val_acc: 0.8032
Epoch 4/30
  - 1s - loss: 0.3719 - acc: 0.8894 - val_loss: 0.5168 - val_acc: 0.8090
Epoch 5/30
  - 1s - loss: 0.3240 - acc: 0.8935 - val_loss: 0.4272 - val_acc: 0.8615
Epoch 6/30
  - 1s - loss: 0.3051 - acc: 0.8957 - val_loss: 0.3826 - val_acc: 0.8571
Epoch 7/30
  - 1s - loss: 0.3041 - acc: 0.8972 - val_loss: 0.3800 - val_acc: 0.8673
Epoch 8/30
  - 1s - loss: 0.2941 - acc: 0.8960 - val_loss: 0.4571 - val_acc: 0.8224
Epoch 9/30
  - 1s - loss: 0.2909 - acc: 0.8975 - val_loss: 0.3771 - val_acc: 0.8596
Epoch 10/30
  - 1s - loss: 0.2925 - acc: 0.8921 - val_loss: 0.7420 - val_acc: 0.8128
Epoch 11/30
  - 1s - loss: 0.2915 - acc: 0.8925 - val_loss: 0.4014 - val_acc: 0.8372
Epoch 12/30
  - 1s - loss: 0.2780 - acc: 0.9007 - val_loss: 0.3523 - val_acc: 0.8615
Epoch 13/30
  - 1s - loss: 0.2881 - acc: 0.9004 - val_loss: 0.3184 - val_acc: 0.8821
Epoch 14/30
  - 1s - loss: 0.2754 - acc: 0.8994 - val_loss: 0.4149 - val_acc: 0.8436
Epoch 15/30
  - 1s - loss: 0.2834 - acc: 0.9014 - val_loss: 0.3285 - val_acc: 0.8840
Epoch 16/30
  - 1s - loss: 0.2828 - acc: 0.8999 - val_loss: 0.3150 - val_acc: 0.8814
Epoch 17/30
  - 1s - loss: 0.2756 - acc: 0.9083 - val_loss: 0.3558 - val_acc: 0.8622

```

```

Epoch 18/30
- 1s - loss: 0.2738 - acc: 0.9093 - val_loss: 0.3323 - val_acc: 0.8769
Epoch 19/30
- 1s - loss: 0.2757 - acc: 0.9034 - val_loss: 0.3234 - val_acc: 0.8910
Epoch 20/30
- 1s - loss: 0.2628 - acc: 0.9066 - val_loss: 0.3066 - val_acc: 0.8910
Epoch 21/30
- 1s - loss: 0.2573 - acc: 0.9117 - val_loss: 0.3705 - val_acc: 0.8686
Epoch 22/30
- 1s - loss: 0.2560 - acc: 0.9120 - val_loss: 0.3344 - val_acc: 0.8821
Epoch 23/30
- 1s - loss: 0.2671 - acc: 0.9071 - val_loss: 0.3083 - val_acc: 0.8865
Epoch 24/30
- 1s - loss: 0.2609 - acc: 0.9085 - val_loss: 0.3156 - val_acc: 0.8942
Epoch 25/30
- 1s - loss: 0.2627 - acc: 0.9093 - val_loss: 0.3435 - val_acc: 0.8929
Epoch 26/30
- 1s - loss: 0.2687 - acc: 0.9075 - val_loss: 0.3242 - val_acc: 0.8853
Epoch 27/30
- 1s - loss: 0.2625 - acc: 0.9100 - val_loss: 0.3262 - val_acc: 0.8872
Epoch 28/30
- 1s - loss: 0.2625 - acc: 0.9164 - val_loss: 0.3073 - val_acc: 0.8968
Epoch 29/30
- 1s - loss: 0.2683 - acc: 0.9115 - val_loss: 0.3174 - val_acc: 0.8955
Epoch 30/30
- 1s - loss: 0.2536 - acc: 0.9149 - val_loss: 0.3300 - val_acc: 0.8667
Train accuracy 0.8500122940742562 Test accuracy: 0.8666666666666667

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0

```



```

-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 26.3178 - acc: 0.8107 - val_loss: 9.0461 - val_acc: 0.8622
Epoch 2/30
  - 1s - loss: 3.5803 - acc: 0.8837 - val_loss: 0.9784 - val_acc: 0.8596
Epoch 3/30
  - 1s - loss: 0.5376 - acc: 0.8896 - val_loss: 0.5245 - val_acc: 0.8083
Epoch 4/30
  - 1s - loss: 0.3563 - acc: 0.8960 - val_loss: 0.4672 - val_acc: 0.8250
Epoch 5/30
  - 1s - loss: 0.3250 - acc: 0.8938 - val_loss: 0.4541 - val_acc: 0.8359
Epoch 6/30
  - 1s - loss: 0.3040 - acc: 0.8982 - val_loss: 0.3845 - val_acc: 0.8615
Epoch 7/30
  - 1s - loss: 0.2971 - acc: 0.8953 - val_loss: 0.3360 - val_acc: 0.8859
Epoch 8/30
  - 1s - loss: 0.2949 - acc: 0.8975 - val_loss: 0.3855 - val_acc: 0.8526
Epoch 9/30
  - 1s - loss: 0.2820 - acc: 0.9046 - val_loss: 0.3467 - val_acc: 0.8679
Epoch 10/30
  - 1s - loss: 0.2935 - acc: 0.8906 - val_loss: 0.3326 - val_acc: 0.8846
Epoch 11/30
  - 1s - loss: 0.2743 - acc: 0.9026 - val_loss: 0.3938 - val_acc: 0.8378
Epoch 12/30
  - 1s - loss: 0.2851 - acc: 0.8999 - val_loss: 0.3458 - val_acc: 0.8801
Epoch 13/30
  - 1s - loss: 0.2764 - acc: 0.9075 - val_loss: 0.3258 - val_acc: 0.8865
Epoch 14/30
  - 1s - loss: 0.2675 - acc: 0.9071 - val_loss: 0.3518 - val_acc: 0.8821
Epoch 15/30
  - 1s - loss: 0.2823 - acc: 0.8992 - val_loss: 0.3242 - val_acc: 0.8910
Epoch 16/30
  - 1s - loss: 0.2658 - acc: 0.9048 - val_loss: 0.3165 - val_acc: 0.8872
Epoch 17/30
  - 1s - loss: 0.2640 - acc: 0.9120 - val_loss: 0.3370 - val_acc: 0.8750
Epoch 18/30
  - 1s - loss: 0.2683 - acc: 0.9063 - val_loss: 0.3441 - val_acc: 0.8846
Epoch 19/30
  - 1s - loss: 0.2664 - acc: 0.9063 - val_loss: 0.3234 - val_acc: 0.8846
Epoch 20/30
  - 1s - loss: 0.2603 - acc: 0.9075 - val_loss: 0.6709 - val_acc: 0.7468
Epoch 21/30
  - 1s - loss: 0.2729 - acc: 0.9075 - val_loss: 0.3350 - val_acc: 0.8756
Epoch 22/30
  - 1s - loss: 0.2609 - acc: 0.9061 - val_loss: 0.3660 - val_acc: 0.8647
Epoch 23/30

```

```

- 1s - loss: 0.2593 - acc: 0.9090 - val_loss: 0.3146 - val_acc: 0.8859
Epoch 24/30
- 1s - loss: 0.2633 - acc: 0.9095 - val_loss: 0.3200 - val_acc: 0.8923
Epoch 25/30
- 1s - loss: 0.2676 - acc: 0.9090 - val_loss: 0.3753 - val_acc: 0.8628
Epoch 26/30
- 1s - loss: 0.2643 - acc: 0.9078 - val_loss: 0.3246 - val_acc: 0.8865
Epoch 27/30
- 1s - loss: 0.2510 - acc: 0.9134 - val_loss: 0.3744 - val_acc: 0.8744
Epoch 28/30
- 1s - loss: 0.2604 - acc: 0.9152 - val_loss: 0.3079 - val_acc: 0.8929
Epoch 29/30
- 1s - loss: 0.2595 - acc: 0.9115 - val_loss: 0.3263 - val_acc: 0.8878
Epoch 30/30
- 1s - loss: 0.2559 - acc: 0.9100 - val_loss: 0.3137 - val_acc: 0.8891
Train accuracy 0.8925497910007376 Test accuracy: 0.889102564102564
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 33.8383 - acc: 0.8011 - val_loss: 5.7532 - val_acc: 0.8481
Epoch 2/30
- 1s - loss: 1.6383 - acc: 0.8594 - val_loss: 0.4907 - val_acc: 0.8500
Epoch 3/30
- 1s - loss: 0.4743 - acc: 0.8623 - val_loss: 0.5213 - val_acc: 0.7917
Epoch 4/30
- 1s - loss: 0.3988 - acc: 0.8753 - val_loss: 0.4840 - val_acc: 0.8077

```

Epoch 5/30  
- 1s - loss: 0.3781 - acc: 0.8810 - val\_loss: 0.4645 - val\_acc: 0.8192

Epoch 6/30  
- 1s - loss: 0.3660 - acc: 0.8827 - val\_loss: 0.3947 - val\_acc: 0.8577

Epoch 7/30  
- 1s - loss: 0.3642 - acc: 0.8778 - val\_loss: 0.3853 - val\_acc: 0.8769

Epoch 8/30  
- 1s - loss: 0.3487 - acc: 0.8820 - val\_loss: 0.4797 - val\_acc: 0.8071

Epoch 9/30  
- 1s - loss: 0.3443 - acc: 0.8839 - val\_loss: 0.3819 - val\_acc: 0.8686

Epoch 10/30  
- 1s - loss: 0.3372 - acc: 0.8817 - val\_loss: 0.3800 - val\_acc: 0.8705

Epoch 11/30  
- 1s - loss: 0.3543 - acc: 0.8820 - val\_loss: 0.4182 - val\_acc: 0.8635

Epoch 12/30  
- 1s - loss: 0.3300 - acc: 0.8894 - val\_loss: 0.3691 - val\_acc: 0.8737

Epoch 13/30  
- 1s - loss: 0.3197 - acc: 0.8913 - val\_loss: 0.3631 - val\_acc: 0.8782

Epoch 14/30  
- 1s - loss: 0.3334 - acc: 0.8943 - val\_loss: 0.4235 - val\_acc: 0.8692

Epoch 15/30  
- 1s - loss: 0.3253 - acc: 0.8930 - val\_loss: 0.3693 - val\_acc: 0.8705

Epoch 16/30  
- 1s - loss: 0.3244 - acc: 0.8864 - val\_loss: 0.3510 - val\_acc: 0.8744

Epoch 17/30  
- 1s - loss: 0.3213 - acc: 0.8913 - val\_loss: 0.3685 - val\_acc: 0.8558

Epoch 18/30  
- 1s - loss: 0.3235 - acc: 0.8891 - val\_loss: 0.5949 - val\_acc: 0.8449

Epoch 19/30  
- 1s - loss: 0.3165 - acc: 0.8903 - val\_loss: 0.3566 - val\_acc: 0.8769

Epoch 20/30  
- 1s - loss: 0.3189 - acc: 0.8923 - val\_loss: 0.5926 - val\_acc: 0.7699

Epoch 21/30  
- 1s - loss: 0.3340 - acc: 0.8886 - val\_loss: 0.3626 - val\_acc: 0.8724

Epoch 22/30  
- 1s - loss: 0.2976 - acc: 0.8977 - val\_loss: 0.3586 - val\_acc: 0.8647

Epoch 23/30  
- 1s - loss: 0.3276 - acc: 0.8864 - val\_loss: 0.3528 - val\_acc: 0.8782

Epoch 24/30  
- 1s - loss: 0.3130 - acc: 0.8908 - val\_loss: 0.3945 - val\_acc: 0.8660

Epoch 25/30  
- 1s - loss: 0.3207 - acc: 0.8879 - val\_loss: 0.5715 - val\_acc: 0.8340

Epoch 26/30  
- 1s - loss: 0.3154 - acc: 0.8935 - val\_loss: 0.4350 - val\_acc: 0.8577

Epoch 27/30  
- 1s - loss: 0.3145 - acc: 0.8911 - val\_loss: 0.3417 - val\_acc: 0.8795

Epoch 28/30  
- 1s - loss: 0.3156 - acc: 0.8916 - val\_loss: 0.3938 - val\_acc: 0.8429

Epoch 29/30

- 1s - loss: 0.3195 - acc: 0.8918 - val\_loss: 0.3622 - val\_acc: 0.8724

Epoch 30/30

- 1s - loss: 0.3065 - acc: 0.8943 - val\_loss: 0.4040 - val\_acc: 0.8250

Train accuracy 0.8094418490287681 Test accuracy: 0.825

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 120, 16)	1552
-----		
dropout_1 (Dropout)	(None, 120, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
-----		
flatten_1 (Flatten)	(None, 960)	0
-----		
dense_1 (Dense)	(None, 16)	15376
-----		
dense_2 (Dense)	(None, 3)	51
=====		

Total params: 19,027

Trainable params: 19,027

Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 11.7422 - acc: 0.8210 - val\_loss: 1.7948 - val\_acc: 0.8679

Epoch 2/30

- 1s - loss: 0.8690 - acc: 0.8672 - val\_loss: 0.6572 - val\_acc: 0.8776

Epoch 3/30

- 1s - loss: 0.4639 - acc: 0.9007 - val\_loss: 0.5763 - val\_acc: 0.8372

Epoch 4/30

- 1s - loss: 0.4223 - acc: 0.9026 - val\_loss: 0.4796 - val\_acc: 0.8455

Epoch 5/30

- 1s - loss: 0.3382 - acc: 0.9078 - val\_loss: 0.3887 - val\_acc: 0.8865

Epoch 6/30

- 1s - loss: 0.3065 - acc: 0.9073 - val\_loss: 0.3465 - val\_acc: 0.8897

Epoch 7/30

- 1s - loss: 0.3032 - acc: 0.9019 - val\_loss: 0.3360 - val\_acc: 0.8974

Epoch 8/30

- 1s - loss: 0.3084 - acc: 0.9115 - val\_loss: 0.4243 - val\_acc: 0.8513

Epoch 9/30

- 1s - loss: 0.2849 - acc: 0.9061 - val\_loss: 0.3814 - val\_acc: 0.8654

Epoch 10/30

```

- 1s - loss: 0.2664 - acc: 0.9117 - val_loss: 0.3439 - val_acc: 0.8891
Epoch 11/30
- 1s - loss: 0.2926 - acc: 0.9112 - val_loss: 0.3220 - val_acc: 0.8731
Epoch 12/30
- 1s - loss: 0.2611 - acc: 0.9171 - val_loss: 0.3274 - val_acc: 0.8962
Epoch 13/30
- 1s - loss: 0.2670 - acc: 0.9132 - val_loss: 0.3379 - val_acc: 0.8885
Epoch 14/30
- 1s - loss: 0.2458 - acc: 0.9196 - val_loss: 0.3068 - val_acc: 0.9013
Epoch 15/30
- 1s - loss: 0.2553 - acc: 0.9152 - val_loss: 0.3468 - val_acc: 0.8833
Epoch 16/30
- 1s - loss: 0.2493 - acc: 0.9166 - val_loss: 0.3041 - val_acc: 0.8974
Epoch 17/30
- 1s - loss: 0.2568 - acc: 0.9223 - val_loss: 0.3184 - val_acc: 0.8897
Epoch 18/30
- 1s - loss: 0.2313 - acc: 0.9272 - val_loss: 0.2988 - val_acc: 0.8994
Epoch 19/30
- 1s - loss: 0.2412 - acc: 0.9176 - val_loss: 0.2829 - val_acc: 0.9160
Epoch 20/30
- 1s - loss: 0.2387 - acc: 0.9275 - val_loss: 0.6275 - val_acc: 0.8340
Epoch 21/30
- 1s - loss: 0.2355 - acc: 0.9243 - val_loss: 0.3079 - val_acc: 0.8814
Epoch 22/30
- 1s - loss: 0.2317 - acc: 0.9235 - val_loss: 0.2853 - val_acc: 0.8994
Epoch 23/30
- 1s - loss: 0.2421 - acc: 0.9213 - val_loss: 0.2883 - val_acc: 0.8910
Epoch 24/30
- 1s - loss: 0.2374 - acc: 0.9255 - val_loss: 0.3012 - val_acc: 0.9058
Epoch 25/30
- 1s - loss: 0.2327 - acc: 0.9216 - val_loss: 0.3098 - val_acc: 0.8763
Epoch 26/30
- 1s - loss: 0.2337 - acc: 0.9211 - val_loss: 0.3423 - val_acc: 0.8929
Epoch 27/30
- 1s - loss: 0.2203 - acc: 0.9289 - val_loss: 0.3006 - val_acc: 0.9045
Epoch 28/30
- 1s - loss: 0.2394 - acc: 0.9272 - val_loss: 0.2832 - val_acc: 0.9006
Epoch 29/30
- 1s - loss: 0.2297 - acc: 0.9272 - val_loss: 0.2963 - val_acc: 0.8929
Epoch 30/30
- 1s - loss: 0.2233 - acc: 0.9282 - val_loss: 0.3972 - val_acc: 0.8891
Train accuracy 0.9114826653552988 Test accuracy: 0.889102564102564

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 124, 28)            1288
-----

```

conv1d_2 (Conv1D)	(None, 122, 24)	2040
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

Total params: 65,027

Trainable params: 65,027

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 48.9803 - acc: 0.8345 - val\_loss: 13.0954 - val\_acc: 0.8359

Epoch 2/30

- 1s - loss: 4.1190 - acc: 0.8908 - val\_loss: 0.7221 - val\_acc: 0.8558

Epoch 3/30

- 1s - loss: 0.3878 - acc: 0.8918 - val\_loss: 0.4709 - val\_acc: 0.8256

Epoch 4/30

- 1s - loss: 0.3207 - acc: 0.9014 - val\_loss: 0.4282 - val\_acc: 0.8481

Epoch 5/30

- 1s - loss: 0.3081 - acc: 0.8982 - val\_loss: 0.4179 - val\_acc: 0.8635

Epoch 6/30

- 1s - loss: 0.3048 - acc: 0.8943 - val\_loss: 0.4543 - val\_acc: 0.8122

Epoch 7/30

- 1s - loss: 0.2943 - acc: 0.8943 - val\_loss: 0.3578 - val\_acc: 0.8731

Epoch 8/30

- 1s - loss: 0.2965 - acc: 0.8911 - val\_loss: 0.4086 - val\_acc: 0.8256

Epoch 9/30

- 1s - loss: 0.2870 - acc: 0.9002 - val\_loss: 0.3379 - val\_acc: 0.8795

Epoch 10/30

- 1s - loss: 0.2856 - acc: 0.8982 - val\_loss: 0.3387 - val\_acc: 0.8788

Epoch 11/30

- 1s - loss: 0.2789 - acc: 0.8994 - val\_loss: 0.4721 - val\_acc: 0.7340

Epoch 12/30

- 1s - loss: 0.2865 - acc: 0.8975 - val\_loss: 0.4152 - val\_acc: 0.8237

Epoch 13/30

- 1s - loss: 0.2823 - acc: 0.8982 - val\_loss: 0.3985 - val\_acc: 0.8353

Epoch 14/30

- 1s - loss: 0.2772 - acc: 0.9026 - val\_loss: 0.4299 - val\_acc: 0.8179

Epoch 15/30

- 1s - loss: 0.2768 - acc: 0.8977 - val\_loss: 0.3243 - val\_acc: 0.8821

Epoch 16/30  
 - 1s - loss: 0.2795 - acc: 0.8970 - val\_loss: 0.3447 - val\_acc: 0.8718  
 Epoch 17/30  
 - 1s - loss: 0.2775 - acc: 0.8923 - val\_loss: 0.3644 - val\_acc: 0.8545  
 Epoch 18/30  
 - 1s - loss: 0.2734 - acc: 0.9002 - val\_loss: 0.3510 - val\_acc: 0.8737  
 Epoch 19/30  
 - 1s - loss: 0.2763 - acc: 0.8948 - val\_loss: 0.3244 - val\_acc: 0.8756  
 Epoch 20/30  
 - 1s - loss: 0.2779 - acc: 0.9002 - val\_loss: 0.3314 - val\_acc: 0.8756  
 Epoch 21/30  
 - 1s - loss: 0.2658 - acc: 0.8980 - val\_loss: 0.3790 - val\_acc: 0.8705  
 Epoch 22/30  
 - 1s - loss: 0.2682 - acc: 0.9019 - val\_loss: 0.3490 - val\_acc: 0.8718  
 Epoch 23/30  
 - 1s - loss: 0.2723 - acc: 0.8928 - val\_loss: 0.3253 - val\_acc: 0.8776  
 Epoch 24/30  
 - 1s - loss: 0.2735 - acc: 0.8970 - val\_loss: 0.3145 - val\_acc: 0.8731  
 Epoch 25/30  
 - 1s - loss: 0.2730 - acc: 0.8962 - val\_loss: 0.3248 - val\_acc: 0.8788  
 Epoch 26/30  
 - 1s - loss: 0.2738 - acc: 0.8967 - val\_loss: 0.3256 - val\_acc: 0.8846  
 Epoch 27/30  
 - 1s - loss: 0.2726 - acc: 0.8967 - val\_loss: 0.3345 - val\_acc: 0.8718  
 Epoch 28/30  
 - 1s - loss: 0.2751 - acc: 0.8940 - val\_loss: 0.3884 - val\_acc: 0.8269  
 Epoch 29/30  
 - 1s - loss: 0.2737 - acc: 0.8992 - val\_loss: 0.3311 - val\_acc: 0.8814  
 Epoch 30/30  
 - 1s - loss: 0.2693 - acc: 0.8975 - val\_loss: 0.3147 - val\_acc: 0.8801  
 Train accuracy 0.9230390951561347 Test accuracy: 0.8801282051282051

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 65,299
Trainable params: 65,299
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
  - 2s - loss: 44.5844 - acc: 0.8067 - val_loss: 23.6495 - val_acc: 0.8596
Epoch 2/25
  - 1s - loss: 12.9508 - acc: 0.8825 - val_loss: 5.3133 - val_acc: 0.8712
Epoch 3/25
  - 1s - loss: 2.4584 - acc: 0.8864 - val_loss: 0.9626 - val_acc: 0.7891
Epoch 4/25
  - 1s - loss: 0.4976 - acc: 0.8884 - val_loss: 0.5267 - val_acc: 0.8058
Epoch 5/25
  - 1s - loss: 0.3492 - acc: 0.8921 - val_loss: 0.4260 - val_acc: 0.8468
Epoch 6/25
  - 1s - loss: 0.3205 - acc: 0.8923 - val_loss: 0.3829 - val_acc: 0.8622
Epoch 7/25
  - 1s - loss: 0.3103 - acc: 0.8938 - val_loss: 0.3703 - val_acc: 0.8654
Epoch 8/25
  - 1s - loss: 0.2921 - acc: 0.8972 - val_loss: 0.3912 - val_acc: 0.8487
Epoch 9/25
  - 1s - loss: 0.2961 - acc: 0.9026 - val_loss: 0.3587 - val_acc: 0.8590
Epoch 10/25
  - 1s - loss: 0.2941 - acc: 0.8933 - val_loss: 0.3819 - val_acc: 0.8705
Epoch 11/25
  - 1s - loss: 0.2891 - acc: 0.8962 - val_loss: 0.3785 - val_acc: 0.8609
Epoch 12/25
  - 1s - loss: 0.2899 - acc: 0.8957 - val_loss: 0.3407 - val_acc: 0.8788
Epoch 13/25
  - 1s - loss: 0.2749 - acc: 0.9036 - val_loss: 0.3315 - val_acc: 0.8840
Epoch 14/25
  - 1s - loss: 0.2733 - acc: 0.9031 - val_loss: 0.3581 - val_acc: 0.8769
Epoch 15/25
  - 1s - loss: 0.2770 - acc: 0.9021 - val_loss: 0.3676 - val_acc: 0.8577
Epoch 16/25
  - 1s - loss: 0.2777 - acc: 0.8989 - val_loss: 0.3310 - val_acc: 0.8808
Epoch 17/25
  - 1s - loss: 0.2676 - acc: 0.9046 - val_loss: 0.3283 - val_acc: 0.8744
Epoch 18/25
  - 1s - loss: 0.2742 - acc: 0.9002 - val_loss: 0.3234 - val_acc: 0.8808
Epoch 19/25
  - 1s - loss: 0.2737 - acc: 0.8994 - val_loss: 0.3344 - val_acc: 0.8750
Epoch 20/25
  - 1s - loss: 0.2724 - acc: 0.8989 - val_loss: 0.4092 - val_acc: 0.8417
Epoch 21/25

```



```

- 1s - loss: 0.2697 - acc: 0.9039 - val_loss: 0.3444 - val_acc: 0.8692
Epoch 22/25
- 1s - loss: 0.2751 - acc: 0.8940 - val_loss: 0.3192 - val_acc: 0.8814
Epoch 23/25
- 1s - loss: 0.2703 - acc: 0.8975 - val_loss: 0.3277 - val_acc: 0.8756
Epoch 24/25
- 1s - loss: 0.2782 - acc: 0.8975 - val_loss: 0.3765 - val_acc: 0.8603
Epoch 25/25
- 1s - loss: 0.2746 - acc: 0.8972 - val_loss: 0.3541 - val_acc: 0.8603
Train accuracy 0.885910990902385 Test accuracy: 0.8602564102564103

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 32)	7200
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 32)	0
flatten_1 (Flatten)	(None, 1888)	0
dense_1 (Dense)	(None, 64)	120896
dense_2 (Dense)	(None, 3)	195

```

Total params: 129,763
Trainable params: 129,763
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 75.3213 - acc: 0.8097 - val_loss: 27.3598 - val_acc: 0.8667
Epoch 2/30
- 1s - loss: 13.6074 - acc: 0.8517 - val_loss: 5.1650 - val_acc: 0.8449
Epoch 3/30
- 1s - loss: 2.2216 - acc: 0.8655 - val_loss: 0.7722 - val_acc: 0.8212
Epoch 4/30
- 1s - loss: 0.4473 - acc: 0.8906 - val_loss: 0.5548 - val_acc: 0.8045
Epoch 5/30
- 1s - loss: 0.3654 - acc: 0.8896 - val_loss: 0.5112 - val_acc: 0.8526
Epoch 6/30
- 1s - loss: 0.3362 - acc: 0.8945 - val_loss: 0.3989 - val_acc: 0.8603
Epoch 7/30
- 1s - loss: 0.3297 - acc: 0.8911 - val_loss: 0.3810 - val_acc: 0.8615

```

Epoch 8/30  
- 1s - loss: 0.3208 - acc: 0.8982 - val\_loss: 0.4327 - val\_acc: 0.8340  
Epoch 9/30  
- 1s - loss: 0.3104 - acc: 0.8957 - val\_loss: 0.4437 - val\_acc: 0.8628  
Epoch 10/30  
- 1s - loss: 0.3178 - acc: 0.8938 - val\_loss: 0.3727 - val\_acc: 0.8724  
Epoch 11/30  
- 1s - loss: 0.3201 - acc: 0.8891 - val\_loss: 0.3766 - val\_acc: 0.8692  
Epoch 12/30  
- 1s - loss: 0.3125 - acc: 0.8953 - val\_loss: 0.3797 - val\_acc: 0.8744  
Epoch 13/30  
- 1s - loss: 0.3024 - acc: 0.8985 - val\_loss: 0.3472 - val\_acc: 0.8801  
Epoch 14/30  
- 1s - loss: 0.3057 - acc: 0.8967 - val\_loss: 0.4728 - val\_acc: 0.8583  
Epoch 15/30  
- 1s - loss: 0.3153 - acc: 0.8901 - val\_loss: 0.4271 - val\_acc: 0.8558  
Epoch 16/30  
- 1s - loss: 0.3056 - acc: 0.8950 - val\_loss: 0.3611 - val\_acc: 0.8712  
Epoch 17/30  
- 1s - loss: 0.3129 - acc: 0.8957 - val\_loss: 0.3911 - val\_acc: 0.8558  
Epoch 18/30  
- 1s - loss: 0.3000 - acc: 0.8985 - val\_loss: 0.3878 - val\_acc: 0.8545  
Epoch 19/30  
- 1s - loss: 0.2987 - acc: 0.8938 - val\_loss: 0.3493 - val\_acc: 0.8801  
Epoch 20/30  
- 1s - loss: 0.2976 - acc: 0.8994 - val\_loss: 0.5055 - val\_acc: 0.8167  
Epoch 21/30  
- 1s - loss: 0.3006 - acc: 0.8960 - val\_loss: 0.3684 - val\_acc: 0.8641  
Epoch 22/30  
- 1s - loss: 0.3026 - acc: 0.8928 - val\_loss: 0.3680 - val\_acc: 0.8628  
Epoch 23/30  
- 1s - loss: 0.3102 - acc: 0.8896 - val\_loss: 0.3511 - val\_acc: 0.8737  
Epoch 24/30  
- 1s - loss: 0.3054 - acc: 0.8928 - val\_loss: 0.3493 - val\_acc: 0.8744  
Epoch 25/30  
- 1s - loss: 0.2940 - acc: 0.8940 - val\_loss: 0.3725 - val\_acc: 0.8622  
Epoch 26/30  
- 1s - loss: 0.2957 - acc: 0.8962 - val\_loss: 1.1632 - val\_acc: 0.5974  
Epoch 27/30  
- 1s - loss: 0.3146 - acc: 0.8928 - val\_loss: 0.3496 - val\_acc: 0.8654  
Epoch 28/30  
- 1s - loss: 0.3078 - acc: 0.8928 - val\_loss: 0.3675 - val\_acc: 0.8744  
Epoch 29/30  
- 1s - loss: 0.3329 - acc: 0.8901 - val\_loss: 0.3984 - val\_acc: 0.8692  
Epoch 30/30  
- 1s - loss: 0.2944 - acc: 0.8992 - val\_loss: 0.3617 - val\_acc: 0.8801  
Train accuracy 0.8868945168428818 Test accuracy: 0.8801282051282051

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 32)	12320
dense_2 (Dense)	(None, 3)	99

Total params: 16,019  
 Trainable params: 16,019  
 Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 49.3103 - acc: 0.8195 - val\_loss: 8.0195 - val\_acc: 0.8628

Epoch 2/30

- 1s - loss: 2.4396 - acc: 0.8810 - val\_loss: 0.6552 - val\_acc: 0.8647

Epoch 3/30

- 1s - loss: 0.3998 - acc: 0.8911 - val\_loss: 0.4740 - val\_acc: 0.8494

Epoch 4/30

- 1s - loss: 0.3822 - acc: 0.8844 - val\_loss: 0.4544 - val\_acc: 0.8500

Epoch 5/30

- 1s - loss: 0.3535 - acc: 0.8874 - val\_loss: 0.4877 - val\_acc: 0.8462

Epoch 6/30

- 1s - loss: 0.3462 - acc: 0.8957 - val\_loss: 0.5970 - val\_acc: 0.7917

Epoch 7/30

- 1s - loss: 0.4063 - acc: 0.8731 - val\_loss: 0.4756 - val\_acc: 0.8429

Epoch 8/30

- 1s - loss: 0.3424 - acc: 0.8896 - val\_loss: 0.4511 - val\_acc: 0.8590

Epoch 9/30

- 1s - loss: 0.3597 - acc: 0.8881 - val\_loss: 0.4348 - val\_acc: 0.8519

Epoch 10/30

- 1s - loss: 0.3421 - acc: 0.8898 - val\_loss: 0.4273 - val\_acc: 0.8692

Epoch 11/30

- 1s - loss: 0.3262 - acc: 0.8923 - val\_loss: 0.4359 - val\_acc: 0.8487

Epoch 12/30

- 1s - loss: 0.3175 - acc: 0.8928 - val\_loss: 0.4407 - val\_acc: 0.8410

Epoch 13/30

```

- 1s - loss: 0.3552 - acc: 0.8884 - val_loss: 0.4121 - val_acc: 0.8686
Epoch 14/30
- 1s - loss: 0.3450 - acc: 0.8876 - val_loss: 0.4220 - val_acc: 0.8699
Epoch 15/30
- 1s - loss: 0.3381 - acc: 0.8864 - val_loss: 0.4354 - val_acc: 0.8622
Epoch 16/30
- 1s - loss: 0.3555 - acc: 0.8903 - val_loss: 0.4573 - val_acc: 0.8333
Epoch 17/30
- 1s - loss: 0.3387 - acc: 0.8889 - val_loss: 0.3880 - val_acc: 0.8686
Epoch 18/30
- 1s - loss: 0.3266 - acc: 0.8908 - val_loss: 0.4157 - val_acc: 0.8628
Epoch 19/30
- 1s - loss: 0.3269 - acc: 0.8923 - val_loss: 0.4438 - val_acc: 0.8609
Epoch 20/30
- 1s - loss: 0.3231 - acc: 0.8881 - val_loss: 0.4208 - val_acc: 0.8679
Epoch 21/30
- 1s - loss: 0.3179 - acc: 0.8881 - val_loss: 0.4251 - val_acc: 0.8417
Epoch 22/30
- 1s - loss: 0.3294 - acc: 0.8921 - val_loss: 0.3989 - val_acc: 0.8763
Epoch 23/30
- 1s - loss: 0.3092 - acc: 0.8957 - val_loss: 0.4182 - val_acc: 0.8628
Epoch 24/30
- 1s - loss: 0.3182 - acc: 0.8894 - val_loss: 0.4541 - val_acc: 0.8449
Epoch 25/30
- 1s - loss: 0.3257 - acc: 0.8916 - val_loss: 0.4118 - val_acc: 0.8692
Epoch 26/30
- 1s - loss: 0.3125 - acc: 0.8925 - val_loss: 0.3985 - val_acc: 0.8795
Epoch 27/30
- 1s - loss: 0.2960 - acc: 0.8994 - val_loss: 0.4416 - val_acc: 0.8212
Epoch 28/30
- 1s - loss: 0.3294 - acc: 0.8894 - val_loss: 0.4051 - val_acc: 0.8712
Epoch 29/30
- 1s - loss: 0.3228 - acc: 0.8913 - val_loss: 0.4518 - val_acc: 0.8449
Epoch 30/30
- 1s - loss: 0.3370 - acc: 0.8839 - val_loss: 0.4193 - val_acc: 0.8609
Train accuracy 0.895992131792476 Test accuracy: 0.860897435897436

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 126, 32)	896
-----		
conv1d_2 (Conv1D)	(None, 122, 16)	2576
-----		
dropout_1 (Dropout)	(None, 122, 16)	0
-----		
max_pooling1d_1 (MaxPooling1d)	(None, 61, 16)	0
-----		

flatten_1 (Flatten)	(None, 976)	0
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dense_1 (Dense)	(None, 64)	62528
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dense_2 (Dense)	(None, 3)	195
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Total params: 66,195  
 Trainable params: 66,195  
 Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35

- 4s - loss: 6.0877 - acc: 0.8503 - val\_loss: 0.5839 - val\_acc: 0.8532

Epoch 2/35

- 3s - loss: 0.4045 - acc: 0.8894 - val\_loss: 0.4331 - val\_acc: 0.8487

Epoch 3/35

- 3s - loss: 0.3242 - acc: 0.8955 - val\_loss: 0.4758 - val\_acc: 0.8353

Epoch 4/35

- 3s - loss: 0.3059 - acc: 0.9063 - val\_loss: 0.4050 - val\_acc: 0.8532

Epoch 5/35

- 3s - loss: 0.3023 - acc: 0.9029 - val\_loss: 0.3527 - val\_acc: 0.8801

Epoch 6/35

- 4s - loss: 0.3124 - acc: 0.9036 - val\_loss: 0.3796 - val\_acc: 0.8654

Epoch 7/35

- 3s - loss: 0.3041 - acc: 0.9039 - val\_loss: 0.4638 - val\_acc: 0.8442

Epoch 8/35

- 3s - loss: 0.3063 - acc: 0.9036 - val\_loss: 0.4023 - val\_acc: 0.8513

Epoch 9/35

- 3s - loss: 0.3137 - acc: 0.9031 - val\_loss: 0.5768 - val\_acc: 0.8577

Epoch 10/35

- 3s - loss: 0.3050 - acc: 0.9073 - val\_loss: 0.4433 - val\_acc: 0.8647

Epoch 11/35

- 3s - loss: 0.2987 - acc: 0.9127 - val\_loss: 0.5078 - val\_acc: 0.8481

Epoch 12/35

- 3s - loss: 0.3125 - acc: 0.9046 - val\_loss: 0.4917 - val\_acc: 0.8635

Epoch 13/35

- 3s - loss: 0.3115 - acc: 0.9093 - val\_loss: 0.4498 - val\_acc: 0.8558

Epoch 14/35

- 3s - loss: 0.2999 - acc: 0.9112 - val\_loss: 0.5692 - val\_acc: 0.8744

Epoch 15/35

- 3s - loss: 0.3074 - acc: 0.9152 - val\_loss: 0.3713 - val\_acc: 0.8840

Epoch 16/35

- 3s - loss: 0.2956 - acc: 0.9112 - val\_loss: 0.3314 - val\_acc: 0.8737

Epoch 17/35

- 4s - loss: 0.2966 - acc: 0.9093 - val\_loss: 0.4800 - val\_acc: 0.8667

Epoch 18/35

- 3s - loss: 0.2969 - acc: 0.9127 - val\_loss: 0.7542 - val\_acc: 0.7372

```

Epoch 19/35
- 3s - loss: 0.2854 - acc: 0.9122 - val_loss: 0.3563 - val_acc: 0.8949
Epoch 20/35
- 3s - loss: 0.2921 - acc: 0.9125 - val_loss: 0.6105 - val_acc: 0.8705
Epoch 21/35
- 3s - loss: 0.2961 - acc: 0.9147 - val_loss: 0.6273 - val_acc: 0.8615
Epoch 22/35
- 3s - loss: 0.3023 - acc: 0.9078 - val_loss: 0.5586 - val_acc: 0.6853
Epoch 23/35
- 3s - loss: 0.4116 - acc: 0.9039 - val_loss: 0.6040 - val_acc: 0.8673
Epoch 24/35
- 3s - loss: 0.3038 - acc: 0.9105 - val_loss: 0.3333 - val_acc: 0.8846
Epoch 25/35
- 3s - loss: 0.2953 - acc: 0.9093 - val_loss: 0.3247 - val_acc: 0.8821
Epoch 26/35
- 3s - loss: 0.3096 - acc: 0.9075 - val_loss: 0.2954 - val_acc: 0.9071
Epoch 27/35
- 3s - loss: 0.2754 - acc: 0.9144 - val_loss: 0.5213 - val_acc: 0.8667
Epoch 28/35
- 3s - loss: 0.3077 - acc: 0.9147 - val_loss: 0.2984 - val_acc: 0.9038
Epoch 29/35
- 3s - loss: 0.3049 - acc: 0.9125 - val_loss: 0.3087 - val_acc: 0.8994
Epoch 30/35
- 3s - loss: 0.3018 - acc: 0.9142 - val_loss: 0.3111 - val_acc: 0.9103
Epoch 31/35
- 3s - loss: 0.3030 - acc: 0.9181 - val_loss: 0.4090 - val_acc: 0.8833
Epoch 32/35
- 3s - loss: 0.2913 - acc: 0.9130 - val_loss: 0.3280 - val_acc: 0.8929
Epoch 33/35
- 3s - loss: 0.2952 - acc: 0.9130 - val_loss: 0.3197 - val_acc: 0.9064
Epoch 34/35
- 3s - loss: 0.3033 - acc: 0.9149 - val_loss: 0.3015 - val_acc: 0.8994
Epoch 35/35
- 3s - loss: 0.3197 - acc: 0.9149 - val_loss: 0.3212 - val_acc: 0.9064
Train accuracy 0.9282026063437423 Test accuracy: 0.9064102564102564

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 120, 24)	3048
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 24)	0
flatten_1 (Flatten)	(None, 1440)	0

---

```

-----
dense_1 (Dense)                (None, 16)                23056
-----
dense_2 (Dense)                (None, 3)                  51
=====
Total params: 28,843
Trainable params: 28,843
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 12.7366 - acc: 0.8294 - val_loss: 0.5700 - val_acc: 0.7929
Epoch 2/30
  - 1s - loss: 0.4456 - acc: 0.8665 - val_loss: 0.4383 - val_acc: 0.8596
Epoch 3/30
  - 1s - loss: 0.4124 - acc: 0.8680 - val_loss: 0.4537 - val_acc: 0.8346
Epoch 4/30
  - 1s - loss: 0.3821 - acc: 0.8790 - val_loss: 0.3826 - val_acc: 0.8699
Epoch 5/30
  - 1s - loss: 0.3827 - acc: 0.8795 - val_loss: 0.3774 - val_acc: 0.8673
Epoch 6/30
  - 1s - loss: 0.3684 - acc: 0.8827 - val_loss: 0.5504 - val_acc: 0.7788
Epoch 7/30
  - 1s - loss: 0.3739 - acc: 0.8798 - val_loss: 0.3811 - val_acc: 0.8679
Epoch 8/30
  - 1s - loss: 0.3756 - acc: 0.8825 - val_loss: 0.4707 - val_acc: 0.8436
Epoch 9/30
  - 1s - loss: 0.3592 - acc: 0.8849 - val_loss: 0.3980 - val_acc: 0.8679
Epoch 10/30
  - 1s - loss: 0.3349 - acc: 0.8857 - val_loss: 0.3560 - val_acc: 0.8763
Epoch 11/30
  - 1s - loss: 0.3335 - acc: 0.8874 - val_loss: 0.8999 - val_acc: 0.6506
Epoch 12/30
  - 1s - loss: 0.3481 - acc: 0.8847 - val_loss: 0.4332 - val_acc: 0.8154
Epoch 13/30
  - 1s - loss: 0.3431 - acc: 0.8822 - val_loss: 0.4443 - val_acc: 0.8192
Epoch 14/30
  - 1s - loss: 0.3425 - acc: 0.8822 - val_loss: 0.6525 - val_acc: 0.7013
Epoch 15/30
  - 1s - loss: 0.3375 - acc: 0.8921 - val_loss: 0.3547 - val_acc: 0.8737
Epoch 16/30
  - 1s - loss: 0.3398 - acc: 0.8859 - val_loss: 0.3759 - val_acc: 0.8564
Epoch 17/30
  - 1s - loss: 0.3323 - acc: 0.8837 - val_loss: 0.3774 - val_acc: 0.8571
Epoch 18/30
  - 1s - loss: 0.3395 - acc: 0.8881 - val_loss: 0.4366 - val_acc: 0.8788
Epoch 19/30

```

```

- 1s - loss: 0.3297 - acc: 0.8881 - val_loss: 0.3423 - val_acc: 0.8731
Epoch 20/30
- 1s - loss: 0.3192 - acc: 0.8950 - val_loss: 0.4801 - val_acc: 0.8628
Epoch 21/30
- 1s - loss: 0.3312 - acc: 0.8903 - val_loss: 0.3461 - val_acc: 0.8718
Epoch 22/30
- 1s - loss: 0.3317 - acc: 0.8894 - val_loss: 0.6345 - val_acc: 0.7679
Epoch 23/30
- 1s - loss: 0.3268 - acc: 0.8844 - val_loss: 0.3805 - val_acc: 0.8679
Epoch 24/30
- 1s - loss: 0.3278 - acc: 0.8842 - val_loss: 0.3678 - val_acc: 0.8692
Epoch 25/30
- 1s - loss: 0.3247 - acc: 0.8894 - val_loss: 0.3472 - val_acc: 0.8917
Epoch 26/30
- 1s - loss: 0.3283 - acc: 0.8866 - val_loss: 0.4050 - val_acc: 0.8635
Epoch 27/30
- 1s - loss: 0.3279 - acc: 0.8876 - val_loss: 0.4146 - val_acc: 0.8571
Epoch 28/30
- 1s - loss: 0.3265 - acc: 0.8950 - val_loss: 0.3907 - val_acc: 0.8667
Epoch 29/30
- 1s - loss: 0.3308 - acc: 0.8898 - val_loss: 0.3676 - val_acc: 0.8673
Epoch 30/30
- 1s - loss: 0.3212 - acc: 0.8886 - val_loss: 0.3432 - val_acc: 0.8936
Train accuracy 0.9139414802065404 Test accuracy: 0.8935897435897436

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 28)	1288
conv1d_2 (Conv1D)	(None, 122, 16)	1360
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 64)	41024
dense_2 (Dense)	(None, 3)	195

---

```

Total params: 43,867
Trainable params: 43,867
Non-trainable params: 0

```

```

None
Train on 4067 samples, validate on 1560 samples

```



Epoch 1/25  
- 1s - loss: 33.2705 - acc: 0.7974 - val\_loss: 12.1803 - val\_acc: 0.8590  
Epoch 2/25  
- 1s - loss: 5.0652 - acc: 0.8793 - val\_loss: 1.4917 - val\_acc: 0.8128  
Epoch 3/25  
- 1s - loss: 0.6818 - acc: 0.8825 - val\_loss: 0.5389 - val\_acc: 0.8462  
Epoch 4/25  
- 1s - loss: 0.3529 - acc: 0.8896 - val\_loss: 0.4971 - val\_acc: 0.8077  
Epoch 5/25  
- 1s - loss: 0.3317 - acc: 0.8918 - val\_loss: 0.3877 - val\_acc: 0.8763  
Epoch 6/25  
- 1s - loss: 0.3198 - acc: 0.8886 - val\_loss: 0.4281 - val\_acc: 0.8506  
Epoch 7/25  
- 1s - loss: 0.3285 - acc: 0.8896 - val\_loss: 0.4177 - val\_acc: 0.8667  
Epoch 8/25  
- 1s - loss: 0.3054 - acc: 0.8906 - val\_loss: 0.4108 - val\_acc: 0.8385  
Epoch 9/25  
- 1s - loss: 0.2990 - acc: 0.8960 - val\_loss: 0.3754 - val\_acc: 0.8827  
Epoch 10/25  
- 1s - loss: 0.3081 - acc: 0.8930 - val\_loss: 0.3719 - val\_acc: 0.8833  
Epoch 11/25  
- 1s - loss: 0.2974 - acc: 0.8955 - val\_loss: 0.4289 - val\_acc: 0.8205  
Epoch 12/25  
- 1s - loss: 0.2921 - acc: 0.9009 - val\_loss: 0.3557 - val\_acc: 0.8763  
Epoch 13/25  
- 1s - loss: 0.2827 - acc: 0.9012 - val\_loss: 0.3412 - val\_acc: 0.8808  
Epoch 14/25  
- 1s - loss: 0.2838 - acc: 0.9044 - val\_loss: 0.4762 - val\_acc: 0.7955  
Epoch 15/25  
- 1s - loss: 0.2838 - acc: 0.8965 - val\_loss: 0.5708 - val\_acc: 0.7571  
Epoch 16/25  
- 1s - loss: 0.2873 - acc: 0.8965 - val\_loss: 0.3468 - val\_acc: 0.8795  
Epoch 17/25  
- 1s - loss: 0.2911 - acc: 0.8960 - val\_loss: 0.3393 - val\_acc: 0.8795  
Epoch 18/25  
- 1s - loss: 0.2837 - acc: 0.8977 - val\_loss: 0.3542 - val\_acc: 0.8801  
Epoch 19/25  
- 1s - loss: 0.2956 - acc: 0.8916 - val\_loss: 0.3606 - val\_acc: 0.8769  
Epoch 20/25  
- 1s - loss: 0.2811 - acc: 0.8957 - val\_loss: 0.3535 - val\_acc: 0.8782  
Epoch 21/25  
- 1s - loss: 0.2731 - acc: 0.8997 - val\_loss: 0.3358 - val\_acc: 0.8737  
Epoch 22/25  
- 1s - loss: 0.2790 - acc: 0.8957 - val\_loss: 0.3541 - val\_acc: 0.8776  
Epoch 23/25  
- 1s - loss: 0.2892 - acc: 0.8901 - val\_loss: 0.3543 - val\_acc: 0.8821  
Epoch 24/25  
- 1s - loss: 0.2771 - acc: 0.8992 - val\_loss: 0.3703 - val\_acc: 0.8673

Epoch 25/25

- 1s - loss: 0.2779 - acc: 0.8967 - val\_loss: 0.3714 - val\_acc: 0.8628

Train accuracy 0.8832062945660192 Test accuracy: 0.8628205128205129

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 120, 32)	3104
-----		
dropout_1 (Dropout)	(None, 120, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 60, 32)	0
-----		
flatten_1 (Flatten)	(None, 1920)	0
-----		
dense_1 (Dense)	(None, 64)	122944
-----		
dense_2 (Dense)	(None, 3)	195
=====		

Total params: 128,291

Trainable params: 128,291

Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 90.0975 - acc: 0.8355 - val\_loss: 23.5573 - val\_acc: 0.8603

Epoch 2/30

- 1s - loss: 8.8094 - acc: 0.8911 - val\_loss: 1.9796 - val\_acc: 0.8609

Epoch 3/30

- 1s - loss: 0.8302 - acc: 0.8923 - val\_loss: 0.5005 - val\_acc: 0.8468

Epoch 4/30

- 1s - loss: 0.4098 - acc: 0.8788 - val\_loss: 0.4449 - val\_acc: 0.8333

Epoch 5/30

- 1s - loss: 0.3493 - acc: 0.8864 - val\_loss: 0.4343 - val\_acc: 0.8494

Epoch 6/30

- 1s - loss: 0.3832 - acc: 0.8935 - val\_loss: 0.4320 - val\_acc: 0.8603

Epoch 7/30

- 1s - loss: 0.3752 - acc: 0.8793 - val\_loss: 0.4176 - val\_acc: 0.8564

Epoch 8/30

- 1s - loss: 0.3403 - acc: 0.8955 - val\_loss: 0.3886 - val\_acc: 0.8667

Epoch 9/30

- 1s - loss: 0.3284 - acc: 0.8945 - val\_loss: 0.3734 - val\_acc: 0.8641

Epoch 10/30

- 1s - loss: 0.3296 - acc: 0.8896 - val\_loss: 0.4065 - val\_acc: 0.8667

Epoch 11/30

```

- 1s - loss: 0.3273 - acc: 0.8935 - val_loss: 0.4311 - val_acc: 0.8571
Epoch 12/30
- 1s - loss: 0.3240 - acc: 0.8948 - val_loss: 0.3919 - val_acc: 0.8474
Epoch 13/30
- 1s - loss: 0.2969 - acc: 0.8989 - val_loss: 0.3708 - val_acc: 0.8564
Epoch 14/30
- 1s - loss: 0.3534 - acc: 0.8835 - val_loss: 0.3888 - val_acc: 0.8635
Epoch 15/30
- 1s - loss: 0.3460 - acc: 0.8894 - val_loss: 0.4001 - val_acc: 0.8647
Epoch 16/30
- 1s - loss: 0.3070 - acc: 0.9007 - val_loss: 0.4308 - val_acc: 0.8321
Epoch 17/30
- 1s - loss: 0.3420 - acc: 0.8835 - val_loss: 0.3741 - val_acc: 0.8750
Epoch 18/30
- 1s - loss: 0.3291 - acc: 0.8918 - val_loss: 0.3947 - val_acc: 0.8615
Epoch 19/30
- 1s - loss: 0.3289 - acc: 0.8857 - val_loss: 0.3952 - val_acc: 0.8526
Epoch 20/30
- 1s - loss: 0.3020 - acc: 0.8972 - val_loss: 0.3552 - val_acc: 0.8699
Epoch 21/30
- 1s - loss: 0.3239 - acc: 0.8923 - val_loss: 0.4341 - val_acc: 0.8417
Epoch 22/30
- 1s - loss: 0.3039 - acc: 0.8925 - val_loss: 0.3898 - val_acc: 0.8513
Epoch 23/30
- 1s - loss: 0.3172 - acc: 0.8923 - val_loss: 0.4819 - val_acc: 0.8410
Epoch 24/30
- 1s - loss: 0.3177 - acc: 0.8948 - val_loss: 0.3974 - val_acc: 0.8737
Epoch 25/30
- 1s - loss: 0.3137 - acc: 0.8903 - val_loss: 0.3987 - val_acc: 0.8474
Epoch 26/30
- 1s - loss: 0.3039 - acc: 0.8938 - val_loss: 0.3561 - val_acc: 0.8776
Epoch 27/30
- 1s - loss: 0.2983 - acc: 0.9014 - val_loss: 0.4686 - val_acc: 0.7994
Epoch 28/30
- 1s - loss: 0.3433 - acc: 0.8827 - val_loss: 0.3499 - val_acc: 0.8705
Epoch 29/30
- 1s - loss: 0.3178 - acc: 0.8933 - val_loss: 0.3678 - val_acc: 0.8647
Epoch 30/30
- 1s - loss: 0.3036 - acc: 0.8933 - val_loss: 0.3582 - val_acc: 0.8737
Train accuracy 0.9124661912957954 Test accuracy: 0.8737179487179487

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 16)	3600

dropout_1 (Dropout)	(None, 118, 16)	0
-----		
max_pooling1d_1 (MaxPooling1d)	(None, 59, 16)	0
-----		
flatten_1 (Flatten)	(None, 944)	0
-----		
dense_1 (Dense)	(None, 64)	60480
-----		
dense_2 (Dense)	(None, 3)	195
=====		
Total params: 65,747		
Trainable params: 65,747		
Non-trainable params: 0		
-----		
None		
Train on 4067 samples, validate on 1560 samples		
Epoch 1/30		
- 2s - loss: 18.1434 - acc: 0.8119 - val_loss: 8.6618 - val_acc: 0.8744		
Epoch 2/30		
- 1s - loss: 4.9041 - acc: 0.8807 - val_loss: 2.4457 - val_acc: 0.8577		
Epoch 3/30		
- 1s - loss: 1.3496 - acc: 0.8967 - val_loss: 0.8461 - val_acc: 0.8372		
Epoch 4/30		
- 1s - loss: 0.5045 - acc: 0.8992 - val_loss: 0.5524 - val_acc: 0.8506		
Epoch 5/30		
- 1s - loss: 0.3551 - acc: 0.8992 - val_loss: 0.4740 - val_acc: 0.8647		
Epoch 6/30		
- 1s - loss: 0.3193 - acc: 0.9014 - val_loss: 0.3663 - val_acc: 0.8673		
Epoch 7/30		
- 1s - loss: 0.2957 - acc: 0.9056 - val_loss: 0.4867 - val_acc: 0.8506		
Epoch 8/30		
- 1s - loss: 0.2849 - acc: 0.9051 - val_loss: 0.3736 - val_acc: 0.8699		
Epoch 9/30		
- 1s - loss: 0.2832 - acc: 0.9093 - val_loss: 0.3395 - val_acc: 0.8827		
Epoch 10/30		
- 1s - loss: 0.2729 - acc: 0.9085 - val_loss: 0.3163 - val_acc: 0.8891		
Epoch 11/30		
- 1s - loss: 0.2728 - acc: 0.9093 - val_loss: 0.3269 - val_acc: 0.8763		
Epoch 12/30		
- 1s - loss: 0.2705 - acc: 0.9100 - val_loss: 0.3494 - val_acc: 0.8814		
Epoch 13/30		
- 1s - loss: 0.2645 - acc: 0.9115 - val_loss: 0.3246 - val_acc: 0.8917		
Epoch 14/30		
- 1s - loss: 0.2654 - acc: 0.9125 - val_loss: 0.3072 - val_acc: 0.9051		
Epoch 15/30		
- 1s - loss: 0.2573 - acc: 0.9147 - val_loss: 0.3889 - val_acc: 0.8692		
Epoch 16/30		
- 1s - loss: 0.2805 - acc: 0.9090 - val_loss: 0.3220 - val_acc: 0.8833		

```

Epoch 17/30
  - 1s - loss: 0.2549 - acc: 0.9171 - val_loss: 0.3410 - val_acc: 0.8795
Epoch 18/30
  - 1s - loss: 0.2505 - acc: 0.9179 - val_loss: 0.3143 - val_acc: 0.8859
Epoch 19/30
  - 1s - loss: 0.2582 - acc: 0.9125 - val_loss: 0.3037 - val_acc: 0.8987
Epoch 20/30
  - 1s - loss: 0.2544 - acc: 0.9191 - val_loss: 0.4293 - val_acc: 0.8526
Epoch 21/30
  - 1s - loss: 0.2462 - acc: 0.9216 - val_loss: 0.3287 - val_acc: 0.8821
Epoch 22/30
  - 1s - loss: 0.2444 - acc: 0.9191 - val_loss: 0.3099 - val_acc: 0.8910
Epoch 23/30
  - 1s - loss: 0.2511 - acc: 0.9162 - val_loss: 0.3915 - val_acc: 0.8859
Epoch 24/30
  - 1s - loss: 0.2477 - acc: 0.9174 - val_loss: 0.5104 - val_acc: 0.8853
Epoch 25/30
  - 1s - loss: 0.2473 - acc: 0.9115 - val_loss: 0.4070 - val_acc: 0.8526
Epoch 26/30
  - 1s - loss: 0.2388 - acc: 0.9201 - val_loss: 0.3328 - val_acc: 0.8981
Epoch 27/30
  - 1s - loss: 0.2346 - acc: 0.9201 - val_loss: 0.2771 - val_acc: 0.9026
Epoch 28/30
  - 1s - loss: 0.2436 - acc: 0.9171 - val_loss: 0.2813 - val_acc: 0.9090
Epoch 29/30
  - 1s - loss: 0.2453 - acc: 0.9198 - val_loss: 0.2906 - val_acc: 0.9058
Epoch 30/30
  - 1s - loss: 0.2409 - acc: 0.9201 - val_loss: 0.3293 - val_acc: 0.8904
Train accuracy 0.9107450208999263 Test accuracy: 0.8903846153846153

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 118, 16)	2576
-----		
dropout_1 (Dropout)	(None, 118, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 16)	0
-----		
flatten_1 (Flatten)	(None, 368)	0
-----		
dense_1 (Dense)	(None, 32)	11808
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 16,531

Trainable params: 16,531

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35

- 2s - loss: 3.2372 - acc: 0.8680 - val\_loss: 0.6381 - val\_acc: 0.8487

Epoch 2/35

- 1s - loss: 0.4385 - acc: 0.9026 - val\_loss: 0.4342 - val\_acc: 0.8673

Epoch 3/35

- 1s - loss: 0.3415 - acc: 0.9139 - val\_loss: 0.4073 - val\_acc: 0.8571

Epoch 4/35

- 1s - loss: 0.2965 - acc: 0.9179 - val\_loss: 0.3458 - val\_acc: 0.8756

Epoch 5/35

- 1s - loss: 0.2820 - acc: 0.9221 - val\_loss: 0.3548 - val\_acc: 0.8859

Epoch 6/35

- 1s - loss: 0.2681 - acc: 0.9248 - val\_loss: 0.3409 - val\_acc: 0.8744

Epoch 7/35

- 1s - loss: 0.2693 - acc: 0.9201 - val\_loss: 0.3495 - val\_acc: 0.8699

Epoch 8/35

- 1s - loss: 0.2612 - acc: 0.9225 - val\_loss: 0.3711 - val\_acc: 0.8596

Epoch 9/35

- 1s - loss: 0.2492 - acc: 0.9267 - val\_loss: 0.5601 - val\_acc: 0.8532

Epoch 10/35

- 1s - loss: 0.2572 - acc: 0.9243 - val\_loss: 0.3517 - val\_acc: 0.9141

Epoch 11/35

- 1s - loss: 0.2547 - acc: 0.9270 - val\_loss: 0.2823 - val\_acc: 0.9032

Epoch 12/35

- 1s - loss: 0.2501 - acc: 0.9275 - val\_loss: 0.2962 - val\_acc: 0.8942

Epoch 13/35

- 1s - loss: 0.2548 - acc: 0.9292 - val\_loss: 0.3525 - val\_acc: 0.8667

Epoch 14/35

- 1s - loss: 0.2487 - acc: 0.9260 - val\_loss: 0.2849 - val\_acc: 0.9154

Epoch 15/35

- 1s - loss: 0.2425 - acc: 0.9309 - val\_loss: 0.3074 - val\_acc: 0.8910

Epoch 16/35

- 1s - loss: 0.2340 - acc: 0.9316 - val\_loss: 0.3178 - val\_acc: 0.8782

Epoch 17/35

- 1s - loss: 0.2335 - acc: 0.9250 - val\_loss: 0.3796 - val\_acc: 0.8756

Epoch 18/35

- 1s - loss: 0.2387 - acc: 0.9316 - val\_loss: 0.3524 - val\_acc: 0.9045

Epoch 19/35

- 1s - loss: 0.2281 - acc: 0.9302 - val\_loss: 0.3054 - val\_acc: 0.8827

Epoch 20/35

- 1s - loss: 0.2410 - acc: 0.9297 - val\_loss: 0.2861 - val\_acc: 0.9000

Epoch 21/35

- 1s - loss: 0.2209 - acc: 0.9316 - val\_loss: 0.3443 - val\_acc: 0.8769

Epoch 22/35

```

- 1s - loss: 0.2300 - acc: 0.9272 - val_loss: 0.3458 - val_acc: 0.9038
Epoch 23/35
- 1s - loss: 0.2289 - acc: 0.9304 - val_loss: 0.3074 - val_acc: 0.8878
Epoch 24/35
- 1s - loss: 0.2241 - acc: 0.9307 - val_loss: 0.2982 - val_acc: 0.8865
Epoch 25/35
- 1s - loss: 0.2355 - acc: 0.9302 - val_loss: 0.3159 - val_acc: 0.8788
Epoch 26/35
- 1s - loss: 0.2224 - acc: 0.9304 - val_loss: 0.3181 - val_acc: 0.8917
Epoch 27/35
- 1s - loss: 0.2284 - acc: 0.9312 - val_loss: 0.3136 - val_acc: 0.8897
Epoch 28/35
- 1s - loss: 0.2359 - acc: 0.9343 - val_loss: 0.2672 - val_acc: 0.9160
Epoch 29/35
- 1s - loss: 0.2347 - acc: 0.9309 - val_loss: 0.3882 - val_acc: 0.8801
Epoch 30/35
- 1s - loss: 0.2185 - acc: 0.9375 - val_loss: 0.3052 - val_acc: 0.8859
Epoch 31/35
- 1s - loss: 0.2284 - acc: 0.9361 - val_loss: 0.3024 - val_acc: 0.8782
Epoch 32/35
- 1s - loss: 0.2392 - acc: 0.9339 - val_loss: 0.3697 - val_acc: 0.8635
Epoch 33/35
- 1s - loss: 0.2367 - acc: 0.9331 - val_loss: 0.2681 - val_acc: 0.9058
Epoch 34/35
- 1s - loss: 0.2201 - acc: 0.9351 - val_loss: 0.2848 - val_acc: 0.9051
Epoch 35/35
- 1s - loss: 0.2351 - acc: 0.9292 - val_loss: 0.2971 - val_acc: 0.8949
Train accuracy 0.9424637324809442 Test accuracy: 0.8948717948717949

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 126, 42)	1176
-----		
conv1d_2 (Conv1D)	(None, 124, 16)	2032
-----		
dropout_1 (Dropout)	(None, 124, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 62, 16)	0
-----		
flatten_1 (Flatten)	(None, 992)	0
-----		
dense_1 (Dense)	(None, 16)	15888
-----		
dense_2 (Dense)	(None, 3)	51
=====		

```

Total params: 19,147
Trainable params: 19,147

```

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 20.2201 - acc: 0.8065 - val\_loss: 1.4877 - val\_acc: 0.7647

Epoch 2/30

- 1s - loss: 0.5541 - acc: 0.8586 - val\_loss: 0.4453 - val\_acc: 0.8622

Epoch 3/30

- 1s - loss: 0.3970 - acc: 0.8714 - val\_loss: 0.4273 - val\_acc: 0.8519

Epoch 4/30

- 1s - loss: 0.3771 - acc: 0.8773 - val\_loss: 0.3933 - val\_acc: 0.8660

Epoch 5/30

- 1s - loss: 0.3765 - acc: 0.8753 - val\_loss: 0.4360 - val\_acc: 0.8506

Epoch 6/30

- 1s - loss: 0.3606 - acc: 0.8832 - val\_loss: 0.4841 - val\_acc: 0.8038

Epoch 7/30

- 1s - loss: 0.3486 - acc: 0.8817 - val\_loss: 0.3848 - val\_acc: 0.8647

Epoch 8/30

- 1s - loss: 0.3425 - acc: 0.8756 - val\_loss: 0.4604 - val\_acc: 0.8128

Epoch 9/30

- 1s - loss: 0.3269 - acc: 0.8906 - val\_loss: 0.3677 - val\_acc: 0.8705

Epoch 10/30

- 1s - loss: 0.3318 - acc: 0.8903 - val\_loss: 0.3585 - val\_acc: 0.8737

Epoch 11/30

- 1s - loss: 0.3270 - acc: 0.8916 - val\_loss: 0.7221 - val\_acc: 0.6891

Epoch 12/30

- 1s - loss: 0.3293 - acc: 0.8876 - val\_loss: 0.4747 - val\_acc: 0.8019

Epoch 13/30

- 1s - loss: 0.3325 - acc: 0.8842 - val\_loss: 0.4376 - val\_acc: 0.8135

Epoch 14/30

- 1s - loss: 0.3230 - acc: 0.8881 - val\_loss: 0.5703 - val\_acc: 0.7115

Epoch 15/30

- 1s - loss: 0.3203 - acc: 0.8884 - val\_loss: 0.3408 - val\_acc: 0.8801

Epoch 16/30

- 1s - loss: 0.3261 - acc: 0.8889 - val\_loss: 0.3621 - val\_acc: 0.8705

Epoch 17/30

- 1s - loss: 0.3276 - acc: 0.8847 - val\_loss: 0.3722 - val\_acc: 0.8564

Epoch 18/30

- 1s - loss: 0.3159 - acc: 0.8921 - val\_loss: 0.3758 - val\_acc: 0.8821

Epoch 19/30

- 1s - loss: 0.3255 - acc: 0.8842 - val\_loss: 0.3529 - val\_acc: 0.8692

Epoch 20/30

- 1s - loss: 0.3182 - acc: 0.8906 - val\_loss: 0.3491 - val\_acc: 0.8705

Epoch 21/30

- 1s - loss: 0.3076 - acc: 0.8930 - val\_loss: 0.3520 - val\_acc: 0.8686

Epoch 22/30

- 1s - loss: 0.3273 - acc: 0.8852 - val\_loss: 0.3623 - val\_acc: 0.8769



Epoch 23/30  
 - 1s - loss: 0.3209 - acc: 0.8881 - val\_loss: 0.3420 - val\_acc: 0.8756  
 Epoch 24/30  
 - 1s - loss: 0.3163 - acc: 0.8866 - val\_loss: 0.3409 - val\_acc: 0.8737  
 Epoch 25/30  
 - 1s - loss: 0.3082 - acc: 0.8874 - val\_loss: 0.3623 - val\_acc: 0.8782  
 Epoch 26/30  
 - 1s - loss: 0.3168 - acc: 0.8898 - val\_loss: 0.3477 - val\_acc: 0.8737  
 Epoch 27/30  
 - 1s - loss: 0.3139 - acc: 0.8921 - val\_loss: 0.3931 - val\_acc: 0.8462  
 Epoch 28/30  
 - 1s - loss: 0.3081 - acc: 0.8898 - val\_loss: 0.3985 - val\_acc: 0.8577  
 Epoch 29/30  
 - 1s - loss: 0.3271 - acc: 0.8908 - val\_loss: 0.3386 - val\_acc: 0.8788  
 Epoch 30/30  
 - 1s - loss: 0.3143 - acc: 0.8889 - val\_loss: 0.3575 - val\_acc: 0.8596  
 Train accuracy 0.9043521022866978 Test accuracy: 0.8596153846153847

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 28)	1288
conv1d_2 (Conv1D)	(None, 122, 24)	2040
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

Total params: 65,027  
 Trainable params: 65,027  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/25  
 - 2s - loss: 9.3331 - acc: 0.8392 - val\_loss: 5.6871 - val\_acc: 0.8891  
 Epoch 2/25  
 - 1s - loss: 3.6758 - acc: 0.9085 - val\_loss: 2.3434 - val\_acc: 0.8718  
 Epoch 3/25  
 - 1s - loss: 1.4613 - acc: 0.9208 - val\_loss: 1.0490 - val\_acc: 0.8686  
 Epoch 4/25

```

- 1s - loss: 0.6616 - acc: 0.9206 - val_loss: 0.5950 - val_acc: 0.8776
Epoch 5/25
- 1s - loss: 0.4184 - acc: 0.9147 - val_loss: 0.4581 - val_acc: 0.8885
Epoch 6/25
- 1s - loss: 0.3007 - acc: 0.9243 - val_loss: 0.3845 - val_acc: 0.8788
Epoch 7/25
- 1s - loss: 0.2837 - acc: 0.9174 - val_loss: 0.3999 - val_acc: 0.8724
Epoch 8/25
- 1s - loss: 0.2571 - acc: 0.9198 - val_loss: 0.3870 - val_acc: 0.8692
Epoch 9/25
- 1s - loss: 0.2352 - acc: 0.9253 - val_loss: 0.3498 - val_acc: 0.8686
Epoch 10/25
- 1s - loss: 0.2380 - acc: 0.9243 - val_loss: 0.3202 - val_acc: 0.8974
Epoch 11/25
- 1s - loss: 0.2289 - acc: 0.9284 - val_loss: 0.3308 - val_acc: 0.8840
Epoch 12/25
- 1s - loss: 0.2397 - acc: 0.9265 - val_loss: 0.3053 - val_acc: 0.9192
Epoch 13/25
- 1s - loss: 0.2167 - acc: 0.9351 - val_loss: 0.3218 - val_acc: 0.8744
Epoch 14/25
- 1s - loss: 0.2065 - acc: 0.9314 - val_loss: 0.3005 - val_acc: 0.8968
Epoch 15/25
- 1s - loss: 0.2181 - acc: 0.9366 - val_loss: 0.3440 - val_acc: 0.8859
Epoch 16/25
- 1s - loss: 0.2228 - acc: 0.9292 - val_loss: 0.3352 - val_acc: 0.8647
Epoch 17/25
- 1s - loss: 0.2239 - acc: 0.9324 - val_loss: 0.3329 - val_acc: 0.8705
Epoch 18/25
- 1s - loss: 0.2279 - acc: 0.9287 - val_loss: 0.3091 - val_acc: 0.8801
Epoch 19/25
- 1s - loss: 0.2103 - acc: 0.9361 - val_loss: 0.3468 - val_acc: 0.8962
Epoch 20/25
- 1s - loss: 0.1990 - acc: 0.9430 - val_loss: 0.2612 - val_acc: 0.9051
Epoch 21/25
- 1s - loss: 0.1951 - acc: 0.9403 - val_loss: 0.3262 - val_acc: 0.8744
Epoch 22/25
- 1s - loss: 0.2017 - acc: 0.9375 - val_loss: 0.2661 - val_acc: 0.9333
Epoch 23/25
- 1s - loss: 0.2012 - acc: 0.9385 - val_loss: 0.2729 - val_acc: 0.8929
Epoch 24/25
- 1s - loss: 0.1829 - acc: 0.9452 - val_loss: 0.2629 - val_acc: 0.9199
Epoch 25/25
- 1s - loss: 0.1836 - acc: 0.9474 - val_loss: 0.2462 - val_acc: 0.9115
Train accuracy 0.9404966805999508 Test accuracy: 0.9115384615384615

```

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-----
Layer (type)                Output Shape                Param #
=====

```

conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 120, 16)	1552
-----		
dropout_1 (Dropout)	(None, 120, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
-----		
flatten_1 (Flatten)	(None, 960)	0
-----		
dense_1 (Dense)	(None, 64)	61504
-----		
dense_2 (Dense)	(None, 3)	195
=====		
Total params: 65,299		
Trainable params: 65,299		
Non-trainable params: 0		
-----		
None		
Train on 4067 samples, validate on 1560 samples		
Epoch 1/30		
- 2s - loss: 21.8776 - acc: 0.8112 - val_loss: 8.2071 - val_acc: 0.8500		
Epoch 2/30		
- 1s - loss: 3.4085 - acc: 0.8805 - val_loss: 0.9762 - val_acc: 0.8564		
Epoch 3/30		
- 1s - loss: 0.5240 - acc: 0.8903 - val_loss: 0.5322 - val_acc: 0.8019		
Epoch 4/30		
- 1s - loss: 0.3385 - acc: 0.8989 - val_loss: 0.4410 - val_acc: 0.8263		
Epoch 5/30		
- 1s - loss: 0.3149 - acc: 0.8940 - val_loss: 0.3724 - val_acc: 0.8590		
Epoch 6/30		
- 1s - loss: 0.2972 - acc: 0.8950 - val_loss: 0.3832 - val_acc: 0.8679		
Epoch 7/30		
- 1s - loss: 0.2956 - acc: 0.8970 - val_loss: 0.3426 - val_acc: 0.8865		
Epoch 8/30		
- 1s - loss: 0.2835 - acc: 0.9009 - val_loss: 0.3881 - val_acc: 0.8474		
Epoch 9/30		
- 1s - loss: 0.2807 - acc: 0.9053 - val_loss: 0.3293 - val_acc: 0.8814		
Epoch 10/30		
- 1s - loss: 0.2849 - acc: 0.8992 - val_loss: 0.3450 - val_acc: 0.8821		
Epoch 11/30		
- 1s - loss: 0.2707 - acc: 0.9075 - val_loss: 0.4416 - val_acc: 0.7808		
Epoch 12/30		
- 1s - loss: 0.2763 - acc: 0.9012 - val_loss: 0.3242 - val_acc: 0.8808		
Epoch 13/30		
- 1s - loss: 0.2759 - acc: 0.9068 - val_loss: 0.3264 - val_acc: 0.8827		
Epoch 14/30		
- 1s - loss: 0.2728 - acc: 0.9100 - val_loss: 0.3511 - val_acc: 0.8865		

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Epoch 15/30
- 1s - loss: 0.2806 - acc: 0.9056 - val_loss: 0.4642 - val_acc: 0.8154
Epoch 16/30
- 1s - loss: 0.2702 - acc: 0.9053 - val_loss: 0.3177 - val_acc: 0.8840
Epoch 17/30
- 1s - loss: 0.2736 - acc: 0.9100 - val_loss: 0.3511 - val_acc: 0.8558
Epoch 18/30
- 1s - loss: 0.2731 - acc: 0.9075 - val_loss: 0.3407 - val_acc: 0.8705
Epoch 19/30
- 1s - loss: 0.2679 - acc: 0.9071 - val_loss: 0.3205 - val_acc: 0.8859
Epoch 20/30
- 1s - loss: 0.2683 - acc: 0.9039 - val_loss: 0.5070 - val_acc: 0.8026
Epoch 21/30
- 1s - loss: 0.2648 - acc: 0.9083 - val_loss: 0.4056 - val_acc: 0.8615
Epoch 22/30
- 1s - loss: 0.2634 - acc: 0.9056 - val_loss: 0.3406 - val_acc: 0.8814
Epoch 23/30
- 1s - loss: 0.2715 - acc: 0.9056 - val_loss: 0.3219 - val_acc: 0.8878
Epoch 24/30
- 1s - loss: 0.2587 - acc: 0.9112 - val_loss: 0.3448 - val_acc: 0.8660
Epoch 25/30
- 1s - loss: 0.2714 - acc: 0.9051 - val_loss: 0.3747 - val_acc: 0.8705
Epoch 26/30
- 1s - loss: 0.2551 - acc: 0.9144 - val_loss: 0.3406 - val_acc: 0.8776
Epoch 27/30
- 1s - loss: 0.2496 - acc: 0.9142 - val_loss: 0.3354 - val_acc: 0.8737
Epoch 28/30
- 1s - loss: 0.2747 - acc: 0.9093 - val_loss: 0.3392 - val_acc: 0.8846
Epoch 29/30
- 1s - loss: 0.2700 - acc: 0.9112 - val_loss: 0.3204 - val_acc: 0.8878
Epoch 30/30
- 1s - loss: 0.2586 - acc: 0.9115 - val_loss: 0.3036 - val_acc: 0.8962
Train accuracy 0.9232849766412589 Test accuracy: 0.8961538461538462

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 32)	7200
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 32)	0
flatten_1 (Flatten)	(None, 1888)	0
dense_1 (Dense)	(None, 64)	120896

```

-----
dense_2 (Dense)                (None, 3)                195
=====
Total params: 129,763
Trainable params: 129,763
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 134.1267 - acc: 0.8281 - val_loss: 84.5430 - val_acc: 0.8545
Epoch 2/30
  - 1s - loss: 56.5396 - acc: 0.8815 - val_loss: 34.2276 - val_acc: 0.8417
Epoch 3/30
  - 1s - loss: 21.5489 - acc: 0.8803 - val_loss: 11.6331 - val_acc: 0.8013
Epoch 4/30
  - 1s - loss: 6.2812 - acc: 0.8894 - val_loss: 2.6907 - val_acc: 0.8058
Epoch 5/30
  - 1s - loss: 1.1943 - acc: 0.8832 - val_loss: 0.6548 - val_acc: 0.8462
Epoch 6/30
  - 1s - loss: 0.3943 - acc: 0.8891 - val_loss: 0.4627 - val_acc: 0.8564
Epoch 7/30
  - 1s - loss: 0.3490 - acc: 0.8943 - val_loss: 0.4004 - val_acc: 0.8686
Epoch 8/30
  - 1s - loss: 0.3179 - acc: 0.8970 - val_loss: 0.4132 - val_acc: 0.8436
Epoch 9/30
  - 1s - loss: 0.3129 - acc: 0.8975 - val_loss: 0.3891 - val_acc: 0.8558
Epoch 10/30
  - 1s - loss: 0.3065 - acc: 0.8965 - val_loss: 0.4127 - val_acc: 0.8628
Epoch 11/30
  - 1s - loss: 0.2999 - acc: 0.8940 - val_loss: 0.3695 - val_acc: 0.8724
Epoch 12/30
  - 1s - loss: 0.2955 - acc: 0.8960 - val_loss: 0.3490 - val_acc: 0.8776
Epoch 13/30
  - 1s - loss: 0.2979 - acc: 0.8989 - val_loss: 0.3483 - val_acc: 0.8827
Epoch 14/30
  - 1s - loss: 0.2807 - acc: 0.9004 - val_loss: 0.4537 - val_acc: 0.8455
Epoch 15/30
  - 1s - loss: 0.2865 - acc: 0.8965 - val_loss: 0.3693 - val_acc: 0.8641
Epoch 16/30
  - 1s - loss: 0.2869 - acc: 0.8965 - val_loss: 0.3556 - val_acc: 0.8737
Epoch 17/30
  - 1s - loss: 0.2853 - acc: 0.9009 - val_loss: 0.3493 - val_acc: 0.8705
Epoch 18/30
  - 1s - loss: 0.2905 - acc: 0.8985 - val_loss: 0.3616 - val_acc: 0.8596
Epoch 19/30
  - 1s - loss: 0.2838 - acc: 0.8997 - val_loss: 0.3369 - val_acc: 0.8801
Epoch 20/30

```

```

- 1s - loss: 0.2771 - acc: 0.9004 - val_loss: 0.6362 - val_acc: 0.7288
Epoch 21/30
- 1s - loss: 0.2821 - acc: 0.9004 - val_loss: 0.3572 - val_acc: 0.8628
Epoch 22/30
- 1s - loss: 0.2849 - acc: 0.8933 - val_loss: 0.3309 - val_acc: 0.8846
Epoch 23/30
- 1s - loss: 0.2787 - acc: 0.8967 - val_loss: 0.3393 - val_acc: 0.8744
Epoch 24/30
- 1s - loss: 0.2759 - acc: 0.8977 - val_loss: 0.3373 - val_acc: 0.8731
Epoch 25/30
- 1s - loss: 0.2814 - acc: 0.8967 - val_loss: 0.3650 - val_acc: 0.8564
Epoch 26/30
- 1s - loss: 0.2789 - acc: 0.8977 - val_loss: 0.3347 - val_acc: 0.8763
Epoch 27/30
- 1s - loss: 0.2713 - acc: 0.8970 - val_loss: 0.3421 - val_acc: 0.8712
Epoch 28/30
- 1s - loss: 0.2835 - acc: 0.8945 - val_loss: 0.3459 - val_acc: 0.8801
Epoch 29/30
- 1s - loss: 0.2877 - acc: 0.8967 - val_loss: 0.3558 - val_acc: 0.8718
Epoch 30/30
- 1s - loss: 0.2792 - acc: 0.8992 - val_loss: 0.3323 - val_acc: 0.8801
Train accuracy 0.9230390951561347 Test accuracy: 0.8801282051282051
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 32)	12320
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 16,019
Trainable params: 16,019
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 14.7731 - acc: 0.8279 - val_loss: 0.5994 - val_acc: 0.7821

```

Epoch 2/30  
- 1s - loss: 0.3990 - acc: 0.8719 - val\_loss: 0.4631 - val\_acc: 0.8551  
Epoch 3/30  
- 1s - loss: 0.3678 - acc: 0.8790 - val\_loss: 0.4502 - val\_acc: 0.8397  
Epoch 4/30  
- 1s - loss: 0.3464 - acc: 0.8839 - val\_loss: 0.4166 - val\_acc: 0.8737  
Epoch 5/30  
- 1s - loss: 0.3418 - acc: 0.8837 - val\_loss: 0.3935 - val\_acc: 0.8763  
Epoch 6/30  
- 1s - loss: 0.3357 - acc: 0.8842 - val\_loss: 0.4331 - val\_acc: 0.8340  
Epoch 7/30  
- 1s - loss: 0.3332 - acc: 0.8839 - val\_loss: 0.3864 - val\_acc: 0.8609  
Epoch 8/30  
- 1s - loss: 0.3243 - acc: 0.8876 - val\_loss: 0.4445 - val\_acc: 0.8423  
Epoch 9/30  
- 1s - loss: 0.3179 - acc: 0.8923 - val\_loss: 0.3803 - val\_acc: 0.8718  
Epoch 10/30  
- 1s - loss: 0.3252 - acc: 0.8862 - val\_loss: 0.3791 - val\_acc: 0.8782  
Epoch 11/30  
- 1s - loss: 0.3213 - acc: 0.8928 - val\_loss: 0.5263 - val\_acc: 0.7000  
Epoch 12/30  
- 1s - loss: 0.3247 - acc: 0.8812 - val\_loss: 0.3930 - val\_acc: 0.8590  
Epoch 13/30  
- 1s - loss: 0.3238 - acc: 0.8817 - val\_loss: 0.4065 - val\_acc: 0.8429  
Epoch 14/30  
- 1s - loss: 0.3137 - acc: 0.8869 - val\_loss: 0.4432 - val\_acc: 0.7891  
Epoch 15/30  
- 1s - loss: 0.3218 - acc: 0.8908 - val\_loss: 0.3937 - val\_acc: 0.8705  
Epoch 16/30  
- 1s - loss: 0.3175 - acc: 0.8908 - val\_loss: 0.3816 - val\_acc: 0.8872  
Epoch 17/30  
- 1s - loss: 0.3078 - acc: 0.8857 - val\_loss: 0.3411 - val\_acc: 0.8737  
Epoch 18/30  
- 1s - loss: 0.3137 - acc: 0.8891 - val\_loss: 0.5001 - val\_acc: 0.8731  
Epoch 19/30  
- 1s - loss: 0.3095 - acc: 0.8908 - val\_loss: 0.4098 - val\_acc: 0.8603  
Epoch 20/30  
- 1s - loss: 0.3045 - acc: 0.8879 - val\_loss: 0.4579 - val\_acc: 0.8692  
Epoch 21/30  
- 1s - loss: 0.2958 - acc: 0.8930 - val\_loss: 0.3381 - val\_acc: 0.8724  
Epoch 22/30  
- 1s - loss: 0.3088 - acc: 0.8945 - val\_loss: 0.5607 - val\_acc: 0.7994  
Epoch 23/30  
- 1s - loss: 0.3079 - acc: 0.8862 - val\_loss: 0.3454 - val\_acc: 0.8750  
Epoch 24/30  
- 1s - loss: 0.3145 - acc: 0.8859 - val\_loss: 0.4384 - val\_acc: 0.8571  
Epoch 25/30  
- 1s - loss: 0.3062 - acc: 0.8928 - val\_loss: 0.3940 - val\_acc: 0.8462

Epoch 26/30  
 - 1s - loss: 0.3019 - acc: 0.8965 - val\_loss: 0.4422 - val\_acc: 0.8718  
 Epoch 27/30  
 - 1s - loss: 0.3038 - acc: 0.8987 - val\_loss: 0.3417 - val\_acc: 0.8827  
 Epoch 28/30  
 - 1s - loss: 0.3069 - acc: 0.8928 - val\_loss: 0.4843 - val\_acc: 0.7545  
 Epoch 29/30  
 - 1s - loss: 0.3001 - acc: 0.8960 - val\_loss: 0.4172 - val\_acc: 0.8333  
 Epoch 30/30  
 - 1s - loss: 0.2977 - acc: 0.8945 - val\_loss: 0.3839 - val\_acc: 0.8782  
 Train accuracy 0.8748463240717974 Test accuracy: 0.8782051282051282

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 122, 16)	3376
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 16)	15632
dense_2 (Dense)	(None, 3)	51

Total params: 20,235  
 Trainable params: 20,235  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/35  
 - 1s - loss: 59.0001 - acc: 0.7817 - val\_loss: 19.4260 - val\_acc: 0.8436  
 Epoch 2/35  
 - 1s - loss: 7.7998 - acc: 0.8409 - val\_loss: 1.4972 - val\_acc: 0.8346  
 Epoch 3/35  
 - 1s - loss: 0.6662 - acc: 0.8495 - val\_loss: 0.5592 - val\_acc: 0.7872  
 Epoch 4/35  
 - 1s - loss: 0.4417 - acc: 0.8643 - val\_loss: 0.5790 - val\_acc: 0.7885  
 Epoch 5/35  
 - 1s - loss: 0.4149 - acc: 0.8768 - val\_loss: 0.5205 - val\_acc: 0.8179  
 Epoch 6/35  
 - 1s - loss: 0.4002 - acc: 0.8761 - val\_loss: 0.4478 - val\_acc: 0.8731  
 Epoch 7/35



- 1s - loss: 0.3978 - acc: 0.8731 - val\_loss: 0.4367 - val\_acc: 0.8628  
 Epoch 8/35  
 - 1s - loss: 0.3713 - acc: 0.8820 - val\_loss: 0.4748 - val\_acc: 0.8135  
 Epoch 9/35  
 - 1s - loss: 0.3693 - acc: 0.8854 - val\_loss: 0.4100 - val\_acc: 0.8769  
 Epoch 10/35  
 - 1s - loss: 0.3837 - acc: 0.8766 - val\_loss: 0.4244 - val\_acc: 0.8641  
 Epoch 11/35  
 - 1s - loss: 0.3649 - acc: 0.8812 - val\_loss: 0.4307 - val\_acc: 0.8365  
 Epoch 12/35  
 - 1s - loss: 0.3630 - acc: 0.8832 - val\_loss: 0.4849 - val\_acc: 0.8596  
 Epoch 13/35  
 - 1s - loss: 0.3712 - acc: 0.8879 - val\_loss: 0.3910 - val\_acc: 0.8795  
 Epoch 14/35  
 - 1s - loss: 0.3412 - acc: 0.8982 - val\_loss: 0.4395 - val\_acc: 0.8744  
 Epoch 15/35  
 - 1s - loss: 0.3519 - acc: 0.8807 - val\_loss: 0.5866 - val\_acc: 0.7641  
 Epoch 16/35  
 - 1s - loss: 0.3587 - acc: 0.8827 - val\_loss: 0.3797 - val\_acc: 0.8705  
 Epoch 17/35  
 - 1s - loss: 0.3519 - acc: 0.8835 - val\_loss: 0.3778 - val\_acc: 0.8724  
 Epoch 18/35  
 - 1s - loss: 0.3549 - acc: 0.8862 - val\_loss: 0.3787 - val\_acc: 0.8712  
 Epoch 19/35  
 - 1s - loss: 0.3541 - acc: 0.8859 - val\_loss: 0.3773 - val\_acc: 0.8705  
 Epoch 20/35  
 - 1s - loss: 0.3519 - acc: 0.8881 - val\_loss: 0.4039 - val\_acc: 0.8673  
 Epoch 21/35  
 - 1s - loss: 0.3480 - acc: 0.8906 - val\_loss: 0.4127 - val\_acc: 0.8513  
 Epoch 22/35  
 - 1s - loss: 0.3235 - acc: 0.8913 - val\_loss: 0.3782 - val\_acc: 0.8692  
 Epoch 23/35  
 - 1s - loss: 0.3647 - acc: 0.8830 - val\_loss: 0.4007 - val\_acc: 0.8814  
 Epoch 24/35  
 - 1s - loss: 0.3343 - acc: 0.8894 - val\_loss: 0.4586 - val\_acc: 0.8564  
 Epoch 25/35  
 - 1s - loss: 0.3548 - acc: 0.8837 - val\_loss: 0.4396 - val\_acc: 0.8212  
 Epoch 26/35  
 - 1s - loss: 0.3322 - acc: 0.8916 - val\_loss: 0.3784 - val\_acc: 0.8763  
 Epoch 27/35  
 - 1s - loss: 0.3527 - acc: 0.8852 - val\_loss: 0.3645 - val\_acc: 0.8782  
 Epoch 28/35  
 - 1s - loss: 0.3373 - acc: 0.8844 - val\_loss: 0.4151 - val\_acc: 0.8756  
 Epoch 29/35  
 - 1s - loss: 0.3514 - acc: 0.8921 - val\_loss: 0.3943 - val\_acc: 0.8776  
 Epoch 30/35  
 - 1s - loss: 0.3382 - acc: 0.8866 - val\_loss: 0.4066 - val\_acc: 0.8673  
 Epoch 31/35

```

- 1s - loss: 0.3405 - acc: 0.8903 - val_loss: 0.3800 - val_acc: 0.8660
Epoch 32/35
- 1s - loss: 0.3283 - acc: 0.8896 - val_loss: 0.3778 - val_acc: 0.8763
Epoch 33/35
- 1s - loss: 0.3327 - acc: 0.8866 - val_loss: 0.3815 - val_acc: 0.8769
Epoch 34/35
- 1s - loss: 0.3445 - acc: 0.8866 - val_loss: 0.3853 - val_acc: 0.8724
Epoch 35/35
- 1s - loss: 0.3250 - acc: 0.8859 - val_loss: 0.3624 - val_acc: 0.8718
Train accuracy 0.9014015244652077 Test accuracy: 0.8717948717948718
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 65,747
Trainable params: 65,747
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 24.5985 - acc: 0.8394 - val_loss: 1.1983 - val_acc: 0.7776
Epoch 2/30
- 2s - loss: 0.5059 - acc: 0.8827 - val_loss: 0.5739 - val_acc: 0.8494
Epoch 3/30
- 2s - loss: 0.3960 - acc: 0.8844 - val_loss: 0.4404 - val_acc: 0.8551
Epoch 4/30
- 1s - loss: 0.3767 - acc: 0.8795 - val_loss: 0.4483 - val_acc: 0.8436
Epoch 5/30
- 1s - loss: 0.3457 - acc: 0.8894 - val_loss: 0.4324 - val_acc: 0.8615
Epoch 6/30
- 1s - loss: 0.3152 - acc: 0.8965 - val_loss: 0.3665 - val_acc: 0.8628
Epoch 7/30
- 1s - loss: 0.3450 - acc: 0.8911 - val_loss: 0.3882 - val_acc: 0.8814

```

Epoch 8/30  
- 2s - loss: 0.3443 - acc: 0.8903 - val\_loss: 0.4357 - val\_acc: 0.8417  
Epoch 9/30  
- 1s - loss: 0.3306 - acc: 0.8962 - val\_loss: 0.4020 - val\_acc: 0.8577  
Epoch 10/30  
- 1s - loss: 0.3373 - acc: 0.8930 - val\_loss: 0.3819 - val\_acc: 0.8744  
Epoch 11/30  
- 1s - loss: 0.3478 - acc: 0.8869 - val\_loss: 0.4091 - val\_acc: 0.8731  
Epoch 12/30  
- 1s - loss: 0.3412 - acc: 0.8825 - val\_loss: 0.3692 - val\_acc: 0.8788  
Epoch 13/30  
- 1s - loss: 0.3280 - acc: 0.8884 - val\_loss: 0.4466 - val\_acc: 0.8308  
Epoch 14/30  
- 2s - loss: 0.3417 - acc: 0.8921 - val\_loss: 0.3902 - val\_acc: 0.8731  
Epoch 15/30  
- 2s - loss: 0.3297 - acc: 0.8923 - val\_loss: 0.4331 - val\_acc: 0.8423  
Epoch 16/30  
- 1s - loss: 0.3372 - acc: 0.8901 - val\_loss: 0.3815 - val\_acc: 0.8628  
Epoch 17/30  
- 1s - loss: 0.3139 - acc: 0.8933 - val\_loss: 0.3689 - val\_acc: 0.8692  
Epoch 18/30  
- 2s - loss: 0.3090 - acc: 0.8938 - val\_loss: 0.4037 - val\_acc: 0.8500  
Epoch 19/30  
- 1s - loss: 0.3164 - acc: 0.8945 - val\_loss: 0.3578 - val\_acc: 0.8731  
Epoch 20/30  
- 1s - loss: 0.3247 - acc: 0.8955 - val\_loss: 0.3505 - val\_acc: 0.8769  
Epoch 21/30  
- 1s - loss: 0.3158 - acc: 0.8972 - val\_loss: 0.4510 - val\_acc: 0.8577  
Epoch 22/30  
- 1s - loss: 0.3083 - acc: 0.8967 - val\_loss: 0.3420 - val\_acc: 0.8782  
Epoch 23/30  
- 1s - loss: 0.3592 - acc: 0.8871 - val\_loss: 0.3878 - val\_acc: 0.8622  
Epoch 24/30  
- 1s - loss: 0.3201 - acc: 0.8871 - val\_loss: 0.3903 - val\_acc: 0.8705  
Epoch 25/30  
- 1s - loss: 0.3155 - acc: 0.8921 - val\_loss: 0.3545 - val\_acc: 0.8692  
Epoch 26/30  
- 1s - loss: 0.3174 - acc: 0.8953 - val\_loss: 0.4639 - val\_acc: 0.8442  
Epoch 27/30  
- 1s - loss: 0.2957 - acc: 0.9004 - val\_loss: 0.3652 - val\_acc: 0.8679  
Epoch 28/30  
- 1s - loss: 0.3297 - acc: 0.8923 - val\_loss: 0.3785 - val\_acc: 0.8744  
Epoch 29/30  
- 2s - loss: 0.3132 - acc: 0.8962 - val\_loss: 0.4102 - val\_acc: 0.8667  
Epoch 30/30  
- 1s - loss: 0.3383 - acc: 0.8921 - val\_loss: 0.3645 - val\_acc: 0.8788  
Train accuracy 0.9154167691172854 Test accuracy: 0.8788461538461538

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 24)	2040
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

Total params: 65,531

Trainable params: 65,531

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/25

- 2s - loss: 39.8979 - acc: 0.8188 - val\_loss: 17.8152 - val\_acc: 0.8551

Epoch 2/25

- 1s - loss: 8.2806 - acc: 0.8874 - val\_loss: 2.4766 - val\_acc: 0.8538

Epoch 3/25

- 1s - loss: 0.9804 - acc: 0.8820 - val\_loss: 0.5882 - val\_acc: 0.8019

Epoch 4/25

- 1s - loss: 0.3854 - acc: 0.8879 - val\_loss: 0.5122 - val\_acc: 0.7987

Epoch 5/25

- 1s - loss: 0.3371 - acc: 0.8898 - val\_loss: 0.4443 - val\_acc: 0.8481

Epoch 6/25

- 1s - loss: 0.3167 - acc: 0.8916 - val\_loss: 0.4012 - val\_acc: 0.8571

Epoch 7/25

- 1s - loss: 0.3146 - acc: 0.8913 - val\_loss: 0.4099 - val\_acc: 0.8705

Epoch 8/25

- 1s - loss: 0.2958 - acc: 0.8982 - val\_loss: 0.3923 - val\_acc: 0.8526

Epoch 9/25

- 1s - loss: 0.3006 - acc: 0.8972 - val\_loss: 0.3733 - val\_acc: 0.8769

Epoch 10/25

- 1s - loss: 0.2936 - acc: 0.8943 - val\_loss: 0.3598 - val\_acc: 0.8808

Epoch 11/25

- 1s - loss: 0.2881 - acc: 0.8992 - val\_loss: 0.3710 - val\_acc: 0.8814

Epoch 12/25

- 1s - loss: 0.2789 - acc: 0.9046 - val\_loss: 0.3589 - val\_acc: 0.8776

Epoch 13/25

```

- 1s - loss: 0.2826 - acc: 0.9039 - val_loss: 0.3543 - val_acc: 0.8827
Epoch 14/25
- 1s - loss: 0.2760 - acc: 0.9044 - val_loss: 0.3940 - val_acc: 0.8718
Epoch 15/25
- 1s - loss: 0.2826 - acc: 0.9009 - val_loss: 0.5577 - val_acc: 0.7564
Epoch 16/25
- 1s - loss: 0.2827 - acc: 0.8999 - val_loss: 0.3416 - val_acc: 0.8821
Epoch 17/25
- 1s - loss: 0.2761 - acc: 0.9095 - val_loss: 0.3694 - val_acc: 0.8558
Epoch 18/25
- 1s - loss: 0.2897 - acc: 0.8994 - val_loss: 0.3598 - val_acc: 0.8724
Epoch 19/25
- 1s - loss: 0.2762 - acc: 0.9068 - val_loss: 0.3388 - val_acc: 0.8859
Epoch 20/25
- 1s - loss: 0.2843 - acc: 0.9034 - val_loss: 0.3243 - val_acc: 0.8859
Epoch 21/25
- 1s - loss: 0.2747 - acc: 0.9093 - val_loss: 0.3551 - val_acc: 0.8724
Epoch 22/25
- 1s - loss: 0.2703 - acc: 0.9009 - val_loss: 0.3488 - val_acc: 0.8692
Epoch 23/25
- 1s - loss: 0.2759 - acc: 0.9046 - val_loss: 0.3451 - val_acc: 0.8827
Epoch 24/25
- 1s - loss: 0.2684 - acc: 0.9083 - val_loss: 0.3358 - val_acc: 0.8891
Epoch 25/25
- 1s - loss: 0.2676 - acc: 0.9051 - val_loss: 0.4777 - val_acc: 0.8372
Train accuracy 0.8532087533808704 Test accuracy: 0.8371794871794872

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 122, 32)          2048
-----
conv1d_2 (Conv1D)            (None, 116, 32)          7200
-----
dropout_1 (Dropout)          (None, 116, 32)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 58, 32)          0
-----
flatten_1 (Flatten)          (None, 1856)              0
-----
dense_1 (Dense)              (None, 64)                118848
-----
dense_2 (Dense)              (None, 3)                 195
=====
Total params: 128,291
Trainable params: 128,291
Non-trainable params: 0
-----

```

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 28.8646 - acc: 0.7349 - val\_loss: 2.5690 - val\_acc: 0.8128

Epoch 2/30

- 1s - loss: 0.8468 - acc: 0.8495 - val\_loss: 0.5242 - val\_acc: 0.8538

Epoch 3/30

- 2s - loss: 0.4756 - acc: 0.8660 - val\_loss: 0.6238 - val\_acc: 0.7904

Epoch 4/30

- 1s - loss: 0.4630 - acc: 0.8677 - val\_loss: 0.6125 - val\_acc: 0.7936

Epoch 5/30

- 1s - loss: 0.4598 - acc: 0.8672 - val\_loss: 0.5314 - val\_acc: 0.8141

Epoch 6/30

- 1s - loss: 0.4139 - acc: 0.8778 - val\_loss: 0.4944 - val\_acc: 0.8590

Epoch 7/30

- 1s - loss: 0.4418 - acc: 0.8726 - val\_loss: 0.4535 - val\_acc: 0.8782

Epoch 8/30

- 1s - loss: 0.3781 - acc: 0.8832 - val\_loss: 0.4348 - val\_acc: 0.8359

Epoch 9/30

- 1s - loss: 0.3982 - acc: 0.8766 - val\_loss: 0.4344 - val\_acc: 0.8519

Epoch 10/30

- 1s - loss: 0.3721 - acc: 0.8839 - val\_loss: 0.4103 - val\_acc: 0.8750

Epoch 11/30

- 1s - loss: 0.3969 - acc: 0.8788 - val\_loss: 0.4315 - val\_acc: 0.8378

Epoch 12/30

- 1s - loss: 0.3820 - acc: 0.8761 - val\_loss: 0.4192 - val\_acc: 0.8519

Epoch 13/30

- 1s - loss: 0.3815 - acc: 0.8825 - val\_loss: 0.4301 - val\_acc: 0.8744

Epoch 14/30

- 1s - loss: 0.3598 - acc: 0.8903 - val\_loss: 0.5088 - val\_acc: 0.8526

Epoch 15/30

- 1s - loss: 0.3785 - acc: 0.8830 - val\_loss: 0.4130 - val\_acc: 0.8686

Epoch 16/30

- 1s - loss: 0.4003 - acc: 0.8817 - val\_loss: 0.6697 - val\_acc: 0.8500

Epoch 17/30

- 1s - loss: 0.3681 - acc: 0.8839 - val\_loss: 0.3889 - val\_acc: 0.8615

Epoch 18/30

- 1s - loss: 0.3645 - acc: 0.8832 - val\_loss: 0.4410 - val\_acc: 0.8622

Epoch 19/30

- 1s - loss: 0.3695 - acc: 0.8807 - val\_loss: 0.3884 - val\_acc: 0.8782

Epoch 20/30

- 1s - loss: 0.3645 - acc: 0.8916 - val\_loss: 0.3970 - val\_acc: 0.8801

Epoch 21/30

- 1s - loss: 0.3826 - acc: 0.8866 - val\_loss: 0.5478 - val\_acc: 0.8564

Epoch 22/30

- 1s - loss: 0.3533 - acc: 0.8876 - val\_loss: 0.4154 - val\_acc: 0.8558

Epoch 23/30

- 1s - loss: 0.3653 - acc: 0.8803 - val\_loss: 0.3994 - val\_acc: 0.8788

Epoch 24/30  
 - 1s - loss: 0.3587 - acc: 0.8871 - val\_loss: 0.4814 - val\_acc: 0.8474  
 Epoch 25/30  
 - 1s - loss: 0.4035 - acc: 0.8837 - val\_loss: 0.3648 - val\_acc: 0.8756  
 Epoch 26/30  
 - 1s - loss: 0.3583 - acc: 0.8903 - val\_loss: 0.4033 - val\_acc: 0.8724  
 Epoch 27/30  
 - 1s - loss: 0.3773 - acc: 0.8812 - val\_loss: 0.3743 - val\_acc: 0.8692  
 Epoch 28/30  
 - 1s - loss: 0.3562 - acc: 0.8830 - val\_loss: 0.6539 - val\_acc: 0.8333  
 Epoch 29/30  
 - 1s - loss: 0.4096 - acc: 0.8842 - val\_loss: 0.4305 - val\_acc: 0.8673  
 Epoch 30/30  
 - 1s - loss: 0.3570 - acc: 0.8869 - val\_loss: 0.4119 - val\_acc: 0.8692  
 Train accuracy 0.8790263093189082 Test accuracy: 0.8692307692307693

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

---

Total params: 65,747  
 Trainable params: 65,747  
 Non-trainable params: 0

---

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/30  
 - 2s - loss: 35.7699 - acc: 0.8114 - val\_loss: 19.9249 - val\_acc: 0.8891  
 Epoch 2/30  
 - 1s - loss: 11.6576 - acc: 0.8911 - val\_loss: 5.6323 - val\_acc: 0.8737  
 Epoch 3/30  
 - 1s - loss: 3.0623 - acc: 0.8982 - val\_loss: 1.5883 - val\_acc: 0.8276  
 Epoch 4/30  
 - 1s - loss: 0.9279 - acc: 0.8987 - val\_loss: 0.7385 - val\_acc: 0.8147  
 Epoch 5/30

- 1s - loss: 0.4642 - acc: 0.9048 - val\_loss: 0.5324 - val\_acc: 0.8641  
Epoch 6/30  
- 1s - loss: 0.3640 - acc: 0.8967 - val\_loss: 0.4491 - val\_acc: 0.8596  
Epoch 7/30  
- 1s - loss: 0.3429 - acc: 0.8940 - val\_loss: 0.4363 - val\_acc: 0.8718  
Epoch 8/30  
- 1s - loss: 0.3034 - acc: 0.9039 - val\_loss: 0.4570 - val\_acc: 0.8160  
Epoch 9/30  
- 1s - loss: 0.2991 - acc: 0.9046 - val\_loss: 0.3721 - val\_acc: 0.8705  
Epoch 10/30  
- 1s - loss: 0.2927 - acc: 0.9012 - val\_loss: 0.3387 - val\_acc: 0.8833  
Epoch 11/30  
- 1s - loss: 0.2805 - acc: 0.9009 - val\_loss: 0.3493 - val\_acc: 0.8519  
Epoch 12/30  
- 1s - loss: 0.2784 - acc: 0.9053 - val\_loss: 0.3613 - val\_acc: 0.8538  
Epoch 13/30  
- 1s - loss: 0.2682 - acc: 0.9046 - val\_loss: 0.3252 - val\_acc: 0.8872  
Epoch 14/30  
- 1s - loss: 0.2630 - acc: 0.9098 - val\_loss: 0.3749 - val\_acc: 0.8699  
Epoch 15/30  
- 1s - loss: 0.2632 - acc: 0.9061 - val\_loss: 0.4205 - val\_acc: 0.8615  
Epoch 16/30  
- 1s - loss: 0.2604 - acc: 0.9112 - val\_loss: 0.3159 - val\_acc: 0.8782  
Epoch 17/30  
- 1s - loss: 0.2489 - acc: 0.9134 - val\_loss: 0.3299 - val\_acc: 0.8622  
Epoch 18/30  
- 1s - loss: 0.2553 - acc: 0.9130 - val\_loss: 0.3369 - val\_acc: 0.8667  
Epoch 19/30  
- 1s - loss: 0.2542 - acc: 0.9085 - val\_loss: 0.3254 - val\_acc: 0.8923  
Epoch 20/30  
- 1s - loss: 0.2500 - acc: 0.9115 - val\_loss: 0.3232 - val\_acc: 0.8603  
Epoch 21/30  
- 1s - loss: 0.2413 - acc: 0.9134 - val\_loss: 0.3359 - val\_acc: 0.8692  
Epoch 22/30  
- 1s - loss: 0.2456 - acc: 0.9122 - val\_loss: 0.2958 - val\_acc: 0.8859  
Epoch 23/30  
- 1s - loss: 0.2506 - acc: 0.9090 - val\_loss: 0.3004 - val\_acc: 0.8910  
Epoch 24/30  
- 1s - loss: 0.2398 - acc: 0.9122 - val\_loss: 0.3583 - val\_acc: 0.8705  
Epoch 25/30  
- 1s - loss: 0.2486 - acc: 0.9134 - val\_loss: 0.3528 - val\_acc: 0.8558  
Epoch 26/30  
- 1s - loss: 0.2450 - acc: 0.9078 - val\_loss: 0.3162 - val\_acc: 0.8917  
Epoch 27/30  
- 1s - loss: 0.2374 - acc: 0.9132 - val\_loss: 0.3191 - val\_acc: 0.8699  
Epoch 28/30  
- 1s - loss: 0.2467 - acc: 0.9127 - val\_loss: 0.3413 - val\_acc: 0.8814  
Epoch 29/30



- 1s - loss: 0.2402 - acc: 0.9142 - val\_loss: 0.3166 - val\_acc: 0.8936  
Epoch 30/30  
- 1s - loss: 0.2454 - acc: 0.9125 - val\_loss: 0.4126 - val\_acc: 0.8654  
Train accuracy 0.869928694369314 Test accuracy: 0.8653846153846154

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 126, 32)	896
-----		
conv1d_2 (Conv1D)	(None, 122, 16)	2576
-----		
dropout_1 (Dropout)	(None, 122, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
-----		
flatten_1 (Flatten)	(None, 384)	0
-----		
dense_1 (Dense)	(None, 32)	12320
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 15,891  
Trainable params: 15,891  
Non-trainable params: 0

---

None  
Train on 4067 samples, validate on 1560 samples  
Epoch 1/35  
- 2s - loss: 19.8048 - acc: 0.8527 - val\_loss: 0.6335 - val\_acc: 0.8699  
Epoch 2/35  
- 1s - loss: 0.4510 - acc: 0.8761 - val\_loss: 0.5094 - val\_acc: 0.8340  
Epoch 3/35  
- 1s - loss: 0.4304 - acc: 0.8694 - val\_loss: 0.5046 - val\_acc: 0.8295  
Epoch 4/35  
- 1s - loss: 0.4330 - acc: 0.8761 - val\_loss: 0.5016 - val\_acc: 0.8532  
Epoch 5/35  
- 1s - loss: 0.3977 - acc: 0.8830 - val\_loss: 0.5584 - val\_acc: 0.8224  
Epoch 6/35  
- 1s - loss: 0.3723 - acc: 0.8839 - val\_loss: 0.4468 - val\_acc: 0.8603  
Epoch 7/35  
- 1s - loss: 0.3760 - acc: 0.8805 - val\_loss: 0.4046 - val\_acc: 0.8814  
Epoch 8/35  
- 1s - loss: 0.3575 - acc: 0.8852 - val\_loss: 0.4753 - val\_acc: 0.8295  
Epoch 9/35  
- 1s - loss: 0.3499 - acc: 0.8884 - val\_loss: 0.4224 - val\_acc: 0.8654  
Epoch 10/35  
- 1s - loss: 0.3728 - acc: 0.8780 - val\_loss: 0.4347 - val\_acc: 0.8776

Epoch 11/35  
- 1s - loss: 0.3844 - acc: 0.8825 - val\_loss: 0.4267 - val\_acc: 0.8615  
Epoch 12/35  
- 1s - loss: 0.3646 - acc: 0.8817 - val\_loss: 0.4143 - val\_acc: 0.8744  
Epoch 13/35  
- 1s - loss: 0.3546 - acc: 0.8906 - val\_loss: 0.3982 - val\_acc: 0.8679  
Epoch 14/35  
- 1s - loss: 0.3730 - acc: 0.8844 - val\_loss: 0.5589 - val\_acc: 0.8353  
Epoch 15/35  
- 1s - loss: 0.3761 - acc: 0.8822 - val\_loss: 0.4248 - val\_acc: 0.8635  
Epoch 16/35  
- 1s - loss: 0.3508 - acc: 0.8835 - val\_loss: 0.4882 - val\_acc: 0.8045  
Epoch 17/35  
- 1s - loss: 0.3436 - acc: 0.8896 - val\_loss: 0.4742 - val\_acc: 0.8237  
Epoch 18/35  
- 1s - loss: 0.3609 - acc: 0.8820 - val\_loss: 0.5305 - val\_acc: 0.8372  
Epoch 19/35  
- 1s - loss: 0.3561 - acc: 0.8871 - val\_loss: 0.4524 - val\_acc: 0.8417  
Epoch 20/35  
- 1s - loss: 0.3635 - acc: 0.8805 - val\_loss: 0.4503 - val\_acc: 0.8301  
Epoch 21/35  
- 1s - loss: 0.3464 - acc: 0.8839 - val\_loss: 0.5888 - val\_acc: 0.7808  
Epoch 22/35  
- 1s - loss: 0.3548 - acc: 0.8783 - val\_loss: 0.4230 - val\_acc: 0.8731  
Epoch 23/35  
- 1s - loss: 0.3775 - acc: 0.8820 - val\_loss: 0.4347 - val\_acc: 0.8314  
Epoch 24/35  
- 1s - loss: 0.3600 - acc: 0.8854 - val\_loss: 0.4303 - val\_acc: 0.8577  
Epoch 25/35  
- 1s - loss: 0.3464 - acc: 0.8866 - val\_loss: 0.4443 - val\_acc: 0.8269  
Epoch 26/35  
- 1s - loss: 0.3787 - acc: 0.8776 - val\_loss: 0.5983 - val\_acc: 0.8135  
Epoch 27/35  
- 1s - loss: 0.3653 - acc: 0.8844 - val\_loss: 0.4770 - val\_acc: 0.7981  
Epoch 28/35  
- 1s - loss: 0.3430 - acc: 0.8815 - val\_loss: 0.4575 - val\_acc: 0.8276  
Epoch 29/35  
- 1s - loss: 0.3310 - acc: 0.8916 - val\_loss: 0.4240 - val\_acc: 0.8673  
Epoch 30/35  
- 1s - loss: 0.3560 - acc: 0.8891 - val\_loss: 0.3987 - val\_acc: 0.8776  
Epoch 31/35  
- 1s - loss: 0.3487 - acc: 0.8830 - val\_loss: 0.4771 - val\_acc: 0.8192  
Epoch 32/35  
- 1s - loss: 0.3430 - acc: 0.8894 - val\_loss: 0.5364 - val\_acc: 0.7987  
Epoch 33/35  
- 1s - loss: 0.3725 - acc: 0.8812 - val\_loss: 0.4473 - val\_acc: 0.8365  
Epoch 34/35  
- 1s - loss: 0.3401 - acc: 0.8832 - val\_loss: 0.4911 - val\_acc: 0.8192

Epoch 35/35

- 1s - loss: 0.3591 - acc: 0.8822 - val\_loss: 0.4479 - val\_acc: 0.8179

Train accuracy 0.8443570199164003 Test accuracy: 0.8179487179487179

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 42)	2688
-----		
conv1d_2 (Conv1D)	(None, 120, 16)	2032
-----		
dropout_1 (Dropout)	(None, 120, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
-----		
flatten_1 (Flatten)	(None, 960)	0
-----		
dense_1 (Dense)	(None, 16)	15376
-----		
dense_2 (Dense)	(None, 3)	51
=====		

Total params: 20,147

Trainable params: 20,147

Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 1s - loss: 28.4293 - acc: 0.8478 - val\_loss: 12.5319 - val\_acc: 0.8744

Epoch 2/30

- 1s - loss: 5.9227 - acc: 0.9002 - val\_loss: 2.0666 - val\_acc: 0.8872

Epoch 3/30

- 1s - loss: 1.0969 - acc: 0.8972 - val\_loss: 0.7310 - val\_acc: 0.8282

Epoch 4/30

- 1s - loss: 0.4620 - acc: 0.8987 - val\_loss: 0.5090 - val\_acc: 0.8487

Epoch 5/30

- 1s - loss: 0.3577 - acc: 0.9019 - val\_loss: 0.4143 - val\_acc: 0.8673

Epoch 6/30

- 1s - loss: 0.3185 - acc: 0.9024 - val\_loss: 0.3947 - val\_acc: 0.8840

Epoch 7/30

- 1s - loss: 0.3125 - acc: 0.9007 - val\_loss: 0.4081 - val\_acc: 0.8558

Epoch 8/30

- 1s - loss: 0.2826 - acc: 0.9073 - val\_loss: 0.3928 - val\_acc: 0.8564

Epoch 9/30

- 1s - loss: 0.2856 - acc: 0.9088 - val\_loss: 0.3604 - val\_acc: 0.8615

Epoch 10/30

- 1s - loss: 0.2797 - acc: 0.9068 - val\_loss: 0.3365 - val\_acc: 0.8865

Epoch 11/30

```

- 1s - loss: 0.2767 - acc: 0.9083 - val_loss: 0.3553 - val_acc: 0.8673
Epoch 12/30
- 1s - loss: 0.2715 - acc: 0.9071 - val_loss: 0.3288 - val_acc: 0.8923
Epoch 13/30
- 1s - loss: 0.2657 - acc: 0.9120 - val_loss: 0.3400 - val_acc: 0.8769
Epoch 14/30
- 1s - loss: 0.2543 - acc: 0.9139 - val_loss: 0.3462 - val_acc: 0.8904
Epoch 15/30
- 1s - loss: 0.2592 - acc: 0.9132 - val_loss: 0.4310 - val_acc: 0.8327
Epoch 16/30
- 1s - loss: 0.2507 - acc: 0.9132 - val_loss: 0.3095 - val_acc: 0.8942
Epoch 17/30
- 1s - loss: 0.2575 - acc: 0.9149 - val_loss: 0.3246 - val_acc: 0.8833
Epoch 18/30
- 1s - loss: 0.2433 - acc: 0.9171 - val_loss: 0.3101 - val_acc: 0.8891
Epoch 19/30
- 1s - loss: 0.2518 - acc: 0.9132 - val_loss: 0.3129 - val_acc: 0.9013
Epoch 20/30
- 1s - loss: 0.2490 - acc: 0.9174 - val_loss: 0.3039 - val_acc: 0.9064
Epoch 21/30
- 1s - loss: 0.2430 - acc: 0.9208 - val_loss: 0.3613 - val_acc: 0.8667
Epoch 22/30
- 1s - loss: 0.2423 - acc: 0.9159 - val_loss: 0.3047 - val_acc: 0.8885
Epoch 23/30
- 1s - loss: 0.2437 - acc: 0.9174 - val_loss: 0.2984 - val_acc: 0.8942
Epoch 24/30
- 1s - loss: 0.2425 - acc: 0.9203 - val_loss: 0.2936 - val_acc: 0.9071
Epoch 25/30
- 1s - loss: 0.2459 - acc: 0.9166 - val_loss: 0.3163 - val_acc: 0.8833
Epoch 26/30
- 1s - loss: 0.2399 - acc: 0.9152 - val_loss: 0.3018 - val_acc: 0.9019
Epoch 27/30
- 1s - loss: 0.2289 - acc: 0.9265 - val_loss: 0.2924 - val_acc: 0.8994
Epoch 28/30
- 1s - loss: 0.2331 - acc: 0.9191 - val_loss: 0.2889 - val_acc: 0.9096
Epoch 29/30
- 1s - loss: 0.2473 - acc: 0.9196 - val_loss: 0.3035 - val_acc: 0.9045
Epoch 30/30
- 1s - loss: 0.2276 - acc: 0.9248 - val_loss: 0.2913 - val_acc: 0.9058
Train accuracy 0.9223014507007622 Test accuracy: 0.9057692307692308

```

```

-----
Layer (type)                Output Shape                Param #
-----
conv1d_1 (Conv1D)           (None, 124, 28)            1288
-----
conv1d_2 (Conv1D)           (None, 122, 16)            1360
-----

```

dropout_1 (Dropout)	(None, 122, 16)	0
-----		
max_pooling1d_1 (MaxPooling1d)	(None, 61, 16)	0
-----		
flatten_1 (Flatten)	(None, 976)	0
-----		
dense_1 (Dense)	(None, 64)	62528
-----		
dense_2 (Dense)	(None, 3)	195
=====		
Total params: 65,371		
Trainable params: 65,371		
Non-trainable params: 0		
-----		
None		
Train on 4067 samples, validate on 1560 samples		
Epoch 1/30		
- 2s - loss: 50.0892 - acc: 0.8178 - val_loss: 9.8352 - val_acc: 0.8179		
Epoch 2/30		
- 1s - loss: 2.5899 - acc: 0.8726 - val_loss: 0.5072 - val_acc: 0.8378		
Epoch 3/30		
- 1s - loss: 0.3749 - acc: 0.8810 - val_loss: 0.4493 - val_acc: 0.8256		
Epoch 4/30		
- 1s - loss: 0.3410 - acc: 0.8879 - val_loss: 0.3977 - val_acc: 0.8699		
Epoch 5/30		
- 1s - loss: 0.3332 - acc: 0.8879 - val_loss: 0.4011 - val_acc: 0.8615		
Epoch 6/30		
- 1s - loss: 0.3277 - acc: 0.8866 - val_loss: 0.4521 - val_acc: 0.8167		
Epoch 7/30		
- 1s - loss: 0.3319 - acc: 0.8864 - val_loss: 0.3554 - val_acc: 0.8801		
Epoch 8/30		
- 1s - loss: 0.3102 - acc: 0.8842 - val_loss: 0.4117 - val_acc: 0.8314		
Epoch 9/30		
- 1s - loss: 0.3088 - acc: 0.8950 - val_loss: 0.3316 - val_acc: 0.8731		
Epoch 10/30		
- 1s - loss: 0.3111 - acc: 0.8911 - val_loss: 0.3413 - val_acc: 0.8699		
Epoch 11/30		
- 1s - loss: 0.3165 - acc: 0.8894 - val_loss: 0.7964 - val_acc: 0.6526		
Epoch 12/30		
- 1s - loss: 0.3130 - acc: 0.8923 - val_loss: 0.4990 - val_acc: 0.8109		
Epoch 13/30		
- 1s - loss: 0.3176 - acc: 0.8903 - val_loss: 0.4289 - val_acc: 0.8160		
Epoch 14/30		
- 1s - loss: 0.3073 - acc: 0.8911 - val_loss: 0.5978 - val_acc: 0.7038		
Epoch 15/30		
- 1s - loss: 0.3017 - acc: 0.8908 - val_loss: 0.3391 - val_acc: 0.8782		
Epoch 16/30		
- 1s - loss: 0.3072 - acc: 0.8945 - val_loss: 0.3578 - val_acc: 0.8628		

```

Epoch 17/30
- 1s - loss: 0.2979 - acc: 0.8884 - val_loss: 0.3302 - val_acc: 0.8737
Epoch 18/30
- 1s - loss: 0.3081 - acc: 0.8894 - val_loss: 0.3791 - val_acc: 0.8635
Epoch 19/30
- 1s - loss: 0.3056 - acc: 0.8866 - val_loss: 0.3363 - val_acc: 0.8679
Epoch 20/30
- 1s - loss: 0.2916 - acc: 0.8955 - val_loss: 0.3431 - val_acc: 0.8782
Epoch 21/30
- 1s - loss: 0.2834 - acc: 0.8977 - val_loss: 0.4106 - val_acc: 0.8513
Epoch 22/30
- 1s - loss: 0.2982 - acc: 0.8898 - val_loss: 0.4206 - val_acc: 0.8096
Epoch 23/30
- 1s - loss: 0.3000 - acc: 0.8862 - val_loss: 0.3348 - val_acc: 0.8718
Epoch 24/30
- 1s - loss: 0.2975 - acc: 0.8935 - val_loss: 0.4165 - val_acc: 0.8577
Epoch 25/30
- 1s - loss: 0.2955 - acc: 0.8901 - val_loss: 0.3325 - val_acc: 0.8737
Epoch 26/30
- 1s - loss: 0.2961 - acc: 0.8938 - val_loss: 0.3466 - val_acc: 0.8731
Epoch 27/30
- 1s - loss: 0.2909 - acc: 0.8940 - val_loss: 0.4338 - val_acc: 0.8442
Epoch 28/30
- 1s - loss: 0.2905 - acc: 0.8925 - val_loss: 0.4344 - val_acc: 0.8096
Epoch 29/30
- 1s - loss: 0.3010 - acc: 0.8938 - val_loss: 0.3506 - val_acc: 0.8788
Epoch 30/30
- 1s - loss: 0.2887 - acc: 0.8876 - val_loss: 0.3325 - val_acc: 0.8795
Train accuracy 0.9144332431767888 Test accuracy: 0.8794871794871795

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 120, 24)	2328
-----		
dropout_1 (Dropout)	(None, 120, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
-----		
flatten_1 (Flatten)	(None, 960)	0
-----		
dense_1 (Dense)	(None, 64)	61504
-----		
dense_2 (Dense)	(None, 3)	195
=====		

Total params: 66,075

Trainable params: 66,075

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/25

- 2s - loss: 31.6678 - acc: 0.8161 - val\_loss: 7.6454 - val\_acc: 0.8353

Epoch 2/25

- 1s - loss: 2.4287 - acc: 0.8716 - val\_loss: 0.5865 - val\_acc: 0.8590

Epoch 3/25

- 1s - loss: 0.4228 - acc: 0.8719 - val\_loss: 0.5216 - val\_acc: 0.7942

Epoch 4/25

- 1s - loss: 0.3457 - acc: 0.8889 - val\_loss: 0.4059 - val\_acc: 0.8705

Epoch 5/25

- 1s - loss: 0.3281 - acc: 0.8923 - val\_loss: 0.4345 - val\_acc: 0.8558

Epoch 6/25

- 1s - loss: 0.3383 - acc: 0.8876 - val\_loss: 0.4069 - val\_acc: 0.8564

Epoch 7/25

- 1s - loss: 0.3237 - acc: 0.8837 - val\_loss: 0.4102 - val\_acc: 0.8583

Epoch 8/25

- 1s - loss: 0.3078 - acc: 0.8975 - val\_loss: 0.3998 - val\_acc: 0.8353

Epoch 9/25

- 1s - loss: 0.3072 - acc: 0.8948 - val\_loss: 0.4141 - val\_acc: 0.8673

Epoch 10/25

- 1s - loss: 0.3080 - acc: 0.8908 - val\_loss: 0.5832 - val\_acc: 0.8327

Epoch 11/25

- 1s - loss: 0.3357 - acc: 0.8869 - val\_loss: 0.4837 - val\_acc: 0.7558

Epoch 12/25

- 1s - loss: 0.2971 - acc: 0.8950 - val\_loss: 0.3477 - val\_acc: 0.8744

Epoch 13/25

- 1s - loss: 0.3061 - acc: 0.8950 - val\_loss: 0.3395 - val\_acc: 0.8788

Epoch 14/25

- 1s - loss: 0.3075 - acc: 0.8985 - val\_loss: 0.4608 - val\_acc: 0.8045

Epoch 15/25

- 1s - loss: 0.3077 - acc: 0.8918 - val\_loss: 0.3565 - val\_acc: 0.8795

Epoch 16/25

- 1s - loss: 0.2967 - acc: 0.8935 - val\_loss: 0.3384 - val\_acc: 0.8756

Epoch 17/25

- 1s - loss: 0.2997 - acc: 0.9007 - val\_loss: 0.3491 - val\_acc: 0.8647

Epoch 18/25

- 1s - loss: 0.3021 - acc: 0.8930 - val\_loss: 0.3769 - val\_acc: 0.8667

Epoch 19/25

- 1s - loss: 0.3025 - acc: 0.8916 - val\_loss: 0.3617 - val\_acc: 0.8840

Epoch 20/25

- 1s - loss: 0.2908 - acc: 0.8965 - val\_loss: 0.6491 - val\_acc: 0.7340

Epoch 21/25

- 1s - loss: 0.2991 - acc: 0.8940 - val\_loss: 0.3574 - val\_acc: 0.8756

Epoch 22/25

```

- 1s - loss: 0.2949 - acc: 0.8967 - val_loss: 0.3389 - val_acc: 0.8756
Epoch 23/25
- 1s - loss: 0.2942 - acc: 0.8955 - val_loss: 0.3536 - val_acc: 0.8808
Epoch 24/25
- 1s - loss: 0.2829 - acc: 0.8977 - val_loss: 0.4205 - val_acc: 0.8359
Epoch 25/25
- 1s - loss: 0.2879 - acc: 0.8972 - val_loss: 0.3261 - val_acc: 0.8731
Train accuracy 0.9068109171379395 Test accuracy: 0.8730769230769231
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 58, 32)	0
flatten_1 (Flatten)	(None, 1856)	0
dense_1 (Dense)	(None, 64)	118848
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 128,291
Trainable params: 128,291
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 105.0102 - acc: 0.7686 - val_loss: 30.4189 - val_acc: 0.8494
Epoch 2/30
- 1s - loss: 11.0520 - acc: 0.8323 - val_loss: 1.4735 - val_acc: 0.8385
Epoch 3/30
- 1s - loss: 0.6631 - acc: 0.8495 - val_loss: 0.5519 - val_acc: 0.8064
Epoch 4/30
- 1s - loss: 0.4259 - acc: 0.8766 - val_loss: 0.6027 - val_acc: 0.7756
Epoch 5/30
- 1s - loss: 0.4122 - acc: 0.8739 - val_loss: 0.5253 - val_acc: 0.8179
Epoch 6/30
- 1s - loss: 0.4033 - acc: 0.8793 - val_loss: 0.4588 - val_acc: 0.8519
Epoch 7/30
- 1s - loss: 0.3780 - acc: 0.8778 - val_loss: 0.3967 - val_acc: 0.8744
Epoch 8/30
- 1s - loss: 0.3839 - acc: 0.8827 - val_loss: 0.5043 - val_acc: 0.8167

```



```

Epoch 9/30
  - 1s - loss: 0.3753 - acc: 0.8817 - val_loss: 0.4157 - val_acc: 0.8641
Epoch 10/30
  - 1s - loss: 0.3996 - acc: 0.8731 - val_loss: 0.6942 - val_acc: 0.7987
Epoch 11/30
  - 1s - loss: 0.3764 - acc: 0.8859 - val_loss: 0.4520 - val_acc: 0.8186
Epoch 12/30
  - 1s - loss: 0.3849 - acc: 0.8803 - val_loss: 0.4719 - val_acc: 0.8487
Epoch 13/30
  - 1s - loss: 0.3882 - acc: 0.8761 - val_loss: 0.4055 - val_acc: 0.8577
Epoch 14/30
  - 1s - loss: 0.3581 - acc: 0.8879 - val_loss: 0.4481 - val_acc: 0.8474
Epoch 15/30
  - 1s - loss: 0.3585 - acc: 0.8869 - val_loss: 0.4134 - val_acc: 0.8628
Epoch 16/30
  - 1s - loss: 0.3972 - acc: 0.8803 - val_loss: 0.3878 - val_acc: 0.8731
Epoch 17/30
  - 1s - loss: 0.3563 - acc: 0.8903 - val_loss: 0.3714 - val_acc: 0.8699
Epoch 18/30
  - 1s - loss: 0.3531 - acc: 0.8832 - val_loss: 0.4143 - val_acc: 0.8551
Epoch 19/30
  - 1s - loss: 0.3581 - acc: 0.8827 - val_loss: 0.3882 - val_acc: 0.8615
Epoch 20/30
  - 1s - loss: 0.3579 - acc: 0.8803 - val_loss: 0.4665 - val_acc: 0.8462
Epoch 21/30
  - 1s - loss: 0.3494 - acc: 0.8876 - val_loss: 0.4147 - val_acc: 0.8590
Epoch 22/30
  - 1s - loss: 0.3519 - acc: 0.8913 - val_loss: 0.4253 - val_acc: 0.8449
Epoch 23/30
  - 1s - loss: 0.3610 - acc: 0.8837 - val_loss: 0.4454 - val_acc: 0.8673
Epoch 24/30
  - 1s - loss: 0.3505 - acc: 0.8827 - val_loss: 0.4061 - val_acc: 0.8782
Epoch 25/30
  - 1s - loss: 0.3538 - acc: 0.8857 - val_loss: 0.4609 - val_acc: 0.8109
Epoch 26/30
  - 1s - loss: 0.3385 - acc: 0.8901 - val_loss: 0.7308 - val_acc: 0.7474
Epoch 27/30
  - 1s - loss: 0.3867 - acc: 0.8795 - val_loss: 0.3670 - val_acc: 0.8776
Epoch 28/30
  - 1s - loss: 0.3850 - acc: 0.8756 - val_loss: 0.3731 - val_acc: 0.8859
Epoch 29/30
  - 1s - loss: 0.3741 - acc: 0.8886 - val_loss: 0.3999 - val_acc: 0.8756
Epoch 30/30
  - 1s - loss: 0.3397 - acc: 0.8906 - val_loss: 0.4745 - val_acc: 0.8147
Train accuracy 0.8268994344725842 Test accuracy: 0.8147435897435897

```

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Layer (type)	Output Shape	Param #
--------------	--------------	---------

```

=====
conv1d_1 (Conv1D)                (None, 124, 32)                1472
-----
conv1d_2 (Conv1D)                (None, 122, 16)                1552
-----
dropout_1 (Dropout)              (None, 122, 16)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 61, 16)                0
-----
flatten_1 (Flatten)              (None, 976)                    0
-----
dense_1 (Dense)                  (None, 32)                     31264
-----
dense_2 (Dense)                  (None, 3)                      99
=====
Total params: 34,387
Trainable params: 34,387
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 26.0367 - acc: 0.8131 - val_loss: 6.2296 - val_acc: 0.8718
Epoch 2/30
  - 1s - loss: 2.4821 - acc: 0.8894 - val_loss: 0.9262 - val_acc: 0.8641
Epoch 3/30
  - 1s - loss: 0.4832 - acc: 0.8972 - val_loss: 0.4205 - val_acc: 0.8571
Epoch 4/30
  - 1s - loss: 0.3344 - acc: 0.8953 - val_loss: 0.4143 - val_acc: 0.8724
Epoch 5/30
  - 1s - loss: 0.3270 - acc: 0.8938 - val_loss: 0.3777 - val_acc: 0.8737
Epoch 6/30
  - 1s - loss: 0.3005 - acc: 0.8999 - val_loss: 0.5679 - val_acc: 0.8167
Epoch 7/30
  - 1s - loss: 0.3297 - acc: 0.8913 - val_loss: 0.3993 - val_acc: 0.8558
Epoch 8/30
  - 1s - loss: 0.3165 - acc: 0.8918 - val_loss: 0.3969 - val_acc: 0.8782
Epoch 9/30
  - 1s - loss: 0.3082 - acc: 0.9021 - val_loss: 0.3782 - val_acc: 0.8628
Epoch 10/30
  - 1s - loss: 0.2792 - acc: 0.9039 - val_loss: 0.3471 - val_acc: 0.8769
Epoch 11/30
  - 1s - loss: 0.2952 - acc: 0.8987 - val_loss: 0.3816 - val_acc: 0.8686
Epoch 12/30
  - 1s - loss: 0.2875 - acc: 0.8957 - val_loss: 0.3478 - val_acc: 0.8827
Epoch 13/30
  - 1s - loss: 0.3112 - acc: 0.9019 - val_loss: 0.3432 - val_acc: 0.8833
Epoch 14/30

```

```

- 1s - loss: 0.2716 - acc: 0.9036 - val_loss: 0.3451 - val_acc: 0.8641
Epoch 15/30
- 1s - loss: 0.2804 - acc: 0.9031 - val_loss: 0.3699 - val_acc: 0.8545
Epoch 16/30
- 1s - loss: 0.2701 - acc: 0.9034 - val_loss: 0.3553 - val_acc: 0.8628
Epoch 17/30
- 1s - loss: 0.2948 - acc: 0.8953 - val_loss: 0.3500 - val_acc: 0.8827
Epoch 18/30
- 1s - loss: 0.2866 - acc: 0.9016 - val_loss: 0.3536 - val_acc: 0.8750
Epoch 19/30
- 1s - loss: 0.2746 - acc: 0.9024 - val_loss: 0.3360 - val_acc: 0.8763
Epoch 20/30
- 1s - loss: 0.2926 - acc: 0.8994 - val_loss: 0.3470 - val_acc: 0.8667
Epoch 21/30
- 1s - loss: 0.2742 - acc: 0.9041 - val_loss: 0.3617 - val_acc: 0.8692
Epoch 22/30
- 1s - loss: 0.2770 - acc: 0.8987 - val_loss: 0.3180 - val_acc: 0.8763
Epoch 23/30
- 1s - loss: 0.2758 - acc: 0.9002 - val_loss: 0.4247 - val_acc: 0.8551
Epoch 24/30
- 1s - loss: 0.2842 - acc: 0.8999 - val_loss: 0.3297 - val_acc: 0.8769
Epoch 25/30
- 1s - loss: 0.2698 - acc: 0.9021 - val_loss: 0.3242 - val_acc: 0.8712
Epoch 26/30
- 1s - loss: 0.2833 - acc: 0.8925 - val_loss: 0.3726 - val_acc: 0.8628
Epoch 27/30
- 1s - loss: 0.2732 - acc: 0.9031 - val_loss: 0.3577 - val_acc: 0.8615
Epoch 28/30
- 1s - loss: 0.2826 - acc: 0.9016 - val_loss: 0.3456 - val_acc: 0.8782
Epoch 29/30
- 1s - loss: 0.2695 - acc: 0.9044 - val_loss: 0.3422 - val_acc: 0.8737
Epoch 30/30
- 1s - loss: 0.2720 - acc: 0.8965 - val_loss: 0.3253 - val_acc: 0.8846
Train accuracy 0.8962380132776002 Test accuracy: 0.8846153846153846

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 16)	2576
dropout_1 (Dropout)	(None, 118, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 16)	0
flatten_1 (Flatten)	(None, 368)	0

dense_1 (Dense)	(None, 64)	23616
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dense_2 (Dense)	(None, 3)	195
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Total params: 28,435  
 Trainable params: 28,435  
 Non-trainable params: 0

---

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35

- 4s - loss: 4.6078 - acc: 0.8338 - val\_loss: 0.6277 - val\_acc: 0.7974

Epoch 2/35

- 3s - loss: 0.4210 - acc: 0.8618 - val\_loss: 0.4797 - val\_acc: 0.8269

Epoch 3/35

- 3s - loss: 0.4187 - acc: 0.8753 - val\_loss: 0.4417 - val\_acc: 0.8231

Epoch 4/35

- 3s - loss: 0.3944 - acc: 0.8721 - val\_loss: 0.3875 - val\_acc: 0.8808

Epoch 5/35

- 3s - loss: 0.3899 - acc: 0.8798 - val\_loss: 0.5157 - val\_acc: 0.8442

Epoch 6/35

- 3s - loss: 0.3896 - acc: 0.8810 - val\_loss: 0.4246 - val\_acc: 0.8679

Epoch 7/35

- 3s - loss: 0.3733 - acc: 0.8803 - val\_loss: 0.3779 - val\_acc: 0.8731

Epoch 8/35

- 3s - loss: 0.3684 - acc: 0.8839 - val\_loss: 0.4468 - val\_acc: 0.8615

Epoch 9/35

- 3s - loss: 0.3786 - acc: 0.8822 - val\_loss: 0.4192 - val\_acc: 0.8641

Epoch 10/35

- 3s - loss: 0.3578 - acc: 0.8822 - val\_loss: 0.4157 - val\_acc: 0.8788

Epoch 11/35

- 3s - loss: 0.3573 - acc: 0.8898 - val\_loss: 0.6348 - val\_acc: 0.6763

Epoch 12/35

- 3s - loss: 0.3718 - acc: 0.8785 - val\_loss: 0.7686 - val\_acc: 0.8404

Epoch 13/35

- 3s - loss: 0.3662 - acc: 0.8835 - val\_loss: 0.6348 - val\_acc: 0.8378

Epoch 14/35

- 3s - loss: 0.3652 - acc: 0.8832 - val\_loss: 0.6029 - val\_acc: 0.7135

Epoch 15/35

- 3s - loss: 0.3479 - acc: 0.8884 - val\_loss: 0.5569 - val\_acc: 0.8686

Epoch 16/35

- 3s - loss: 0.3684 - acc: 0.8913 - val\_loss: 0.4259 - val\_acc: 0.8673

Epoch 17/35

- 3s - loss: 0.3432 - acc: 0.8830 - val\_loss: 0.4825 - val\_acc: 0.8583

Epoch 18/35

- 3s - loss: 0.3663 - acc: 0.8876 - val\_loss: 0.4726 - val\_acc: 0.8481

Epoch 19/35

- 3s - loss: 0.3526 - acc: 0.8871 - val\_loss: 0.4848 - val\_acc: 0.8718

```

Epoch 20/35
- 3s - loss: 0.3502 - acc: 0.8894 - val_loss: 0.5696 - val_acc: 0.8667
Epoch 21/35
- 3s - loss: 0.3401 - acc: 0.8874 - val_loss: 0.4509 - val_acc: 0.8391
Epoch 22/35
- 3s - loss: 0.3554 - acc: 0.8857 - val_loss: 0.6387 - val_acc: 0.7218
Epoch 23/35
- 3s - loss: 0.3584 - acc: 0.8788 - val_loss: 0.4560 - val_acc: 0.8385
Epoch 24/35
- 3s - loss: 0.3392 - acc: 0.8886 - val_loss: 0.3733 - val_acc: 0.8590
Epoch 25/35
- 3s - loss: 0.3528 - acc: 0.8879 - val_loss: 0.5545 - val_acc: 0.8295
Epoch 26/35
- 3s - loss: 0.3580 - acc: 0.8876 - val_loss: 0.3970 - val_acc: 0.8833
Epoch 27/35
- 3s - loss: 0.3539 - acc: 0.8886 - val_loss: 0.3992 - val_acc: 0.8564
Epoch 28/35
- 3s - loss: 0.3627 - acc: 0.8916 - val_loss: 0.4535 - val_acc: 0.8391
Epoch 29/35
- 3s - loss: 0.3539 - acc: 0.8820 - val_loss: 0.3789 - val_acc: 0.8750
Epoch 30/35
- 3s - loss: 0.3535 - acc: 0.8898 - val_loss: 0.3765 - val_acc: 0.8660
Epoch 31/35
- 3s - loss: 0.3603 - acc: 0.8864 - val_loss: 0.3627 - val_acc: 0.8679
Epoch 32/35
- 3s - loss: 0.3384 - acc: 0.8881 - val_loss: 0.4178 - val_acc: 0.8622
Epoch 33/35
- 3s - loss: 0.3582 - acc: 0.8844 - val_loss: 0.6131 - val_acc: 0.7237
Epoch 34/35
- 3s - loss: 0.3701 - acc: 0.8847 - val_loss: 0.4470 - val_acc: 0.8538
Epoch 35/35
- 3s - loss: 0.3568 - acc: 0.8815 - val_loss: 0.4948 - val_acc: 0.7410
Train accuracy 0.745758544381608 Test accuracy: 0.7410256410256411

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 124, 16)	2032
dropout_1 (Dropout)	(None, 124, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 62, 16)	0
flatten_1 (Flatten)	(None, 992)	0
dense_1 (Dense)	(None, 64)	63552

```

-----
dense_2 (Dense)                (None, 3)                195
=====
Total params: 66,955
Trainable params: 66,955
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 1s - loss: 24.3662 - acc: 0.8129 - val_loss: 9.9430 - val_acc: 0.8788
Epoch 2/30
  - 1s - loss: 5.0248 - acc: 0.8842 - val_loss: 2.0056 - val_acc: 0.8596
Epoch 3/30
  - 1s - loss: 0.9594 - acc: 0.8903 - val_loss: 0.5637 - val_acc: 0.8179
Epoch 4/30
  - 1s - loss: 0.3637 - acc: 0.8962 - val_loss: 0.4833 - val_acc: 0.8064
Epoch 5/30
  - 1s - loss: 0.3332 - acc: 0.8923 - val_loss: 0.3953 - val_acc: 0.8532
Epoch 6/30
  - 1s - loss: 0.3038 - acc: 0.8977 - val_loss: 0.3941 - val_acc: 0.8609
Epoch 7/30
  - 1s - loss: 0.3021 - acc: 0.8945 - val_loss: 0.3635 - val_acc: 0.8667
Epoch 8/30
  - 1s - loss: 0.2924 - acc: 0.8989 - val_loss: 0.4231 - val_acc: 0.8173
Epoch 9/30
  - 1s - loss: 0.2876 - acc: 0.9009 - val_loss: 0.3338 - val_acc: 0.8718
Epoch 10/30
  - 1s - loss: 0.2844 - acc: 0.8960 - val_loss: 0.3326 - val_acc: 0.8788
Epoch 11/30
  - 1s - loss: 0.2924 - acc: 0.8992 - val_loss: 0.3640 - val_acc: 0.8788
Epoch 12/30
  - 1s - loss: 0.2745 - acc: 0.9007 - val_loss: 0.3244 - val_acc: 0.8744
Epoch 13/30
  - 1s - loss: 0.2727 - acc: 0.9044 - val_loss: 0.3216 - val_acc: 0.8891
Epoch 14/30
  - 1s - loss: 0.2646 - acc: 0.9048 - val_loss: 0.3924 - val_acc: 0.8571
Epoch 15/30
  - 1s - loss: 0.2717 - acc: 0.9019 - val_loss: 0.3922 - val_acc: 0.8615
Epoch 16/30
  - 1s - loss: 0.2695 - acc: 0.9019 - val_loss: 0.3279 - val_acc: 0.8699
Epoch 17/30
  - 1s - loss: 0.2617 - acc: 0.9090 - val_loss: 0.3434 - val_acc: 0.8699
Epoch 18/30
  - 1s - loss: 0.2707 - acc: 0.9056 - val_loss: 0.3144 - val_acc: 0.8756
Epoch 19/30
  - 1s - loss: 0.2665 - acc: 0.9002 - val_loss: 0.2993 - val_acc: 0.8917
Epoch 20/30

```

```

- 1s - loss: 0.2638 - acc: 0.9056 - val_loss: 0.3158 - val_acc: 0.8872
Epoch 21/30
- 1s - loss: 0.2568 - acc: 0.9090 - val_loss: 0.3535 - val_acc: 0.8583
Epoch 22/30
- 1s - loss: 0.2656 - acc: 0.8997 - val_loss: 0.3067 - val_acc: 0.8840
Epoch 23/30
- 1s - loss: 0.2609 - acc: 0.9039 - val_loss: 0.3093 - val_acc: 0.8891
Epoch 24/30
- 1s - loss: 0.2663 - acc: 0.9039 - val_loss: 0.5176 - val_acc: 0.8590
Epoch 25/30
- 1s - loss: 0.2641 - acc: 0.9024 - val_loss: 0.3456 - val_acc: 0.8654
Epoch 26/30
- 1s - loss: 0.2633 - acc: 0.9004 - val_loss: 0.4427 - val_acc: 0.8519
Epoch 27/30
- 1s - loss: 0.2547 - acc: 0.9071 - val_loss: 0.3427 - val_acc: 0.8705
Epoch 28/30
- 1s - loss: 0.2698 - acc: 0.9012 - val_loss: 0.3360 - val_acc: 0.8756
Epoch 29/30
- 1s - loss: 0.2551 - acc: 0.9107 - val_loss: 0.3282 - val_acc: 0.8904
Epoch 30/30
- 1s - loss: 0.2606 - acc: 0.9039 - val_loss: 0.3100 - val_acc: 0.8968
Train accuracy 0.9104991394148021 Test accuracy: 0.8967948717948718
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 16)	15632
dense_2 (Dense)	(None, 3)	51

```

=====
Total params: 18,707
Trainable params: 18,707
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 3s - loss: 6.8487 - acc: 0.8296 - val_loss: 0.6860 - val_acc: 0.7808

```

Epoch 2/30  
- 2s - loss: 0.4185 - acc: 0.8790 - val\_loss: 0.4572 - val\_acc: 0.8365  
Epoch 3/30  
- 2s - loss: 0.3720 - acc: 0.8766 - val\_loss: 0.4745 - val\_acc: 0.7897  
Epoch 4/30  
- 2s - loss: 0.3571 - acc: 0.8822 - val\_loss: 0.4015 - val\_acc: 0.8468  
Epoch 5/30  
- 2s - loss: 0.3482 - acc: 0.8894 - val\_loss: 0.4722 - val\_acc: 0.8333  
Epoch 6/30  
- 2s - loss: 0.3460 - acc: 0.8866 - val\_loss: 0.4529 - val\_acc: 0.8109  
Epoch 7/30  
- 2s - loss: 0.3281 - acc: 0.8864 - val\_loss: 0.3721 - val\_acc: 0.8622  
Epoch 8/30  
- 2s - loss: 0.3257 - acc: 0.8884 - val\_loss: 0.4343 - val\_acc: 0.8494  
Epoch 9/30  
- 2s - loss: 0.3082 - acc: 0.8967 - val\_loss: 0.3569 - val\_acc: 0.8609  
Epoch 10/30  
- 2s - loss: 0.3090 - acc: 0.9004 - val\_loss: 0.3505 - val\_acc: 0.8814  
Epoch 11/30  
- 2s - loss: 0.3134 - acc: 0.8928 - val\_loss: 0.6904 - val\_acc: 0.6654  
Epoch 12/30  
- 2s - loss: 0.3176 - acc: 0.8891 - val\_loss: 0.4599 - val\_acc: 0.8212  
Epoch 13/30  
- 2s - loss: 0.3102 - acc: 0.8894 - val\_loss: 0.5355 - val\_acc: 0.8244  
Epoch 14/30  
- 2s - loss: 0.3239 - acc: 0.8916 - val\_loss: 0.5230 - val\_acc: 0.7160  
Epoch 15/30  
- 2s - loss: 0.3296 - acc: 0.8923 - val\_loss: 0.3519 - val\_acc: 0.8718  
Epoch 16/30  
- 2s - loss: 0.3235 - acc: 0.8886 - val\_loss: 0.3582 - val\_acc: 0.8744  
Epoch 17/30  
- 2s - loss: 0.3072 - acc: 0.8847 - val\_loss: 0.3428 - val\_acc: 0.8744  
Epoch 18/30  
- 2s - loss: 0.2937 - acc: 0.9016 - val\_loss: 0.4835 - val\_acc: 0.7513  
Epoch 19/30  
- 2s - loss: 0.3075 - acc: 0.8930 - val\_loss: 0.3450 - val\_acc: 0.8692  
Epoch 20/30  
- 2s - loss: 0.2921 - acc: 0.8980 - val\_loss: 0.3562 - val\_acc: 0.8808  
Epoch 21/30  
- 2s - loss: 0.3025 - acc: 0.8965 - val\_loss: 0.3748 - val\_acc: 0.8718  
Epoch 22/30  
- 2s - loss: 0.2992 - acc: 0.8977 - val\_loss: 0.4744 - val\_acc: 0.7340  
Epoch 23/30  
- 2s - loss: 0.2986 - acc: 0.8943 - val\_loss: 0.3356 - val\_acc: 0.8769  
Epoch 24/30  
- 2s - loss: 0.2976 - acc: 0.8945 - val\_loss: 0.3230 - val\_acc: 0.8731  
Epoch 25/30  
- 2s - loss: 0.3107 - acc: 0.8903 - val\_loss: 0.3468 - val\_acc: 0.8731



Epoch 26/30  
 - 2s - loss: 0.2977 - acc: 0.8955 - val\_loss: 0.3428 - val\_acc: 0.8673  
 Epoch 27/30  
 - 2s - loss: 0.3052 - acc: 0.8925 - val\_loss: 0.3361 - val\_acc: 0.8776  
 Epoch 28/30  
 - 2s - loss: 0.2877 - acc: 0.8960 - val\_loss: 0.4061 - val\_acc: 0.8256  
 Epoch 29/30  
 - 2s - loss: 0.3045 - acc: 0.8962 - val\_loss: 0.3892 - val\_acc: 0.8673  
 Epoch 30/30  
 - 2s - loss: 0.2993 - acc: 0.8935 - val\_loss: 0.3417 - val\_acc: 0.8821  
 Train accuracy 0.9141873616916646 Test accuracy: 0.882051282051282

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 24)	2040
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

Total params: 65,531  
 Trainable params: 65,531  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/25  
 - 2s - loss: 21.0202 - acc: 0.8227 - val\_loss: 4.6590 - val\_acc: 0.8615  
 Epoch 2/25  
 - 1s - loss: 1.5321 - acc: 0.8748 - val\_loss: 0.5389 - val\_acc: 0.8615  
 Epoch 3/25  
 - 1s - loss: 0.4209 - acc: 0.8748 - val\_loss: 0.5672 - val\_acc: 0.7897  
 Epoch 4/25  
 - 1s - loss: 0.3767 - acc: 0.8803 - val\_loss: 0.5465 - val\_acc: 0.7840  
 Epoch 5/25  
 - 1s - loss: 0.3354 - acc: 0.8938 - val\_loss: 0.3843 - val\_acc: 0.8590  
 Epoch 6/25  
 - 1s - loss: 0.3213 - acc: 0.8884 - val\_loss: 0.3750 - val\_acc: 0.8641  
 Epoch 7/25

```

- 1s - loss: 0.3183 - acc: 0.8913 - val_loss: 0.3563 - val_acc: 0.8840
Epoch 8/25
- 1s - loss: 0.3126 - acc: 0.8957 - val_loss: 0.4202 - val_acc: 0.8256
Epoch 9/25
- 1s - loss: 0.3085 - acc: 0.8992 - val_loss: 0.3863 - val_acc: 0.8622
Epoch 10/25
- 1s - loss: 0.3005 - acc: 0.8957 - val_loss: 0.3665 - val_acc: 0.8788
Epoch 11/25
- 1s - loss: 0.2960 - acc: 0.8977 - val_loss: 0.3699 - val_acc: 0.8744
Epoch 12/25
- 1s - loss: 0.2954 - acc: 0.8977 - val_loss: 0.3547 - val_acc: 0.8833
Epoch 13/25
- 1s - loss: 0.3038 - acc: 0.8965 - val_loss: 0.3570 - val_acc: 0.8769
Epoch 14/25
- 1s - loss: 0.2809 - acc: 0.9031 - val_loss: 0.3825 - val_acc: 0.8699
Epoch 15/25
- 1s - loss: 0.3127 - acc: 0.8980 - val_loss: 0.3791 - val_acc: 0.8577
Epoch 16/25
- 1s - loss: 0.2917 - acc: 0.8953 - val_loss: 0.3416 - val_acc: 0.8833
Epoch 17/25
- 1s - loss: 0.2922 - acc: 0.9044 - val_loss: 0.3465 - val_acc: 0.8769
Epoch 18/25
- 1s - loss: 0.2830 - acc: 0.9024 - val_loss: 0.3396 - val_acc: 0.8853
Epoch 19/25
- 1s - loss: 0.2903 - acc: 0.8989 - val_loss: 0.3431 - val_acc: 0.8923
Epoch 20/25
- 1s - loss: 0.2831 - acc: 0.9066 - val_loss: 0.3416 - val_acc: 0.8917
Epoch 21/25
- 1s - loss: 0.2751 - acc: 0.9068 - val_loss: 0.3522 - val_acc: 0.8756
Epoch 22/25
- 1s - loss: 0.2721 - acc: 0.9078 - val_loss: 0.3434 - val_acc: 0.8821
Epoch 23/25
- 1s - loss: 0.2962 - acc: 0.8989 - val_loss: 0.3416 - val_acc: 0.8904
Epoch 24/25
- 1s - loss: 0.2802 - acc: 0.9063 - val_loss: 0.3243 - val_acc: 0.8968
Epoch 25/25
- 1s - loss: 0.2830 - acc: 0.9012 - val_loss: 0.3874 - val_acc: 0.8590
Train accuracy 0.885910990902385 Test accuracy: 0.8589743589743589

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Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 122, 32)          2048
-----
conv1d_2 (Conv1D)            (None, 120, 32)          3104
-----
dropout_1 (Dropout)          (None, 120, 32)          0
-----

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max_pooling1d_1 (MaxPooling1 (None, 60, 32)          0
-----
flatten_1 (Flatten)          (None, 1920)          0
-----
dense_1 (Dense)              (None, 64)          122944
-----
dense_2 (Dense)              (None, 3)           195
=====
Total params: 128,291
Trainable params: 128,291
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 61.7890 - acc: 0.7915 - val_loss: 6.6004 - val_acc: 0.8077
Epoch 2/30
  - 1s - loss: 1.5842 - acc: 0.8402 - val_loss: 0.5764 - val_acc: 0.8462
Epoch 3/30
  - 1s - loss: 0.4809 - acc: 0.8579 - val_loss: 0.5324 - val_acc: 0.7968
Epoch 4/30
  - 1s - loss: 0.4481 - acc: 0.8719 - val_loss: 0.6561 - val_acc: 0.7788
Epoch 5/30
  - 1s - loss: 0.4334 - acc: 0.8670 - val_loss: 0.6865 - val_acc: 0.7628
Epoch 6/30
  - 1s - loss: 0.4063 - acc: 0.8753 - val_loss: 0.7110 - val_acc: 0.7814
Epoch 7/30
  - 1s - loss: 0.4491 - acc: 0.8606 - val_loss: 0.5099 - val_acc: 0.8506
Epoch 8/30
  - 1s - loss: 0.4062 - acc: 0.8790 - val_loss: 0.5762 - val_acc: 0.7897
Epoch 9/30
  - 1s - loss: 0.3978 - acc: 0.8763 - val_loss: 0.4166 - val_acc: 0.8821
Epoch 10/30
  - 1s - loss: 0.4024 - acc: 0.8721 - val_loss: 0.8304 - val_acc: 0.7654
Epoch 11/30
  - 1s - loss: 0.3987 - acc: 0.8771 - val_loss: 0.4295 - val_acc: 0.8308
Epoch 12/30
  - 1s - loss: 0.4252 - acc: 0.8702 - val_loss: 0.4347 - val_acc: 0.8558
Epoch 13/30
  - 1s - loss: 0.4065 - acc: 0.8800 - val_loss: 0.4231 - val_acc: 0.8782
Epoch 14/30
  - 1s - loss: 0.3898 - acc: 0.8788 - val_loss: 0.6307 - val_acc: 0.7724
Epoch 15/30
  - 1s - loss: 0.4170 - acc: 0.8739 - val_loss: 0.4919 - val_acc: 0.8346
Epoch 16/30
  - 1s - loss: 0.4172 - acc: 0.8746 - val_loss: 0.4077 - val_acc: 0.8705
Epoch 17/30
  - 1s - loss: 0.3861 - acc: 0.8837 - val_loss: 0.4264 - val_acc: 0.8564

```

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Epoch 18/30
- 1s - loss: 0.4292 - acc: 0.8712 - val_loss: 0.6185 - val_acc: 0.8519
Epoch 19/30
- 1s - loss: 0.3859 - acc: 0.8714 - val_loss: 0.4144 - val_acc: 0.8590
Epoch 20/30
- 1s - loss: 0.4047 - acc: 0.8773 - val_loss: 0.6096 - val_acc: 0.8192
Epoch 21/30
- 1s - loss: 0.3787 - acc: 0.8862 - val_loss: 0.4355 - val_acc: 0.8526
Epoch 22/30
- 1s - loss: 0.3809 - acc: 0.8817 - val_loss: 0.5824 - val_acc: 0.7987
Epoch 23/30
- 1s - loss: 0.3838 - acc: 0.8807 - val_loss: 0.4377 - val_acc: 0.8776
Epoch 24/30
- 1s - loss: 0.3892 - acc: 0.8788 - val_loss: 0.4788 - val_acc: 0.8000
Epoch 25/30
- 1s - loss: 0.3607 - acc: 0.8849 - val_loss: 0.6587 - val_acc: 0.8250
Epoch 26/30
- 1s - loss: 0.4121 - acc: 0.8726 - val_loss: 0.4022 - val_acc: 0.8705
Epoch 27/30
- 1s - loss: 0.3647 - acc: 0.8822 - val_loss: 0.3942 - val_acc: 0.8872
Epoch 28/30
- 1s - loss: 0.4080 - acc: 0.8712 - val_loss: 0.5171 - val_acc: 0.8641
Epoch 29/30
- 1s - loss: 0.3676 - acc: 0.8906 - val_loss: 0.4369 - val_acc: 0.8583
Epoch 30/30
- 1s - loss: 0.3718 - acc: 0.8812 - val_loss: 0.6097 - val_acc: 0.7814
Train accuracy 0.7809195967543644 Test accuracy: 0.7814102564102564

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 16)	3600
dropout_1 (Dropout)	(None, 118, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 16)	0
flatten_1 (Flatten)	(None, 944)	0
dense_1 (Dense)	(None, 64)	60480
dense_2 (Dense)	(None, 3)	195

```

Total params: 65,747
Trainable params: 65,747
Non-trainable params: 0

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```

-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 12.6782 - acc: 0.8380 - val_loss: 4.0726 - val_acc: 0.8750
Epoch 2/30
  - 1s - loss: 1.9615 - acc: 0.8994 - val_loss: 0.9147 - val_acc: 0.8763
Epoch 3/30
  - 1s - loss: 0.5114 - acc: 0.9036 - val_loss: 0.4165 - val_acc: 0.8699
Epoch 4/30
  - 1s - loss: 0.3395 - acc: 0.9009 - val_loss: 0.4036 - val_acc: 0.8692
Epoch 5/30
  - 1s - loss: 0.3053 - acc: 0.8997 - val_loss: 0.3340 - val_acc: 0.8814
Epoch 6/30
  - 1s - loss: 0.2825 - acc: 0.9132 - val_loss: 0.3573 - val_acc: 0.8859
Epoch 7/30
  - 1s - loss: 0.2803 - acc: 0.9044 - val_loss: 0.4514 - val_acc: 0.8385
Epoch 8/30
  - 1s - loss: 0.3093 - acc: 0.9031 - val_loss: 0.3445 - val_acc: 0.8865
Epoch 9/30
  - 1s - loss: 0.2711 - acc: 0.9122 - val_loss: 0.3856 - val_acc: 0.8558
Epoch 10/30
  - 1s - loss: 0.2567 - acc: 0.9122 - val_loss: 0.3200 - val_acc: 0.8910
Epoch 11/30
  - 1s - loss: 0.2620 - acc: 0.9093 - val_loss: 0.3550 - val_acc: 0.8577
Epoch 12/30
  - 1s - loss: 0.2717 - acc: 0.9085 - val_loss: 0.3601 - val_acc: 0.8763
Epoch 13/30
  - 1s - loss: 0.2950 - acc: 0.9149 - val_loss: 0.3736 - val_acc: 0.8737
Epoch 14/30
  - 1s - loss: 0.2669 - acc: 0.9134 - val_loss: 0.3345 - val_acc: 0.8724
Epoch 15/30
  - 1s - loss: 0.2920 - acc: 0.9068 - val_loss: 0.3659 - val_acc: 0.8821
Epoch 16/30
  - 1s - loss: 0.2627 - acc: 0.9137 - val_loss: 0.3602 - val_acc: 0.8583
Epoch 17/30
  - 1s - loss: 0.2683 - acc: 0.9134 - val_loss: 0.3248 - val_acc: 0.8814
Epoch 18/30
  - 1s - loss: 0.2748 - acc: 0.9088 - val_loss: 0.3023 - val_acc: 0.8821
Epoch 19/30
  - 1s - loss: 0.2441 - acc: 0.9130 - val_loss: 0.3364 - val_acc: 0.8756
Epoch 20/30
  - 1s - loss: 0.2483 - acc: 0.9144 - val_loss: 0.3314 - val_acc: 0.8782
Epoch 21/30
  - 1s - loss: 0.2826 - acc: 0.9103 - val_loss: 0.3437 - val_acc: 0.8622
Epoch 22/30
  - 1s - loss: 0.2675 - acc: 0.9093 - val_loss: 0.3025 - val_acc: 0.8936
Epoch 23/30

```

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- 1s - loss: 0.2514 - acc: 0.9189 - val_loss: 0.3302 - val_acc: 0.8808
Epoch 24/30
- 1s - loss: 0.2643 - acc: 0.9127 - val_loss: 0.3159 - val_acc: 0.9083
Epoch 25/30
- 1s - loss: 0.2786 - acc: 0.9090 - val_loss: 0.3260 - val_acc: 0.8897
Epoch 26/30
- 1s - loss: 0.2820 - acc: 0.9112 - val_loss: 0.3013 - val_acc: 0.8962
Epoch 27/30
- 1s - loss: 0.2355 - acc: 0.9213 - val_loss: 0.3628 - val_acc: 0.8628
Epoch 28/30
- 1s - loss: 0.2688 - acc: 0.9105 - val_loss: 0.3470 - val_acc: 0.8917
Epoch 29/30
- 1s - loss: 0.2464 - acc: 0.9253 - val_loss: 0.2961 - val_acc: 0.9058
Epoch 30/30
- 1s - loss: 0.2410 - acc: 0.9194 - val_loss: 0.3182 - val_acc: 0.8929
Train accuracy 0.9055815097123187 Test accuracy: 0.8929487176430531
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 16)	2576
dropout_1 (Dropout)	(None, 118, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 16)	0
flatten_1 (Flatten)	(None, 368)	0
dense_1 (Dense)	(None, 32)	11808
dense_2 (Dense)	(None, 3)	99

```

Total params: 16,531
Trainable params: 16,531
Non-trainable params: 0
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```

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None
Train on 4067 samples, validate on 1560 samples
Epoch 1/35
- 2s - loss: 15.2014 - acc: 0.8330 - val_loss: 0.5496 - val_acc: 0.8218
Epoch 2/35
- 1s - loss: 0.3984 - acc: 0.8670 - val_loss: 0.5108 - val_acc: 0.8019
Epoch 3/35
- 1s - loss: 0.3681 - acc: 0.8766 - val_loss: 0.4770 - val_acc: 0.8301
Epoch 4/35
- 1s - loss: 0.3664 - acc: 0.8798 - val_loss: 0.4257 - val_acc: 0.8750

```

Epoch 5/35  
- 1s - loss: 0.3493 - acc: 0.8788 - val\_loss: 0.4036 - val\_acc: 0.8615

Epoch 6/35  
- 1s - loss: 0.3525 - acc: 0.8812 - val\_loss: 0.4690 - val\_acc: 0.8205

Epoch 7/35  
- 1s - loss: 0.3368 - acc: 0.8835 - val\_loss: 0.4015 - val\_acc: 0.8545

Epoch 8/35  
- 1s - loss: 0.3346 - acc: 0.8886 - val\_loss: 0.4878 - val\_acc: 0.8436

Epoch 9/35  
- 1s - loss: 0.3356 - acc: 0.8859 - val\_loss: 0.4015 - val\_acc: 0.8673

Epoch 10/35  
- 1s - loss: 0.3405 - acc: 0.8820 - val\_loss: 0.4059 - val\_acc: 0.8756

Epoch 11/35  
- 1s - loss: 0.3262 - acc: 0.8923 - val\_loss: 0.5510 - val\_acc: 0.6833

Epoch 12/35  
- 1s - loss: 0.3259 - acc: 0.8844 - val\_loss: 0.3901 - val\_acc: 0.8622

Epoch 13/35  
- 1s - loss: 0.3216 - acc: 0.8832 - val\_loss: 0.4671 - val\_acc: 0.8288

Epoch 14/35  
- 1s - loss: 0.3155 - acc: 0.8911 - val\_loss: 0.4631 - val\_acc: 0.8064

Epoch 15/35  
- 1s - loss: 0.3169 - acc: 0.8925 - val\_loss: 0.3928 - val\_acc: 0.8724

Epoch 16/35  
- 1s - loss: 0.3218 - acc: 0.8896 - val\_loss: 0.3874 - val\_acc: 0.8795

Epoch 17/35  
- 1s - loss: 0.3164 - acc: 0.8886 - val\_loss: 0.3960 - val\_acc: 0.8551

Epoch 18/35  
- 1s - loss: 0.3219 - acc: 0.8871 - val\_loss: 0.6011 - val\_acc: 0.8006

Epoch 19/35  
- 1s - loss: 0.3109 - acc: 0.8916 - val\_loss: 0.4613 - val\_acc: 0.8122

Epoch 20/35  
- 1s - loss: 0.3084 - acc: 0.8898 - val\_loss: 0.4155 - val\_acc: 0.8513

Epoch 21/35  
- 1s - loss: 0.2989 - acc: 0.8901 - val\_loss: 0.4785 - val\_acc: 0.8628

Epoch 22/35  
- 1s - loss: 0.3182 - acc: 0.8930 - val\_loss: 0.5503 - val\_acc: 0.6897

Epoch 23/35  
- 1s - loss: 0.3180 - acc: 0.8879 - val\_loss: 0.4223 - val\_acc: 0.8673

Epoch 24/35  
- 1s - loss: 0.3138 - acc: 0.8896 - val\_loss: 0.4771 - val\_acc: 0.8019

Epoch 25/35  
- 1s - loss: 0.3243 - acc: 0.8864 - val\_loss: 0.5009 - val\_acc: 0.8045

Epoch 26/35  
- 1s - loss: 0.3151 - acc: 0.8901 - val\_loss: 0.5228 - val\_acc: 0.8141

Epoch 27/35  
- 1s - loss: 0.3203 - acc: 0.8948 - val\_loss: 0.4357 - val\_acc: 0.8686

Epoch 28/35  
- 1s - loss: 0.3120 - acc: 0.8923 - val\_loss: 0.5932 - val\_acc: 0.6981

Epoch 29/35  
 - 1s - loss: 0.3107 - acc: 0.8967 - val\_loss: 0.4372 - val\_acc: 0.8442  
 Epoch 30/35  
 - 1s - loss: 0.3137 - acc: 0.8930 - val\_loss: 0.4843 - val\_acc: 0.8051  
 Epoch 31/35  
 - 1s - loss: 0.3230 - acc: 0.8940 - val\_loss: 0.6136 - val\_acc: 0.8301  
 Epoch 32/35  
 - 1s - loss: 0.3150 - acc: 0.8921 - val\_loss: 0.4210 - val\_acc: 0.8506  
 Epoch 33/35  
 - 1s - loss: 0.3175 - acc: 0.8930 - val\_loss: 0.7219 - val\_acc: 0.6885  
 Epoch 34/35  
 - 1s - loss: 0.3166 - acc: 0.8903 - val\_loss: 0.4040 - val\_acc: 0.8776  
 Epoch 35/35  
 - 1s - loss: 0.3145 - acc: 0.8943 - val\_loss: 0.7001 - val\_acc: 0.6756  
 Train accuracy 0.6606835505286452 Test accuracy: 0.6756410256410257

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 124, 16)	2032
dropout_1 (Dropout)	(None, 124, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 62, 16)	0
flatten_1 (Flatten)	(None, 992)	0
dense_1 (Dense)	(None, 64)	63552
dense_2 (Dense)	(None, 3)	195

Total params: 66,955  
 Trainable params: 66,955  
 Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30  
 - 1s - loss: 48.4957 - acc: 0.8156 - val\_loss: 20.3294 - val\_acc: 0.8071  
 Epoch 2/30  
 - 1s - loss: 9.9924 - acc: 0.8704 - val\_loss: 3.3942 - val\_acc: 0.8647  
 Epoch 3/30  
 - 1s - loss: 1.3814 - acc: 0.8761 - val\_loss: 0.5942 - val\_acc: 0.7891  
 Epoch 4/30  
 - 1s - loss: 0.4082 - acc: 0.8793 - val\_loss: 0.5354 - val\_acc: 0.7782  
 Epoch 5/30



- 1s - loss: 0.3763 - acc: 0.8815 - val\_loss: 0.5306 - val\_acc: 0.8147  
Epoch 6/30  
- 1s - loss: 0.3421 - acc: 0.8854 - val\_loss: 0.3928 - val\_acc: 0.8628  
Epoch 7/30  
- 1s - loss: 0.3561 - acc: 0.8805 - val\_loss: 0.4062 - val\_acc: 0.8609  
Epoch 8/30  
- 1s - loss: 0.3229 - acc: 0.8911 - val\_loss: 0.4726 - val\_acc: 0.8096  
Epoch 9/30  
- 1s - loss: 0.3220 - acc: 0.8955 - val\_loss: 0.3894 - val\_acc: 0.8603  
Epoch 10/30  
- 1s - loss: 0.3192 - acc: 0.8908 - val\_loss: 0.4327 - val\_acc: 0.8615  
Epoch 11/30  
- 1s - loss: 0.3108 - acc: 0.8906 - val\_loss: 0.4154 - val\_acc: 0.8346  
Epoch 12/30  
- 1s - loss: 0.3093 - acc: 0.8913 - val\_loss: 0.3504 - val\_acc: 0.8763  
Epoch 13/30  
- 1s - loss: 0.3039 - acc: 0.8980 - val\_loss: 0.3497 - val\_acc: 0.8788  
Epoch 14/30  
- 1s - loss: 0.2922 - acc: 0.8992 - val\_loss: 0.4432 - val\_acc: 0.8397  
Epoch 15/30  
- 1s - loss: 0.3053 - acc: 0.8948 - val\_loss: 0.4355 - val\_acc: 0.8429  
Epoch 16/30  
- 1s - loss: 0.3052 - acc: 0.8923 - val\_loss: 0.3397 - val\_acc: 0.8763  
Epoch 17/30  
- 1s - loss: 0.2876 - acc: 0.9012 - val\_loss: 0.3372 - val\_acc: 0.8750  
Epoch 18/30  
- 1s - loss: 0.3014 - acc: 0.8940 - val\_loss: 0.3446 - val\_acc: 0.8712  
Epoch 19/30  
- 1s - loss: 0.2950 - acc: 0.8916 - val\_loss: 0.3614 - val\_acc: 0.8756  
Epoch 20/30  
- 1s - loss: 0.2956 - acc: 0.8935 - val\_loss: 0.4798 - val\_acc: 0.8103  
Epoch 21/30  
- 1s - loss: 0.2911 - acc: 0.8985 - val\_loss: 0.3685 - val\_acc: 0.8615  
Epoch 22/30  
- 1s - loss: 0.2913 - acc: 0.8945 - val\_loss: 0.3311 - val\_acc: 0.8776  
Epoch 23/30  
- 1s - loss: 0.2872 - acc: 0.8921 - val\_loss: 0.3530 - val\_acc: 0.8776  
Epoch 24/30  
- 1s - loss: 0.2843 - acc: 0.8955 - val\_loss: 0.3569 - val\_acc: 0.8763  
Epoch 25/30  
- 1s - loss: 0.2913 - acc: 0.8960 - val\_loss: 0.4266 - val\_acc: 0.8596  
Epoch 26/30  
- 1s - loss: 0.2945 - acc: 0.8935 - val\_loss: 0.3404 - val\_acc: 0.8801  
Epoch 27/30  
- 1s - loss: 0.2785 - acc: 0.8997 - val\_loss: 0.3292 - val\_acc: 0.8814  
Epoch 28/30  
- 1s - loss: 0.2992 - acc: 0.8903 - val\_loss: 0.3772 - val\_acc: 0.8506  
Epoch 29/30

- 1s - loss: 0.2880 - acc: 0.9007 - val\_loss: 0.3541 - val\_acc: 0.8737  
Epoch 30/30  
- 1s - loss: 0.2917 - acc: 0.8962 - val\_loss: 0.3823 - val\_acc: 0.8372  
Train accuracy 0.8377182198180477 Test accuracy: 0.8371794871794872

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
<hr/>		
conv1d_2 (Conv1D)	(None, 122, 16)	1552
<hr/>		
dropout_1 (Dropout)	(None, 122, 16)	0
<hr/>		
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
<hr/>		
flatten_1 (Flatten)	(None, 976)	0
<hr/>		
dense_1 (Dense)	(None, 16)	15632
<hr/>		
dense_2 (Dense)	(None, 3)	51
<hr/>		

Total params: 18,707  
Trainable params: 18,707  
Non-trainable params: 0

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None  
Train on 4067 samples, validate on 1560 samples  
Epoch 1/30  
- 3s - loss: 6.8408 - acc: 0.8441 - val\_loss: 0.7709 - val\_acc: 0.7853  
Epoch 2/30  
- 2s - loss: 0.4288 - acc: 0.8859 - val\_loss: 0.4314 - val\_acc: 0.8538  
Epoch 3/30  
- 2s - loss: 0.3410 - acc: 0.8923 - val\_loss: 0.4027 - val\_acc: 0.8391  
Epoch 4/30  
- 2s - loss: 0.3124 - acc: 0.8928 - val\_loss: 0.3735 - val\_acc: 0.8487  
Epoch 5/30  
- 2s - loss: 0.3133 - acc: 0.8957 - val\_loss: 0.3409 - val\_acc: 0.8756  
Epoch 6/30  
- 2s - loss: 0.3123 - acc: 0.8950 - val\_loss: 0.3934 - val\_acc: 0.8462  
Epoch 7/30  
- 2s - loss: 0.2933 - acc: 0.8970 - val\_loss: 0.3548 - val\_acc: 0.8718  
Epoch 8/30  
- 2s - loss: 0.3006 - acc: 0.8948 - val\_loss: 0.3963 - val\_acc: 0.8353  
Epoch 9/30  
- 2s - loss: 0.2891 - acc: 0.9021 - val\_loss: 0.3316 - val\_acc: 0.8801  
Epoch 10/30  
- 2s - loss: 0.2863 - acc: 0.9053 - val\_loss: 0.3290 - val\_acc: 0.8801

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Epoch 11/30
  - 2s - loss: 0.2818 - acc: 0.9019 - val_loss: 0.5855 - val_acc: 0.7372
Epoch 12/30
  - 2s - loss: 0.2841 - acc: 0.8999 - val_loss: 0.4008 - val_acc: 0.8462
Epoch 13/30
  - 2s - loss: 0.2799 - acc: 0.8987 - val_loss: 0.4074 - val_acc: 0.8372
Epoch 14/30
  - 2s - loss: 0.2959 - acc: 0.9004 - val_loss: 0.4543 - val_acc: 0.7532
Epoch 15/30
  - 2s - loss: 0.2894 - acc: 0.9021 - val_loss: 0.3378 - val_acc: 0.8686
Epoch 16/30
  - 2s - loss: 0.2871 - acc: 0.9048 - val_loss: 0.3296 - val_acc: 0.8827
Epoch 17/30
  - 2s - loss: 0.2950 - acc: 0.8957 - val_loss: 0.3877 - val_acc: 0.8590
Epoch 18/30
  - 2s - loss: 0.2738 - acc: 0.9016 - val_loss: 0.6877 - val_acc: 0.6968
Epoch 19/30
  - 2s - loss: 0.2851 - acc: 0.8987 - val_loss: 0.3259 - val_acc: 0.8724
Epoch 20/30
  - 2s - loss: 0.2763 - acc: 0.9044 - val_loss: 0.3080 - val_acc: 0.8942
Epoch 21/30
  - 2s - loss: 0.2642 - acc: 0.9068 - val_loss: 0.4022 - val_acc: 0.8647
Epoch 22/30
  - 2s - loss: 0.2860 - acc: 0.9034 - val_loss: 0.4544 - val_acc: 0.8481
Epoch 23/30
  - 2s - loss: 0.2735 - acc: 0.9031 - val_loss: 0.3388 - val_acc: 0.8827
Epoch 24/30
  - 2s - loss: 0.2830 - acc: 0.9061 - val_loss: 0.3552 - val_acc: 0.8718
Epoch 25/30
  - 2s - loss: 0.2765 - acc: 0.9048 - val_loss: 0.3394 - val_acc: 0.8968
Epoch 26/30
  - 2s - loss: 0.2844 - acc: 0.9058 - val_loss: 0.4149 - val_acc: 0.8692
Epoch 27/30
  - 2s - loss: 0.2855 - acc: 0.9004 - val_loss: 0.4654 - val_acc: 0.8577
Epoch 28/30
  - 2s - loss: 0.2728 - acc: 0.9058 - val_loss: 0.3931 - val_acc: 0.7987
Epoch 29/30
  - 2s - loss: 0.2728 - acc: 0.9080 - val_loss: 0.3744 - val_acc: 0.8673
Epoch 30/30
  - 2s - loss: 0.2738 - acc: 0.9058 - val_loss: 0.3366 - val_acc: 0.8795
Train accuracy 0.9068109171379395 Test accuracy: 0.8794871794871795

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
<hr/>		
conv1d_2 (Conv1D)	(None, 120, 16)	1360

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dropout_1 (Dropout)                (None, 120, 16)                0
-----
max_pooling1d_1 (MaxPooling1D)      (None, 40, 16)                0
-----
flatten_1 (Flatten)                 (None, 640)                    0
-----
dense_1 (Dense)                     (None, 64)                     41024
-----
dense_2 (Dense)                     (None, 3)                      195
=====
Total params: 44,371
Trainable params: 44,371
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25
  - 1s - loss: 19.6197 - acc: 0.8276 - val_loss: 4.1968 - val_acc: 0.8647
Epoch 2/25
  - 1s - loss: 1.4208 - acc: 0.8817 - val_loss: 0.6038 - val_acc: 0.8667
Epoch 3/25
  - 1s - loss: 0.4762 - acc: 0.8999 - val_loss: 0.5621 - val_acc: 0.8596
Epoch 4/25
  - 1s - loss: 0.3757 - acc: 0.9112 - val_loss: 0.4712 - val_acc: 0.8494
Epoch 5/25
  - 1s - loss: 0.3585 - acc: 0.9098 - val_loss: 0.3741 - val_acc: 0.8827
Epoch 6/25
  - 1s - loss: 0.3111 - acc: 0.9120 - val_loss: 0.3474 - val_acc: 0.8865
Epoch 7/25
  - 1s - loss: 0.2956 - acc: 0.9139 - val_loss: 0.4264 - val_acc: 0.8551
Epoch 8/25
  - 1s - loss: 0.3037 - acc: 0.9164 - val_loss: 0.3518 - val_acc: 0.8821
Epoch 9/25
  - 1s - loss: 0.2649 - acc: 0.9196 - val_loss: 0.3355 - val_acc: 0.8955
Epoch 10/25
  - 1s - loss: 0.2682 - acc: 0.9154 - val_loss: 0.3038 - val_acc: 0.8904
Epoch 11/25
  - 1s - loss: 0.2726 - acc: 0.9184 - val_loss: 0.3188 - val_acc: 0.8904
Epoch 12/25
  - 1s - loss: 0.2491 - acc: 0.9194 - val_loss: 0.3127 - val_acc: 0.9013
Epoch 13/25
  - 1s - loss: 0.2382 - acc: 0.9248 - val_loss: 0.3494 - val_acc: 0.8718
Epoch 14/25
  - 1s - loss: 0.2519 - acc: 0.9240 - val_loss: 0.2891 - val_acc: 0.9224
Epoch 15/25
  - 1s - loss: 0.2301 - acc: 0.9299 - val_loss: 0.3380 - val_acc: 0.8718
Epoch 16/25

```

```

- 1s - loss: 0.2437 - acc: 0.9223 - val_loss: 0.3008 - val_acc: 0.8904
Epoch 17/25
- 1s - loss: 0.2334 - acc: 0.9299 - val_loss: 0.3205 - val_acc: 0.8840
Epoch 18/25
- 1s - loss: 0.2306 - acc: 0.9292 - val_loss: 0.3043 - val_acc: 0.8962
Epoch 19/25
- 1s - loss: 0.2283 - acc: 0.9265 - val_loss: 0.2693 - val_acc: 0.9128
Epoch 20/25
- 1s - loss: 0.2253 - acc: 0.9299 - val_loss: 0.6581 - val_acc: 0.7718
Epoch 21/25
- 1s - loss: 0.2252 - acc: 0.9309 - val_loss: 0.2950 - val_acc: 0.8865
Epoch 22/25
- 1s - loss: 0.2171 - acc: 0.9302 - val_loss: 0.3195 - val_acc: 0.8917
Epoch 23/25
- 1s - loss: 0.2135 - acc: 0.9326 - val_loss: 0.3080 - val_acc: 0.8885
Epoch 24/25
- 1s - loss: 0.2210 - acc: 0.9326 - val_loss: 0.2618 - val_acc: 0.9141
Epoch 25/25
- 1s - loss: 0.2162 - acc: 0.9307 - val_loss: 0.2886 - val_acc: 0.8949
Train accuracy 0.9454143103024343 Test accuracy: 0.8948717948717949
-----

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 24)	2328
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 24)	0
flatten_1 (Flatten)	(None, 1440)	0
dense_1 (Dense)	(None, 64)	92224
dense_2 (Dense)	(None, 3)	195

```

Total params: 96,795
Trainable params: 96,795
Non-trainable params: 0
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```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
- 2s - loss: 71.8882 - acc: 0.8547 - val_loss: 7.6055 - val_acc: 0.8667
Epoch 2/30
- 1s - loss: 2.0432 - acc: 0.8871 - val_loss: 0.5594 - val_acc: 0.8667

```

Epoch 3/30  
 - 1s - loss: 0.4075 - acc: 0.8842 - val\_loss: 0.4499 - val\_acc: 0.8462

Epoch 4/30  
 - 1s - loss: 0.4001 - acc: 0.8827 - val\_loss: 0.4643 - val\_acc: 0.8308

Epoch 5/30  
 - 1s - loss: 0.4089 - acc: 0.8761 - val\_loss: 0.5166 - val\_acc: 0.8538

Epoch 6/30  
 - 1s - loss: 0.3622 - acc: 0.8862 - val\_loss: 0.4662 - val\_acc: 0.8571

Epoch 7/30  
 - 1s - loss: 0.4059 - acc: 0.8739 - val\_loss: 0.4547 - val\_acc: 0.8628

Epoch 8/30  
 - 1s - loss: 0.3553 - acc: 0.8901 - val\_loss: 0.4175 - val\_acc: 0.8590

Epoch 9/30  
 - 1s - loss: 0.3639 - acc: 0.8862 - val\_loss: 0.4652 - val\_acc: 0.8455

Epoch 10/30  
 - 1s - loss: 0.3614 - acc: 0.8874 - val\_loss: 0.4193 - val\_acc: 0.8660

Epoch 11/30  
 - 1s - loss: 0.3356 - acc: 0.8930 - val\_loss: 0.3844 - val\_acc: 0.8673

Epoch 12/30  
 - 1s - loss: 0.3388 - acc: 0.8874 - val\_loss: 0.4057 - val\_acc: 0.8526

Epoch 13/30  
 - 1s - loss: 0.3480 - acc: 0.8866 - val\_loss: 0.3904 - val\_acc: 0.8558

Epoch 14/30  
 - 1s - loss: 0.3543 - acc: 0.8876 - val\_loss: 0.3866 - val\_acc: 0.8712

Epoch 15/30  
 - 1s - loss: 0.3593 - acc: 0.8817 - val\_loss: 0.4112 - val\_acc: 0.8673

Epoch 16/30  
 - 1s - loss: 0.3565 - acc: 0.8921 - val\_loss: 0.4245 - val\_acc: 0.8481

Epoch 17/30  
 - 1s - loss: 0.3471 - acc: 0.8820 - val\_loss: 0.3652 - val\_acc: 0.8731

Epoch 18/30  
 - 1s - loss: 0.3361 - acc: 0.8938 - val\_loss: 0.3773 - val\_acc: 0.8635

Epoch 19/30  
 - 1s - loss: 0.3320 - acc: 0.8935 - val\_loss: 0.4194 - val\_acc: 0.8481

Epoch 20/30  
 - 1s - loss: 0.3256 - acc: 0.8953 - val\_loss: 0.3582 - val\_acc: 0.8744

Epoch 21/30  
 - 1s - loss: 0.3373 - acc: 0.8911 - val\_loss: 0.3966 - val\_acc: 0.8679

Epoch 22/30  
 - 1s - loss: 0.3489 - acc: 0.8894 - val\_loss: 0.3934 - val\_acc: 0.8641

Epoch 23/30  
 - 1s - loss: 0.3545 - acc: 0.8852 - val\_loss: 0.3904 - val\_acc: 0.8654

Epoch 24/30  
 - 1s - loss: 0.3248 - acc: 0.8891 - val\_loss: 0.3690 - val\_acc: 0.8808

Epoch 25/30  
 - 1s - loss: 0.3286 - acc: 0.8891 - val\_loss: 0.4190 - val\_acc: 0.8551

Epoch 26/30  
 - 1s - loss: 0.3117 - acc: 0.8955 - val\_loss: 0.3770 - val\_acc: 0.8628

Epoch 27/30  
 - 1s - loss: 0.3462 - acc: 0.8889 - val\_loss: 0.4589 - val\_acc: 0.8224  
 Epoch 28/30  
 - 1s - loss: 0.3594 - acc: 0.8785 - val\_loss: 0.3720 - val\_acc: 0.8731  
 Epoch 29/30  
 - 1s - loss: 0.3309 - acc: 0.8994 - val\_loss: 0.4474 - val\_acc: 0.8571  
 Epoch 30/30  
 - 1s - loss: 0.3312 - acc: 0.8884 - val\_loss: 0.3679 - val\_acc: 0.8679  
 Train accuracy 0.8925497910007376 Test accuracy: 0.867948717948718

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 32)	7200
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 32)	0
flatten_1 (Flatten)	(None, 1888)	0
dense_1 (Dense)	(None, 64)	120896
dense_2 (Dense)	(None, 3)	195

Total params: 129,763  
 Trainable params: 129,763  
 Non-trainable params: 0

None  
 Train on 4067 samples, validate on 1560 samples  
 Epoch 1/30  
 - 2s - loss: 44.7396 - acc: 0.7981 - val\_loss: 7.5927 - val\_acc: 0.5897  
 Epoch 2/30  
 - 1s - loss: 2.9382 - acc: 0.8397 - val\_loss: 0.8895 - val\_acc: 0.8090  
 Epoch 3/30  
 - 1s - loss: 0.4927 - acc: 0.8736 - val\_loss: 0.5849 - val\_acc: 0.7968  
 Epoch 4/30  
 - 1s - loss: 0.4011 - acc: 0.8874 - val\_loss: 0.5888 - val\_acc: 0.7840  
 Epoch 5/30  
 - 1s - loss: 0.3659 - acc: 0.8842 - val\_loss: 0.5697 - val\_acc: 0.8314  
 Epoch 6/30  
 - 1s - loss: 0.3546 - acc: 0.8889 - val\_loss: 0.4015 - val\_acc: 0.8679  
 Epoch 7/30  
 - 1s - loss: 0.3575 - acc: 0.8842 - val\_loss: 0.4043 - val\_acc: 0.8718  
 Epoch 8/30

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- 1s - loss: 0.3333 - acc: 0.8901 - val_loss: 0.5026 - val_acc: 0.8167
Epoch 9/30
- 1s - loss: 0.3438 - acc: 0.8940 - val_loss: 0.3978 - val_acc: 0.8551
Epoch 10/30
- 1s - loss: 0.3600 - acc: 0.8830 - val_loss: 0.4375 - val_acc: 0.8564
Epoch 11/30
- 1s - loss: 0.3314 - acc: 0.8933 - val_loss: 0.3926 - val_acc: 0.8724
Epoch 12/30
- 1s - loss: 0.3467 - acc: 0.8889 - val_loss: 0.4332 - val_acc: 0.8603
Epoch 13/30
- 1s - loss: 0.3157 - acc: 0.9007 - val_loss: 0.3800 - val_acc: 0.8750
Epoch 14/30
- 1s - loss: 0.3407 - acc: 0.8933 - val_loss: 0.4281 - val_acc: 0.8577
Epoch 15/30
- 1s - loss: 0.3360 - acc: 0.8901 - val_loss: 0.5413 - val_acc: 0.8199
Epoch 16/30
- 1s - loss: 0.3266 - acc: 0.8938 - val_loss: 0.4195 - val_acc: 0.8590
Epoch 17/30
- 1s - loss: 0.3319 - acc: 0.8913 - val_loss: 0.3761 - val_acc: 0.8718
Epoch 18/30
- 1s - loss: 0.3233 - acc: 0.8918 - val_loss: 0.3957 - val_acc: 0.8551
Epoch 19/30
- 1s - loss: 0.3252 - acc: 0.8925 - val_loss: 0.3716 - val_acc: 0.8718
Epoch 20/30
- 1s - loss: 0.3278 - acc: 0.8945 - val_loss: 0.3599 - val_acc: 0.8679
Epoch 21/30
- 1s - loss: 0.3084 - acc: 0.9019 - val_loss: 0.4380 - val_acc: 0.8545
Epoch 22/30
- 1s - loss: 0.3388 - acc: 0.8894 - val_loss: 0.4653 - val_acc: 0.8538
Epoch 23/30
- 1s - loss: 0.3218 - acc: 0.8896 - val_loss: 0.3636 - val_acc: 0.8756
Epoch 24/30
- 1s - loss: 0.3287 - acc: 0.8940 - val_loss: 0.3865 - val_acc: 0.8692
Epoch 25/30
- 1s - loss: 0.3202 - acc: 0.8940 - val_loss: 0.3613 - val_acc: 0.8750
Epoch 26/30
- 1s - loss: 0.3136 - acc: 0.8982 - val_loss: 0.3797 - val_acc: 0.8763
Epoch 27/30
- 1s - loss: 0.3064 - acc: 0.8992 - val_loss: 0.3660 - val_acc: 0.8590
Epoch 28/30
- 1s - loss: 0.3397 - acc: 0.8925 - val_loss: 0.3835 - val_acc: 0.8603
Epoch 29/30
- 1s - loss: 0.3513 - acc: 0.8950 - val_loss: 0.4121 - val_acc: 0.8705
Epoch 30/30
- 1s - loss: 0.3162 - acc: 0.8989 - val_loss: 0.3925 - val_acc: 0.8622
Train accuracy 0.8605851979345955 Test accuracy: 0.8621794871794872
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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 32)	12320
dense_2 (Dense)	(None, 3)	99

Total params: 16,019  
 Trainable params: 16,019  
 Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/35  
 - 2s - loss: 18.5672 - acc: 0.8208 - val\_loss: 0.5694 - val\_acc: 0.8192

Epoch 2/35  
 - 1s - loss: 0.3982 - acc: 0.8748 - val\_loss: 0.4753 - val\_acc: 0.8506

Epoch 3/35  
 - 1s - loss: 0.3616 - acc: 0.8758 - val\_loss: 0.4663 - val\_acc: 0.8186

Epoch 4/35  
 - 1s - loss: 0.3384 - acc: 0.8874 - val\_loss: 0.4199 - val\_acc: 0.8679

Epoch 5/35  
 - 1s - loss: 0.3323 - acc: 0.8849 - val\_loss: 0.3933 - val\_acc: 0.8782

Epoch 6/35  
 - 1s - loss: 0.3279 - acc: 0.8852 - val\_loss: 0.4284 - val\_acc: 0.8308

Epoch 7/35  
 - 1s - loss: 0.3196 - acc: 0.8881 - val\_loss: 0.3961 - val\_acc: 0.8564

Epoch 8/35  
 - 1s - loss: 0.3212 - acc: 0.8884 - val\_loss: 0.4040 - val\_acc: 0.8397

Epoch 9/35  
 - 1s - loss: 0.3237 - acc: 0.8886 - val\_loss: 0.3827 - val\_acc: 0.8705

Epoch 10/35  
 - 1s - loss: 0.3270 - acc: 0.8837 - val\_loss: 0.4147 - val\_acc: 0.8776

Epoch 11/35  
 - 1s - loss: 0.3165 - acc: 0.8921 - val\_loss: 0.4934 - val\_acc: 0.7032

Epoch 12/35  
 - 1s - loss: 0.3189 - acc: 0.8849 - val\_loss: 0.3990 - val\_acc: 0.8596

Epoch 13/35  
 - 1s - loss: 0.3208 - acc: 0.8837 - val\_loss: 0.4107 - val\_acc: 0.8455

```

Epoch 14/35
  - 1s - loss: 0.3179 - acc: 0.8903 - val_loss: 0.4493 - val_acc: 0.8212
Epoch 15/35
  - 1s - loss: 0.3125 - acc: 0.8913 - val_loss: 0.3689 - val_acc: 0.8782
Epoch 16/35
  - 1s - loss: 0.3113 - acc: 0.8911 - val_loss: 0.3722 - val_acc: 0.8827
Epoch 17/35
  - 1s - loss: 0.3093 - acc: 0.8874 - val_loss: 0.3403 - val_acc: 0.8750
Epoch 18/35
  - 1s - loss: 0.3068 - acc: 0.8896 - val_loss: 0.4273 - val_acc: 0.8295
Epoch 19/35
  - 1s - loss: 0.3057 - acc: 0.8859 - val_loss: 0.3857 - val_acc: 0.8763
Epoch 20/35
  - 1s - loss: 0.3057 - acc: 0.8916 - val_loss: 0.4407 - val_acc: 0.8724
Epoch 21/35
  - 1s - loss: 0.2953 - acc: 0.8943 - val_loss: 0.3866 - val_acc: 0.8532
Epoch 22/35
  - 1s - loss: 0.3073 - acc: 0.8896 - val_loss: 0.4594 - val_acc: 0.7827
Epoch 23/35
  - 1s - loss: 0.3075 - acc: 0.8864 - val_loss: 0.3600 - val_acc: 0.8801
Epoch 24/35
  - 1s - loss: 0.3018 - acc: 0.8925 - val_loss: 0.3783 - val_acc: 0.8788
Epoch 25/35
  - 1s - loss: 0.2951 - acc: 0.8923 - val_loss: 0.4091 - val_acc: 0.8237
Epoch 26/35
  - 1s - loss: 0.2970 - acc: 0.8921 - val_loss: 0.3966 - val_acc: 0.8782
Epoch 27/35
  - 1s - loss: 0.3083 - acc: 0.8921 - val_loss: 0.3475 - val_acc: 0.8814
Epoch 28/35
  - 1s - loss: 0.2986 - acc: 0.8928 - val_loss: 0.4569 - val_acc: 0.7571
Epoch 29/35
  - 1s - loss: 0.2927 - acc: 0.8957 - val_loss: 0.4110 - val_acc: 0.8603
Epoch 30/35
  - 1s - loss: 0.2973 - acc: 0.8925 - val_loss: 0.3867 - val_acc: 0.8679
Epoch 31/35
  - 1s - loss: 0.2914 - acc: 0.8955 - val_loss: 0.4099 - val_acc: 0.8667
Epoch 32/35
  - 1s - loss: 0.2981 - acc: 0.8889 - val_loss: 0.4880 - val_acc: 0.8519
Epoch 33/35
  - 1s - loss: 0.2980 - acc: 0.8930 - val_loss: 0.5790 - val_acc: 0.7186
Epoch 34/35
  - 1s - loss: 0.2974 - acc: 0.8945 - val_loss: 0.4221 - val_acc: 0.8397
Epoch 35/35
  - 1s - loss: 0.2942 - acc: 0.8999 - val_loss: 0.6764 - val_acc: 0.6737
Train accuracy 0.6774034915170888 Test accuracy: 0.6737179487179488
-----

```

```

-----
Layer (type)                Output Shape                Param #

```

```

=====
conv1d_1 (Conv1D)                (None, 126, 42)                1176
-----
conv1d_2 (Conv1D)                (None, 122, 16)                3376
-----
dropout_1 (Dropout)              (None, 122, 16)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 61, 16)                0
-----
flatten_1 (Flatten)              (None, 976)                    0
-----
dense_1 (Dense)                  (None, 64)                     62528
-----
dense_2 (Dense)                  (None, 3)                      195
=====
Total params: 67,275
Trainable params: 67,275
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 1s - loss: 140.7741 - acc: 0.8343 - val_loss: 82.4743 - val_acc: 0.8814
Epoch 2/30
  - 1s - loss: 51.2177 - acc: 0.8721 - val_loss: 26.5850 - val_acc: 0.8615
Epoch 3/30
  - 1s - loss: 13.9654 - acc: 0.8844 - val_loss: 5.1062 - val_acc: 0.8378
Epoch 4/30
  - 1s - loss: 1.9749 - acc: 0.8803 - val_loss: 0.6709 - val_acc: 0.7929
Epoch 5/30
  - 1s - loss: 0.4319 - acc: 0.8729 - val_loss: 0.5418 - val_acc: 0.8192
Epoch 6/30
  - 1s - loss: 0.3733 - acc: 0.8815 - val_loss: 0.3995 - val_acc: 0.8628
Epoch 7/30
  - 1s - loss: 0.3535 - acc: 0.8827 - val_loss: 0.3849 - val_acc: 0.8859
Epoch 8/30
  - 1s - loss: 0.3433 - acc: 0.8869 - val_loss: 0.5312 - val_acc: 0.8135
Epoch 9/30
  - 1s - loss: 0.3321 - acc: 0.8921 - val_loss: 0.4001 - val_acc: 0.8744
Epoch 10/30
  - 1s - loss: 0.3296 - acc: 0.8837 - val_loss: 0.3737 - val_acc: 0.8769
Epoch 11/30
  - 1s - loss: 0.3166 - acc: 0.8918 - val_loss: 0.3615 - val_acc: 0.8744
Epoch 12/30
  - 1s - loss: 0.3145 - acc: 0.8943 - val_loss: 0.3599 - val_acc: 0.8763
Epoch 13/30
  - 1s - loss: 0.3081 - acc: 0.8948 - val_loss: 0.3588 - val_acc: 0.8750
Epoch 14/30

```

```

- 1s - loss: 0.3007 - acc: 0.9021 - val_loss: 0.4567 - val_acc: 0.8577
Epoch 15/30
- 1s - loss: 0.3107 - acc: 0.8901 - val_loss: 0.3884 - val_acc: 0.8615
Epoch 16/30
- 1s - loss: 0.3141 - acc: 0.8901 - val_loss: 0.3508 - val_acc: 0.8782
Epoch 17/30
- 1s - loss: 0.3054 - acc: 0.8970 - val_loss: 0.3519 - val_acc: 0.8641
Epoch 18/30
- 1s - loss: 0.3001 - acc: 0.8925 - val_loss: 0.3498 - val_acc: 0.8744
Epoch 19/30
- 1s - loss: 0.3014 - acc: 0.8940 - val_loss: 0.3540 - val_acc: 0.8776
Epoch 20/30
- 1s - loss: 0.3022 - acc: 0.8933 - val_loss: 0.4873 - val_acc: 0.7974
Epoch 21/30
- 1s - loss: 0.3027 - acc: 0.8943 - val_loss: 0.3572 - val_acc: 0.8705
Epoch 22/30
- 1s - loss: 0.3038 - acc: 0.8896 - val_loss: 0.3626 - val_acc: 0.8609
Epoch 23/30
- 1s - loss: 0.3135 - acc: 0.8859 - val_loss: 0.3603 - val_acc: 0.8756
Epoch 24/30
- 1s - loss: 0.3075 - acc: 0.8881 - val_loss: 0.4531 - val_acc: 0.8545
Epoch 25/30
- 1s - loss: 0.3021 - acc: 0.8925 - val_loss: 0.5416 - val_acc: 0.8378
Epoch 26/30
- 1s - loss: 0.3131 - acc: 0.8857 - val_loss: 0.3414 - val_acc: 0.8737
Epoch 27/30
- 1s - loss: 0.2906 - acc: 0.8955 - val_loss: 0.3428 - val_acc: 0.8763
Epoch 28/30
- 1s - loss: 0.3206 - acc: 0.8876 - val_loss: 0.3731 - val_acc: 0.8673
Epoch 29/30
- 1s - loss: 0.2905 - acc: 0.9004 - val_loss: 0.3712 - val_acc: 0.8750
Epoch 30/30
- 1s - loss: 0.3068 - acc: 0.8921 - val_loss: 0.3976 - val_acc: 0.8391
Train accuracy 0.8396852716990411 Test accuracy: 0.8391025641025641

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0

dense_1 (Dense)	(None, 16)	15632
-----		
dense_2 (Dense)	(None, 3)	51
=====		

Total params: 18,707  
 Trainable params: 18,707  
 Non-trainable params: 0

-----

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 3s - loss: 24.2597 - acc: 0.8279 - val\_loss: 4.6851 - val\_acc: 0.8199

Epoch 2/30

- 2s - loss: 1.5129 - acc: 0.8886 - val\_loss: 0.5973 - val\_acc: 0.8455

Epoch 3/30

- 2s - loss: 0.3934 - acc: 0.8903 - val\_loss: 0.4793 - val\_acc: 0.8250

Epoch 4/30

- 2s - loss: 0.3378 - acc: 0.8921 - val\_loss: 0.3897 - val\_acc: 0.8686

Epoch 5/30

- 2s - loss: 0.3233 - acc: 0.8972 - val\_loss: 0.4009 - val\_acc: 0.8622

Epoch 6/30

- 2s - loss: 0.3154 - acc: 0.8894 - val\_loss: 0.4496 - val\_acc: 0.8224

Epoch 7/30

- 2s - loss: 0.3046 - acc: 0.8928 - val\_loss: 0.3575 - val\_acc: 0.8756

Epoch 8/30

- 2s - loss: 0.2981 - acc: 0.8921 - val\_loss: 0.4184 - val\_acc: 0.8282

Epoch 9/30

- 2s - loss: 0.2924 - acc: 0.8992 - val\_loss: 0.3438 - val\_acc: 0.8712

Epoch 10/30

- 2s - loss: 0.2904 - acc: 0.9016 - val\_loss: 0.3317 - val\_acc: 0.8853

Epoch 11/30

- 2s - loss: 0.2759 - acc: 0.8997 - val\_loss: 0.4907 - val\_acc: 0.7179

Epoch 12/30

- 2s - loss: 0.2790 - acc: 0.9002 - val\_loss: 0.3979 - val\_acc: 0.8391

Epoch 13/30

- 2s - loss: 0.2802 - acc: 0.8985 - val\_loss: 0.3904 - val\_acc: 0.8353

Epoch 14/30

- 2s - loss: 0.2729 - acc: 0.9014 - val\_loss: 0.4390 - val\_acc: 0.7782

Epoch 15/30

- 2s - loss: 0.2784 - acc: 0.9026 - val\_loss: 0.3193 - val\_acc: 0.8929

Epoch 16/30

- 2s - loss: 0.2688 - acc: 0.9061 - val\_loss: 0.3233 - val\_acc: 0.8929

Epoch 17/30

- 2s - loss: 0.2709 - acc: 0.9016 - val\_loss: 0.3437 - val\_acc: 0.8558

Epoch 18/30

- 2s - loss: 0.2743 - acc: 0.9026 - val\_loss: 0.3509 - val\_acc: 0.8821

Epoch 19/30

- 2s - loss: 0.2663 - acc: 0.8982 - val\_loss: 0.3142 - val\_acc: 0.8846

```

Epoch 20/30
  - 2s - loss: 0.2626 - acc: 0.9051 - val_loss: 0.3088 - val_acc: 0.8821
Epoch 21/30
  - 2s - loss: 0.2559 - acc: 0.9061 - val_loss: 0.3463 - val_acc: 0.8577
Epoch 22/30
  - 2s - loss: 0.2691 - acc: 0.9024 - val_loss: 0.3654 - val_acc: 0.8776
Epoch 23/30
  - 2s - loss: 0.2649 - acc: 0.8999 - val_loss: 0.3018 - val_acc: 0.8859
Epoch 24/30
  - 2s - loss: 0.2708 - acc: 0.9029 - val_loss: 0.3108 - val_acc: 0.8853
Epoch 25/30
  - 2s - loss: 0.2648 - acc: 0.9029 - val_loss: 0.3087 - val_acc: 0.8853
Epoch 26/30
  - 2s - loss: 0.2653 - acc: 0.9016 - val_loss: 0.3106 - val_acc: 0.8833
Epoch 27/30
  - 2s - loss: 0.2678 - acc: 0.9024 - val_loss: 0.3521 - val_acc: 0.8551
Epoch 28/30
  - 2s - loss: 0.2627 - acc: 0.9026 - val_loss: 0.3547 - val_acc: 0.8583
Epoch 29/30
  - 2s - loss: 0.2644 - acc: 0.9051 - val_loss: 0.3778 - val_acc: 0.8615
Epoch 30/30
  - 2s - loss: 0.2648 - acc: 0.8972 - val_loss: 0.3198 - val_acc: 0.8840
Train accuracy 0.9018932874354562 Test accuracy: 0.8839743589743589
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 120, 24)	2040
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 65,531
Trainable params: 65,531
Non-trainable params: 0
-----

```

```

None
Train on 4067 samples, validate on 1560 samples
Epoch 1/25

```

- 2s - loss: 84.0153 - acc: 0.8153 - val\_loss: 17.4594 - val\_acc: 0.8853  
Epoch 2/25  
- 1s - loss: 5.7245 - acc: 0.8950 - val\_loss: 1.0771 - val\_acc: 0.8654  
Epoch 3/25  
- 1s - loss: 0.5153 - acc: 0.8886 - val\_loss: 0.4824 - val\_acc: 0.8513  
Epoch 4/25  
- 1s - loss: 0.3920 - acc: 0.8761 - val\_loss: 0.4541 - val\_acc: 0.8513  
Epoch 5/25  
- 1s - loss: 0.3878 - acc: 0.8783 - val\_loss: 0.4846 - val\_acc: 0.8500  
Epoch 6/25  
- 1s - loss: 0.3693 - acc: 0.8918 - val\_loss: 0.5395 - val\_acc: 0.8365  
Epoch 7/25  
- 1s - loss: 0.3770 - acc: 0.8780 - val\_loss: 0.4699 - val\_acc: 0.8577  
Epoch 8/25  
- 1s - loss: 0.3332 - acc: 0.8982 - val\_loss: 0.4525 - val\_acc: 0.8628  
Epoch 9/25  
- 1s - loss: 0.3498 - acc: 0.8869 - val\_loss: 0.4218 - val\_acc: 0.8654  
Epoch 10/25  
- 1s - loss: 0.3436 - acc: 0.8906 - val\_loss: 0.4447 - val\_acc: 0.8538  
Epoch 11/25  
- 1s - loss: 0.3573 - acc: 0.8866 - val\_loss: 0.4786 - val\_acc: 0.8558  
Epoch 12/25  
- 1s - loss: 0.3397 - acc: 0.8908 - val\_loss: 0.4236 - val\_acc: 0.8487  
Epoch 13/25  
- 1s - loss: 0.3125 - acc: 0.9014 - val\_loss: 0.4070 - val\_acc: 0.8699  
Epoch 14/25  
- 1s - loss: 0.3645 - acc: 0.8803 - val\_loss: 0.4530 - val\_acc: 0.8500  
Epoch 15/25  
- 1s - loss: 0.3544 - acc: 0.8881 - val\_loss: 0.4325 - val\_acc: 0.8609  
Epoch 16/25  
- 1s - loss: 0.3351 - acc: 0.8921 - val\_loss: 0.4838 - val\_acc: 0.8404  
Epoch 17/25  
- 1s - loss: 0.3404 - acc: 0.8876 - val\_loss: 0.4059 - val\_acc: 0.8577  
Epoch 18/25  
- 1s - loss: 0.3345 - acc: 0.8898 - val\_loss: 0.4209 - val\_acc: 0.8532  
Epoch 19/25  
- 1s - loss: 0.3339 - acc: 0.8898 - val\_loss: 0.4131 - val\_acc: 0.8538  
Epoch 20/25  
- 1s - loss: 0.3317 - acc: 0.8894 - val\_loss: 0.4207 - val\_acc: 0.8628  
Epoch 21/25  
- 1s - loss: 0.3486 - acc: 0.8871 - val\_loss: 0.4530 - val\_acc: 0.8269  
Epoch 22/25  
- 1s - loss: 0.3509 - acc: 0.8930 - val\_loss: 0.3880 - val\_acc: 0.8795  
Epoch 23/25  
- 1s - loss: 0.3132 - acc: 0.8960 - val\_loss: 0.4073 - val\_acc: 0.8590  
Epoch 24/25  
- 1s - loss: 0.3358 - acc: 0.8847 - val\_loss: 0.4270 - val\_acc: 0.8679  
Epoch 25/25

- 1s - loss: 0.3479 - acc: 0.8835 - val\_loss: 0.4405 - val\_acc: 0.8526  
Train accuracy 0.8864027538726333 Test accuracy: 0.8525641025641025

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

Total params: 65,299

Trainable params: 65,299

Non-trainable params: 0

None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 51.4627 - acc: 0.7814 - val\_loss: 38.2469 - val\_acc: 0.8308

Epoch 2/30

- 1s - loss: 28.9163 - acc: 0.8761 - val\_loss: 20.5786 - val\_acc: 0.8731

Epoch 3/30

- 1s - loss: 14.7457 - acc: 0.8980 - val\_loss: 9.8157 - val\_acc: 0.8481

Epoch 4/30

- 1s - loss: 6.5088 - acc: 0.9085 - val\_loss: 4.0169 - val\_acc: 0.8500

Epoch 5/30

- 1s - loss: 2.4520 - acc: 0.9041 - val\_loss: 1.4413 - val\_acc: 0.8692

Epoch 6/30

- 1s - loss: 0.8494 - acc: 0.9061 - val\_loss: 0.6290 - val\_acc: 0.8609

Epoch 7/30

- 1s - loss: 0.4228 - acc: 0.9024 - val\_loss: 0.4378 - val\_acc: 0.8679

Epoch 8/30

- 1s - loss: 0.3311 - acc: 0.9026 - val\_loss: 0.4393 - val\_acc: 0.8391

Epoch 9/30

- 1s - loss: 0.3102 - acc: 0.9078 - val\_loss: 0.3924 - val\_acc: 0.8526

Epoch 10/30

- 1s - loss: 0.2962 - acc: 0.9016 - val\_loss: 0.3445 - val\_acc: 0.8769

Epoch 11/30

- 1s - loss: 0.2850 - acc: 0.9029 - val\_loss: 0.3738 - val\_acc: 0.8808



```

Epoch 12/30
- 1s - loss: 0.2762 - acc: 0.9048 - val_loss: 0.3395 - val_acc: 0.8712
Epoch 13/30
- 1s - loss: 0.2718 - acc: 0.9061 - val_loss: 0.3272 - val_acc: 0.8840
Epoch 14/30
- 1s - loss: 0.2647 - acc: 0.9085 - val_loss: 0.3604 - val_acc: 0.8808
Epoch 15/30
- 1s - loss: 0.2652 - acc: 0.9095 - val_loss: 0.4122 - val_acc: 0.8487
Epoch 16/30
- 1s - loss: 0.2604 - acc: 0.9075 - val_loss: 0.3241 - val_acc: 0.8833
Epoch 17/30
- 1s - loss: 0.2579 - acc: 0.9090 - val_loss: 0.3548 - val_acc: 0.8609
Epoch 18/30
- 1s - loss: 0.2560 - acc: 0.9107 - val_loss: 0.3184 - val_acc: 0.8699
Epoch 19/30
- 1s - loss: 0.2558 - acc: 0.9048 - val_loss: 0.3213 - val_acc: 0.8846
Epoch 20/30
- 1s - loss: 0.2526 - acc: 0.9122 - val_loss: 0.3494 - val_acc: 0.8609
Epoch 21/30
- 1s - loss: 0.2450 - acc: 0.9166 - val_loss: 0.3492 - val_acc: 0.8583
Epoch 22/30
- 1s - loss: 0.2484 - acc: 0.9093 - val_loss: 0.3051 - val_acc: 0.9006
Epoch 23/30
- 1s - loss: 0.2464 - acc: 0.9110 - val_loss: 0.3303 - val_acc: 0.8929
Epoch 24/30
- 1s - loss: 0.2473 - acc: 0.9176 - val_loss: 0.3049 - val_acc: 0.9000
Epoch 25/30
- 1s - loss: 0.2433 - acc: 0.9073 - val_loss: 0.3254 - val_acc: 0.8641
Epoch 26/30
- 1s - loss: 0.2426 - acc: 0.9095 - val_loss: 0.3226 - val_acc: 0.8923
Epoch 27/30
- 1s - loss: 0.2362 - acc: 0.9152 - val_loss: 0.3337 - val_acc: 0.8744
Epoch 28/30
- 1s - loss: 0.2356 - acc: 0.9154 - val_loss: 0.3204 - val_acc: 0.8962
Epoch 29/30
- 1s - loss: 0.2356 - acc: 0.9203 - val_loss: 0.3290 - val_acc: 0.9019
Epoch 30/30
- 1s - loss: 0.2345 - acc: 0.9166 - val_loss: 0.3402 - val_acc: 0.8763
Train accuracy 0.8895992131792476 Test accuracy: 0.8762820512820513

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 32)	7200
dropout_1 (Dropout)	(None, 118, 32)	0

---

```

-----
max_pooling1d_1 (MaxPooling1 (None, 59, 32)          0
-----
flatten_1 (Flatten)          (None, 1888)          0
-----
dense_1 (Dense)              (None, 64)          120896
-----
dense_2 (Dense)              (None, 3)          195
=====
Total params: 129,763
Trainable params: 129,763
Non-trainable params: 0
-----
None
Train on 4067 samples, validate on 1560 samples
Epoch 1/30
  - 2s - loss: 19.3529 - acc: 0.8237 - val_loss: 4.9012 - val_acc: 0.8487
Epoch 2/30
  - 1s - loss: 2.4061 - acc: 0.8692 - val_loss: 1.2586 - val_acc: 0.8532
Epoch 3/30
  - 1s - loss: 0.7073 - acc: 0.8916 - val_loss: 0.5626 - val_acc: 0.8365
Epoch 4/30
  - 1s - loss: 0.3935 - acc: 0.9036 - val_loss: 0.4844 - val_acc: 0.8333
Epoch 5/30
  - 1s - loss: 0.3634 - acc: 0.8886 - val_loss: 0.4799 - val_acc: 0.8635
Epoch 6/30
  - 1s - loss: 0.3163 - acc: 0.8994 - val_loss: 0.4679 - val_acc: 0.8635
Epoch 7/30
  - 1s - loss: 0.3170 - acc: 0.8999 - val_loss: 0.3867 - val_acc: 0.8782
Epoch 8/30
  - 1s - loss: 0.3073 - acc: 0.9051 - val_loss: 0.4400 - val_acc: 0.8468
Epoch 9/30
  - 1s - loss: 0.2865 - acc: 0.9073 - val_loss: 0.3495 - val_acc: 0.8615
Epoch 10/30
  - 1s - loss: 0.2901 - acc: 0.9009 - val_loss: 0.3600 - val_acc: 0.8641
Epoch 11/30
  - 1s - loss: 0.2792 - acc: 0.9024 - val_loss: 0.4725 - val_acc: 0.8212
Epoch 12/30
  - 1s - loss: 0.2877 - acc: 0.8987 - val_loss: 0.3918 - val_acc: 0.8583
Epoch 13/30
  - 1s - loss: 0.2620 - acc: 0.9100 - val_loss: 0.3371 - val_acc: 0.8705
Epoch 14/30
  - 1s - loss: 0.2693 - acc: 0.9083 - val_loss: 0.3177 - val_acc: 0.8942
Epoch 15/30
  - 1s - loss: 0.2771 - acc: 0.9051 - val_loss: 0.4239 - val_acc: 0.8590
Epoch 16/30
  - 1s - loss: 0.2644 - acc: 0.9085 - val_loss: 0.3261 - val_acc: 0.8788
Epoch 17/30

```

```

- 1s - loss: 0.2687 - acc: 0.9134 - val_loss: 0.3557 - val_acc: 0.8782
Epoch 18/30
- 1s - loss: 0.2625 - acc: 0.9127 - val_loss: 0.3482 - val_acc: 0.8769
Epoch 19/30
- 1s - loss: 0.2675 - acc: 0.9044 - val_loss: 0.3083 - val_acc: 0.8974
Epoch 20/30
- 1s - loss: 0.2587 - acc: 0.9107 - val_loss: 0.7944 - val_acc: 0.7635
Epoch 21/30
- 1s - loss: 0.2770 - acc: 0.9098 - val_loss: 0.3281 - val_acc: 0.8699
Epoch 22/30
- 1s - loss: 0.2651 - acc: 0.9051 - val_loss: 0.3412 - val_acc: 0.8808
Epoch 23/30
- 1s - loss: 0.2690 - acc: 0.9073 - val_loss: 0.3541 - val_acc: 0.8744
Epoch 24/30
- 1s - loss: 0.2608 - acc: 0.9090 - val_loss: 0.2987 - val_acc: 0.8853
Epoch 25/30
- 1s - loss: 0.2618 - acc: 0.9103 - val_loss: 0.3241 - val_acc: 0.8763
Epoch 26/30
- 1s - loss: 0.2568 - acc: 0.9125 - val_loss: 0.3625 - val_acc: 0.8788
Epoch 27/30
- 1s - loss: 0.2679 - acc: 0.9073 - val_loss: 0.3223 - val_acc: 0.8763
Epoch 28/30
- 1s - loss: 0.2507 - acc: 0.9132 - val_loss: 0.3041 - val_acc: 0.8987
Epoch 29/30
- 1s - loss: 0.2691 - acc: 0.9142 - val_loss: 0.3184 - val_acc: 0.8929
Epoch 30/30
- 1s - loss: 0.2552 - acc: 0.9144 - val_loss: 0.3496 - val_acc: 0.8904
Train accuracy 0.9055815097123187 Test accuracy: 0.8903846153846153

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 32)	12320
dense_2 (Dense)	(None, 3)	99

```

Total params: 16,019
Trainable params: 16,019

```

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/30

- 2s - loss: 19.5666 - acc: 0.8281 - val\_loss: 0.6750 - val\_acc: 0.8346

Epoch 2/30

- 1s - loss: 0.3865 - acc: 0.8839 - val\_loss: 0.4630 - val\_acc: 0.8577

Epoch 3/30

- 1s - loss: 0.3369 - acc: 0.8871 - val\_loss: 0.4484 - val\_acc: 0.8365

Epoch 4/30

- 1s - loss: 0.3088 - acc: 0.8940 - val\_loss: 0.4145 - val\_acc: 0.8641

Epoch 5/30

- 1s - loss: 0.3070 - acc: 0.8930 - val\_loss: 0.3788 - val\_acc: 0.8788

Epoch 6/30

- 1s - loss: 0.2969 - acc: 0.8930 - val\_loss: 0.4231 - val\_acc: 0.8410

Epoch 7/30

- 1s - loss: 0.2892 - acc: 0.8977 - val\_loss: 0.3814 - val\_acc: 0.8654

Epoch 8/30

- 1s - loss: 0.2868 - acc: 0.8935 - val\_loss: 0.4122 - val\_acc: 0.8372

Epoch 9/30

- 1s - loss: 0.2854 - acc: 0.8987 - val\_loss: 0.3642 - val\_acc: 0.8718

Epoch 10/30

- 1s - loss: 0.2852 - acc: 0.8960 - val\_loss: 0.3676 - val\_acc: 0.8859

Epoch 11/30

- 1s - loss: 0.2861 - acc: 0.8965 - val\_loss: 0.4356 - val\_acc: 0.7532

Epoch 12/30

- 1s - loss: 0.2842 - acc: 0.8933 - val\_loss: 0.3907 - val\_acc: 0.8558

Epoch 13/30

- 1s - loss: 0.2855 - acc: 0.8911 - val\_loss: 0.3778 - val\_acc: 0.8513

Epoch 14/30

- 1s - loss: 0.2739 - acc: 0.8965 - val\_loss: 0.3928 - val\_acc: 0.8532

Epoch 15/30

- 1s - loss: 0.2811 - acc: 0.8960 - val\_loss: 0.3470 - val\_acc: 0.8782

Epoch 16/30

- 1s - loss: 0.2791 - acc: 0.8989 - val\_loss: 0.3594 - val\_acc: 0.8750

Epoch 17/30

- 1s - loss: 0.2793 - acc: 0.8916 - val\_loss: 0.3863 - val\_acc: 0.8532

Epoch 18/30

- 1s - loss: 0.2782 - acc: 0.8972 - val\_loss: 0.3695 - val\_acc: 0.8782

Epoch 19/30

- 1s - loss: 0.2778 - acc: 0.8957 - val\_loss: 0.3445 - val\_acc: 0.8814

Epoch 20/30

- 1s - loss: 0.2711 - acc: 0.8960 - val\_loss: 0.3952 - val\_acc: 0.8603

Epoch 21/30

- 1s - loss: 0.2642 - acc: 0.8997 - val\_loss: 0.3618 - val\_acc: 0.8571

Epoch 22/30

- 1s - loss: 0.2710 - acc: 0.9002 - val\_loss: 0.3657 - val\_acc: 0.8808

```

Epoch 23/30
- 1s - loss: 0.2798 - acc: 0.8879 - val_loss: 0.3476 - val_acc: 0.8776
Epoch 24/30
- 1s - loss: 0.2710 - acc: 0.8989 - val_loss: 0.3589 - val_acc: 0.8756
Epoch 25/30
- 1s - loss: 0.2716 - acc: 0.8950 - val_loss: 0.3376 - val_acc: 0.8872
Epoch 26/30
- 1s - loss: 0.2745 - acc: 0.8972 - val_loss: 0.3470 - val_acc: 0.8853
Epoch 27/30
- 1s - loss: 0.2731 - acc: 0.8977 - val_loss: 0.3329 - val_acc: 0.8833
Epoch 28/30
- 1s - loss: 0.2671 - acc: 0.9012 - val_loss: 0.3693 - val_acc: 0.8641
Epoch 29/30
- 1s - loss: 0.2888 - acc: 0.8982 - val_loss: 0.3461 - val_acc: 0.8846
Epoch 30/30
- 1s - loss: 0.2699 - acc: 0.9014 - val_loss: 0.3277 - val_acc: 0.8827
Train accuracy 0.9225473321858864 Test accuracy: 0.8826923076923077
-----

```

```
In [12]: best_run
```

```

Out[12]: {'Dense': 2,
          'Dense_1': 2,
          'Dropout': 0.45377377480700615,
          'choiceval': 1,
          'filters': 1,
          'filters_1': 0,
          'kernel_size': 1,
          'kernel_size_1': 0,
          'l2': 0.0019801221163149862,
          'l2_1': 0.8236255110533577,
          'lr': 0.003918784585237195,
          'lr_1': 0.002237071747066137,
          'nb_epoch': 1,
          'pool_size': 0}

```

```

In [21]: from hyperas.utils import eval_hyopt_space
total_trials = dict()
total_list = []
for t, trial in enumerate(trials):
    vals = trial.get('misc').get('vals')
    z = eval_hyopt_space(space, vals)
    total_trials['M'+str(t+1)] = z

#best Hyper params from hyperas
best_params = eval_hyopt_space(space, best_run)
best_params

```

```
Out[21]: {'Dense': 64,
          'Dense_1': 64,
          'Dropout': 0.45377377480700615,
          'choiceval': 'rmsprop',
          'filters': 32,
          'filters_1': 16,
          'kernel_size': 5,
          'kernel_size_1': 3,
          'l2': 0.0019801221163149862,
          'l2_1': 0.8236255110533577,
          'lr': 0.003918784585237195,
          'lr_1': 0.002237071747066137,
          'nb_epoch': 30,
          'pool_size': 2}
```

```
In [3]: from keras.regularizers import l2
```

```
In [71]: ##model from hyperas
```

```
def keras_fmin_fnct(space,verbose=1):
    np.random.seed(0)
    tf.set_random_seed(0)
    sess = tf.Session(graph=tf.get_default_graph())
    K.set_session(sess)
    # Initiliazing the sequential model
    model = Sequential()
    model.add(Conv1D(filters=space['filters'], kernel_size=space['kernel_size'],activation='relu',
                    kernel_initializer='he_uniform',
                    kernel_regularizer=l2(space['l2']),input_shape=(128,9)))
    model.add(Conv1D(filters=space['filters_1'], kernel_size=space['kernel_size_1'],
                    activation='relu',kernel_regularizer=l2(space['l2_1']),kernel_initializer='he_uniform'))
    model.add(Dropout(space['Dropout']))
    model.add(MaxPooling1D(pool_size=space['pool_size']))
    model.add(Flatten())
    model.add(Dense(space['Dense'], activation='relu'))
    model.add(Dense(3, activation='softmax'))
    adam = keras.optimizers.Adam(lr=space['lr'])
    rmsprop = keras.optimizers.RMSprop(lr=space['lr_1'])
    choiceval = space['choiceval']
    if choiceval == 'adam':
        optim = adam
    else:
        optim = rmsprop
    print(model.summary())
    model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=optim)
    result = model.fit(X_train_s, Y_train_s,
                    batch_size=space['Dense_1'],
                    nb_epoch=space['nb_epoch'],
                    verbose=verbose,
```

```

        validation_data=(X_val_s, Y_val_s))
    #K.clear_session()
    return model,result

```

```
In [28]: best_model,result = keras_fmin_fnct(best_params)
```

```

-----
Layer (type)                 Output Shape              Param #
=====
conv1d_3 (Conv1D)            (None, 124, 32)          1472
-----
conv1d_4 (Conv1D)            (None, 122, 16)          1552
-----
dropout_2 (Dropout)          (None, 122, 16)          0
-----
max_pooling1d_2 (MaxPooling1 (None, 61, 16)          0
-----
flatten_2 (Flatten)          (None, 976)              0
-----
dense_3 (Dense)              (None, 64)               62528
-----
dense_4 (Dense)              (None, 3)                195
=====
Total params: 65,747
Trainable params: 65,747
Non-trainable params: 0
-----
None

```

```
/glob/intel-python/versions/2018u2/intelpython3/lib/python3.6/site-packages/ipykernel_launcher
```

```
Train on 4067 samples, validate on 1560 samples
```

```

Epoch 1/30
4067/4067 [=====] - 1s 350us/step - loss: 10.6708 - acc: 0.8375 - val_
Epoch 2/30
4067/4067 [=====] - 1s 184us/step - loss: 1.2846 - acc: 0.8960 - val_
Epoch 3/30
4067/4067 [=====] - 1s 184us/step - loss: 0.4912 - acc: 0.8943 - val_
Epoch 4/30
4067/4067 [=====] - 1s 184us/step - loss: 0.3866 - acc: 0.9053 - val_
Epoch 5/30
4067/4067 [=====] - 1s 184us/step - loss: 0.3421 - acc: 0.9098 - val_
Epoch 6/30
4067/4067 [=====] - 1s 184us/step - loss: 0.3151 - acc: 0.9166 - val_
Epoch 7/30
4067/4067 [=====] - 1s 183us/step - loss: 0.3091 - acc: 0.9154 - val_
Epoch 8/30

```

```

4067/4067 [=====] - 1s 183us/step - loss: 0.2749 - acc: 0.9312 - val_
Epoch 9/30
4067/4067 [=====] - 1s 184us/step - loss: 0.2743 - acc: 0.9272 - val_
Epoch 10/30
4067/4067 [=====] - 1s 184us/step - loss: 0.2576 - acc: 0.9292 - val_
Epoch 11/30
4067/4067 [=====] - 1s 183us/step - loss: 0.2791 - acc: 0.9302 - val_
Epoch 12/30
4067/4067 [=====] - 1s 185us/step - loss: 0.2315 - acc: 0.9346 - val_
Epoch 13/30
4067/4067 [=====] - 1s 184us/step - loss: 0.2301 - acc: 0.9410 - val_
Epoch 14/30
4067/4067 [=====] - 1s 184us/step - loss: 0.2294 - acc: 0.9368 - val_
Epoch 15/30
4067/4067 [=====] - 1s 184us/step - loss: 0.2371 - acc: 0.9353 - val_
Epoch 16/30
4067/4067 [=====] - 1s 183us/step - loss: 0.2146 - acc: 0.9449 - val_
Epoch 17/30
4067/4067 [=====] - 1s 184us/step - loss: 0.2065 - acc: 0.9447 - val_
Epoch 18/30
4067/4067 [=====] - 1s 184us/step - loss: 0.2056 - acc: 0.9420 - val_
Epoch 19/30
4067/4067 [=====] - 1s 185us/step - loss: 0.2223 - acc: 0.9398 - val_
Epoch 20/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1979 - acc: 0.9442 - val_
Epoch 21/30
4067/4067 [=====] - 1s 183us/step - loss: 0.2421 - acc: 0.9432 - val_
Epoch 22/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1836 - acc: 0.9498 - val_
Epoch 23/30
4067/4067 [=====] - 1s 184us/step - loss: 0.1963 - acc: 0.9457 - val_
Epoch 24/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1863 - acc: 0.9462 - val_
Epoch 25/30
4067/4067 [=====] - 1s 184us/step - loss: 0.1844 - acc: 0.9462 - val_
Epoch 26/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1754 - acc: 0.9525 - val_
Epoch 27/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1793 - acc: 0.9511 - val_
Epoch 28/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1665 - acc: 0.9555 - val_
Epoch 29/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1705 - acc: 0.9575 - val_
Epoch 30/30
4067/4067 [=====] - 1s 183us/step - loss: 0.1712 - acc: 0.9577 - val_

```

```
In [32]: _,acc_val = best_model.evaluate(X_val_s,Y_val_s,verbose=0)
```



```
_,acc_train = best_model.evaluate(X_train_s,Y_train_s,verbose=0)
print('Train_accuracy',acc_train,'test_accuracy',acc_val)
```

```
Train_accuracy 0.9628718957462503 test_accuracy 0.9391025641025641
```

i can observe that 23rd model is also giving good scores in runtime so will try once wit that params.

```
In [38]: runtime_param = total_trials['M23']
runtime_param
```

```
Out[38]: {'Dense': 64,
'Dense_1': 64,
'Dropout': 0.45377377480700615,
'choicerval': 'rmsprop',
'filters': 32,
'filters_1': 16,
'kernel_size': 5,
'kernel_size_1': 3,
'l2': 0.0019801221163149862,
'l2_1': 0.8236255110533577,
'lr': 0.003918784585237195,
'lr_1': 0.002237071747066137,
'nb_epoch': 30,
'pool_size': 2}
```

```
In [63]: runtime_param['nb_epoch'] = 150
```

```
In [64]: runtime_best_model,result = keras_fmin_fnct(runtime_param)
```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195
Total params: 65,747		

Trainable params: 65,747  
Non-trainable params: 0

-----  
None

/glob/intel-python/versions/2018u2/intelpython3/lib/python3.6/site-packages/ipykernel\_launcher

Train on 4067 samples, validate on 1560 samples

Epoch 1/150

4067/4067 [=====] - 1s 344us/step - loss: 10.6708 - acc: 0.8375 - val\_

Epoch 2/150

4067/4067 [=====] - 1s 186us/step - loss: 1.2846 - acc: 0.8960 - val\_

Epoch 3/150

4067/4067 [=====] - 1s 184us/step - loss: 0.4912 - acc: 0.8943 - val\_

Epoch 4/150

4067/4067 [=====] - 1s 185us/step - loss: 0.3866 - acc: 0.9053 - val\_

Epoch 5/150

4067/4067 [=====] - 1s 183us/step - loss: 0.3421 - acc: 0.9098 - val\_

Epoch 6/150

4067/4067 [=====] - 1s 183us/step - loss: 0.3151 - acc: 0.9166 - val\_

Epoch 7/150

4067/4067 [=====] - 1s 183us/step - loss: 0.3091 - acc: 0.9154 - val\_

Epoch 8/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2749 - acc: 0.9312 - val\_

Epoch 9/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2743 - acc: 0.9272 - val\_

Epoch 10/150

4067/4067 [=====] - 1s 184us/step - loss: 0.2576 - acc: 0.9292 - val\_

Epoch 11/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2791 - acc: 0.9302 - val\_

Epoch 12/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2315 - acc: 0.9346 - val\_

Epoch 13/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2301 - acc: 0.9410 - val\_

Epoch 14/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2294 - acc: 0.9368 - val\_

Epoch 15/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2371 - acc: 0.9353 - val\_

Epoch 16/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2146 - acc: 0.9449 - val\_

Epoch 17/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2065 - acc: 0.9447 - val\_

Epoch 18/150

4067/4067 [=====] - 1s 184us/step - loss: 0.2056 - acc: 0.9420 - val\_

Epoch 19/150

4067/4067 [=====] - 1s 183us/step - loss: 0.2223 - acc: 0.9398 - val\_

Epoch 20/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1979 - acc: 0.9442 - val\_  
Epoch 21/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.2421 - acc: 0.9432 - val\_  
Epoch 22/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1836 - acc: 0.9498 - val\_  
Epoch 23/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1963 - acc: 0.9457 - val\_  
Epoch 24/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1863 - acc: 0.9462 - val\_  
Epoch 25/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1844 - acc: 0.9462 - val\_  
Epoch 26/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1754 - acc: 0.9525 - val\_  
Epoch 27/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1793 - acc: 0.9511 - val\_  
Epoch 28/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1665 - acc: 0.9555 - val\_  
Epoch 29/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1705 - acc: 0.9575 - val\_  
Epoch 30/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1712 - acc: 0.9577 - val\_  
Epoch 31/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1698 - acc: 0.9565 - val\_  
Epoch 32/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1621 - acc: 0.9580 - val\_  
Epoch 33/150  
4067/4067 [=====] - 1s 196us/step - loss: 0.1537 - acc: 0.9557 - val\_  
Epoch 34/150  
4067/4067 [=====] - 1s 185us/step - loss: 0.1592 - acc: 0.9552 - val\_  
Epoch 35/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1598 - acc: 0.9570 - val\_  
Epoch 36/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1561 - acc: 0.9570 - val\_  
Epoch 37/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1612 - acc: 0.9555 - val\_  
Epoch 38/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1535 - acc: 0.9577 - val\_  
Epoch 39/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1490 - acc: 0.9562 - val\_  
Epoch 40/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1476 - acc: 0.9604 - val\_  
Epoch 41/150  
4067/4067 [=====] - 1s 182us/step - loss: 0.1772 - acc: 0.9577 - val\_  
Epoch 42/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1421 - acc: 0.9609 - val\_  
Epoch 43/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1492 - acc: 0.9639 - val\_

Epoch 44/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1643 - acc: 0.9575 - val\_  
Epoch 45/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1510 - acc: 0.9643 - val\_  
Epoch 46/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1519 - acc: 0.9639 - val\_  
Epoch 47/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1437 - acc: 0.9621 - val\_  
Epoch 48/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1351 - acc: 0.9636 - val\_  
Epoch 49/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1476 - acc: 0.9621 - val\_  
Epoch 50/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1399 - acc: 0.9634 - val\_  
Epoch 51/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1425 - acc: 0.9599 - val\_  
Epoch 52/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1390 - acc: 0.9641 - val\_  
Epoch 53/150  
4067/4067 [=====] - 1s 185us/step - loss: 0.1492 - acc: 0.9636 - val\_  
Epoch 54/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1344 - acc: 0.9656 - val\_  
Epoch 55/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1410 - acc: 0.9648 - val\_  
Epoch 56/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1417 - acc: 0.9636 - val\_  
Epoch 57/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1436 - acc: 0.9624 - val\_  
Epoch 58/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1390 - acc: 0.9675 - val\_  
Epoch 59/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1400 - acc: 0.9658 - val\_  
Epoch 60/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1312 - acc: 0.9666 - val\_  
Epoch 61/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1295 - acc: 0.9668 - val\_  
Epoch 62/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1288 - acc: 0.9673 - val\_  
Epoch 63/150  
4067/4067 [=====] - 1s 185us/step - loss: 0.1601 - acc: 0.9658 - val\_  
Epoch 64/150  
4067/4067 [=====] - 1s 185us/step - loss: 0.1275 - acc: 0.9702 - val\_  
Epoch 65/150  
4067/4067 [=====] - 1s 185us/step - loss: 0.1365 - acc: 0.9648 - val\_  
Epoch 66/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1385 - acc: 0.9671 - val\_  
Epoch 67/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1444 - acc: 0.9683 - val\_

Epoch 68/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1374 - acc: 0.9661 - val\_  
Epoch 69/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1310 - acc: 0.9712 - val\_  
Epoch 70/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1302 - acc: 0.9666 - val\_  
Epoch 71/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1283 - acc: 0.9698 - val\_  
Epoch 72/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1256 - acc: 0.9705 - val\_  
Epoch 73/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1311 - acc: 0.9668 - val\_  
Epoch 74/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1244 - acc: 0.9715 - val\_  
Epoch 75/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1321 - acc: 0.9671 - val\_  
Epoch 76/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1217 - acc: 0.9700 - val\_  
Epoch 77/150  
4067/4067 [=====] - 1s 182us/step - loss: 0.1246 - acc: 0.9720 - val\_  
Epoch 78/150  
4067/4067 [=====] - 1s 185us/step - loss: 0.1424 - acc: 0.9705 - val\_  
Epoch 79/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1402 - acc: 0.9688 - val\_  
Epoch 80/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1284 - acc: 0.9722 - val\_  
Epoch 81/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1396 - acc: 0.9693 - val\_  
Epoch 82/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1281 - acc: 0.9700 - val\_  
Epoch 83/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1311 - acc: 0.9705 - val\_  
Epoch 84/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1373 - acc: 0.9680 - val\_  
Epoch 85/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1213 - acc: 0.9722 - val\_  
Epoch 86/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1316 - acc: 0.9707 - val\_  
Epoch 87/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1110 - acc: 0.9730 - val\_  
Epoch 88/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1190 - acc: 0.9712 - val\_  
Epoch 89/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1252 - acc: 0.9717 - val\_  
Epoch 90/150  
4067/4067 [=====] - 1s 185us/step - loss: 0.1225 - acc: 0.9702 - val\_  
Epoch 91/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1260 - acc: 0.9725 - val\_

Epoch 92/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1554 - acc: 0.9651 - val\_  
Epoch 93/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1225 - acc: 0.9761 - val\_  
Epoch 94/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1249 - acc: 0.9712 - val\_  
Epoch 95/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1170 - acc: 0.9727 - val\_  
Epoch 96/150  
4067/4067 [=====] - 1s 184us/step - loss: 0.1245 - acc: 0.9742 - val\_  
Epoch 97/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1176 - acc: 0.9717 - val\_  
Epoch 98/150  
4067/4067 [=====] - 1s 182us/step - loss: 0.1084 - acc: 0.9737 - val\_  
Epoch 99/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1301 - acc: 0.9715 - val\_  
Epoch 100/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1204 - acc: 0.9678 - val\_  
Epoch 101/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1241 - acc: 0.9715 - val\_  
Epoch 102/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1080 - acc: 0.9771 - val\_  
Epoch 103/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1394 - acc: 0.9678 - val\_  
Epoch 104/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1248 - acc: 0.9757 - val\_  
Epoch 105/150  
4067/4067 [=====] - 1s 184us/step - loss: 0.1148 - acc: 0.9734 - val\_  
Epoch 106/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1267 - acc: 0.9705 - val\_  
Epoch 107/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1139 - acc: 0.9749 - val\_  
Epoch 108/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1211 - acc: 0.9688 - val\_  
Epoch 109/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1279 - acc: 0.9715 - val\_  
Epoch 110/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1206 - acc: 0.9710 - val\_  
Epoch 111/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1085 - acc: 0.9766 - val\_  
Epoch 112/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1028 - acc: 0.9779 - val\_  
Epoch 113/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1205 - acc: 0.9734 - val\_  
Epoch 114/150  
4067/4067 [=====] - 1s 192us/step - loss: 0.1214 - acc: 0.9732 - val\_  
Epoch 115/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1396 - acc: 0.9754 - val\_

Epoch 116/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1134 - acc: 0.9734 - val\_  
Epoch 117/150  
4067/4067 [=====] - 1s 182us/step - loss: 0.1283 - acc: 0.9744 - val\_  
Epoch 118/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1112 - acc: 0.9761 - val\_  
Epoch 119/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1104 - acc: 0.9730 - val\_  
Epoch 120/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1208 - acc: 0.9749 - val\_  
Epoch 121/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1047 - acc: 0.9786 - val\_  
Epoch 122/150  
4067/4067 [=====] - 1s 184us/step - loss: 0.1258 - acc: 0.9761 - val\_  
Epoch 123/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1092 - acc: 0.9761 - val\_  
Epoch 124/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1156 - acc: 0.9771 - val\_  
Epoch 125/150  
4067/4067 [=====] - 1s 184us/step - loss: 0.1174 - acc: 0.9725 - val\_  
Epoch 126/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1259 - acc: 0.9749 - val\_  
Epoch 127/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1037 - acc: 0.9774 - val\_  
Epoch 128/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1121 - acc: 0.9757 - val\_  
Epoch 129/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1411 - acc: 0.9734 - val\_  
Epoch 130/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1013 - acc: 0.9811 - val\_  
Epoch 131/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1160 - acc: 0.9764 - val\_  
Epoch 132/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1540 - acc: 0.9705 - val\_  
Epoch 133/150  
4067/4067 [=====] - 1s 184us/step - loss: 0.1229 - acc: 0.9747 - val\_  
Epoch 134/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1112 - acc: 0.9779 - val\_  
Epoch 135/150  
4067/4067 [=====] - 1s 182us/step - loss: 0.1277 - acc: 0.9757 - val\_  
Epoch 136/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1165 - acc: 0.9769 - val\_  
Epoch 137/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1170 - acc: 0.9784 - val\_  
Epoch 138/150  
4067/4067 [=====] - 1s 183us/step - loss: 0.1261 - acc: 0.9747 - val\_  
Epoch 139/150  
4067/4067 [=====] - 1s 184us/step - loss: 0.1050 - acc: 0.9764 - val\_

```

Epoch 140/150
4067/4067 [=====] - 1s 183us/step - loss: 0.1088 - acc: 0.9774 - val_
Epoch 141/150
4067/4067 [=====] - 1s 182us/step - loss: 0.1082 - acc: 0.9749 - val_
Epoch 142/150
4067/4067 [=====] - 1s 185us/step - loss: 0.1251 - acc: 0.9727 - val_
Epoch 143/150
4067/4067 [=====] - 1s 183us/step - loss: 0.1217 - acc: 0.9759 - val_
Epoch 144/150
4067/4067 [=====] - 1s 183us/step - loss: 0.1080 - acc: 0.9801 - val_
Epoch 145/150
4067/4067 [=====] - 1s 183us/step - loss: 0.1048 - acc: 0.9798 - val_
Epoch 146/150
4067/4067 [=====] - 1s 185us/step - loss: 0.1175 - acc: 0.9779 - val_
Epoch 147/150
4067/4067 [=====] - 1s 185us/step - loss: 0.1047 - acc: 0.9798 - val_
Epoch 148/150
4067/4067 [=====] - 1s 183us/step - loss: 0.1140 - acc: 0.9766 - val_
Epoch 149/150
4067/4067 [=====] - 1s 183us/step - loss: 0.1539 - acc: 0.9720 - val_
Epoch 150/150
4067/4067 [=====] - 1s 185us/step - loss: 0.1189 - acc: 0.9744 - val_

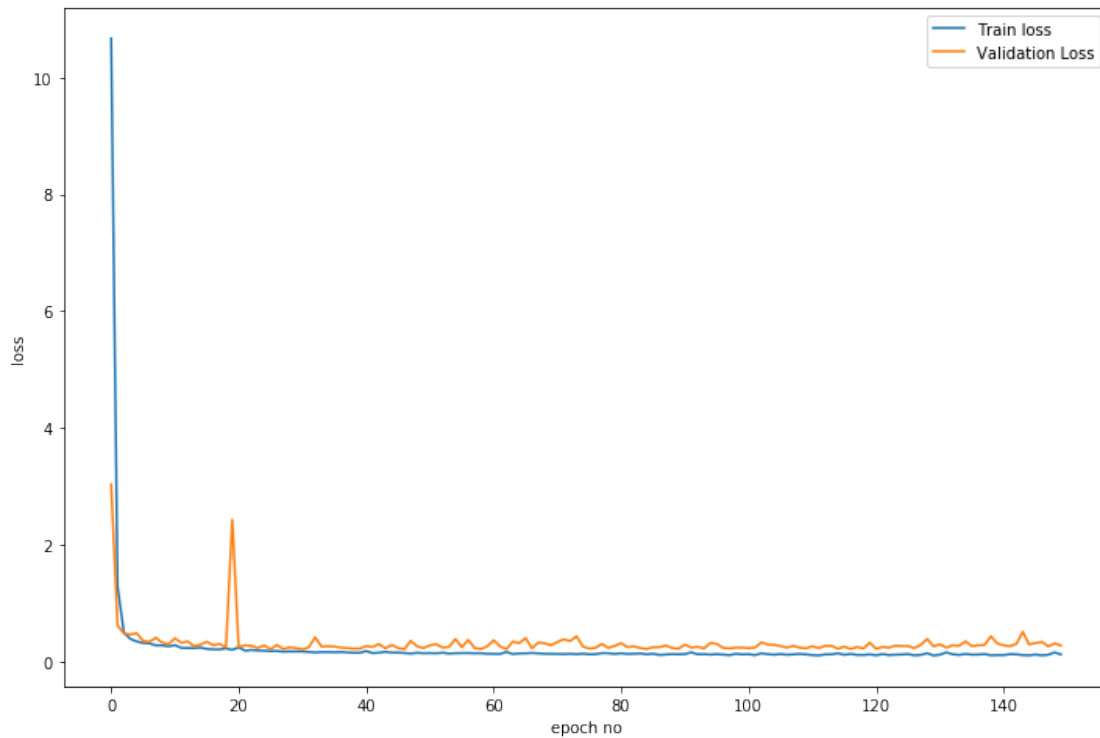
```

```

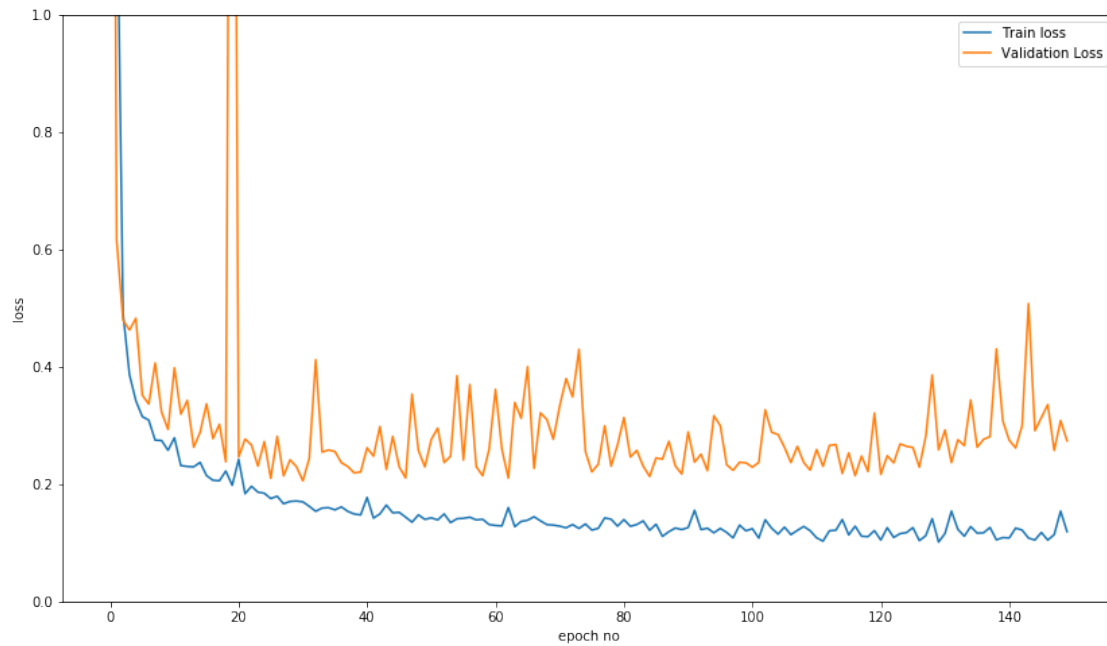
In [66]: plt.figure(figsize=(12,8))
         plt.plot(result.history['loss'],label='Train loss')
         plt.plot(result.history['val_loss'],label = 'Validation Loss')
         plt.xlabel('epoch no')
         plt.ylabel('loss')
         plt.legend()
         plt.show()

```

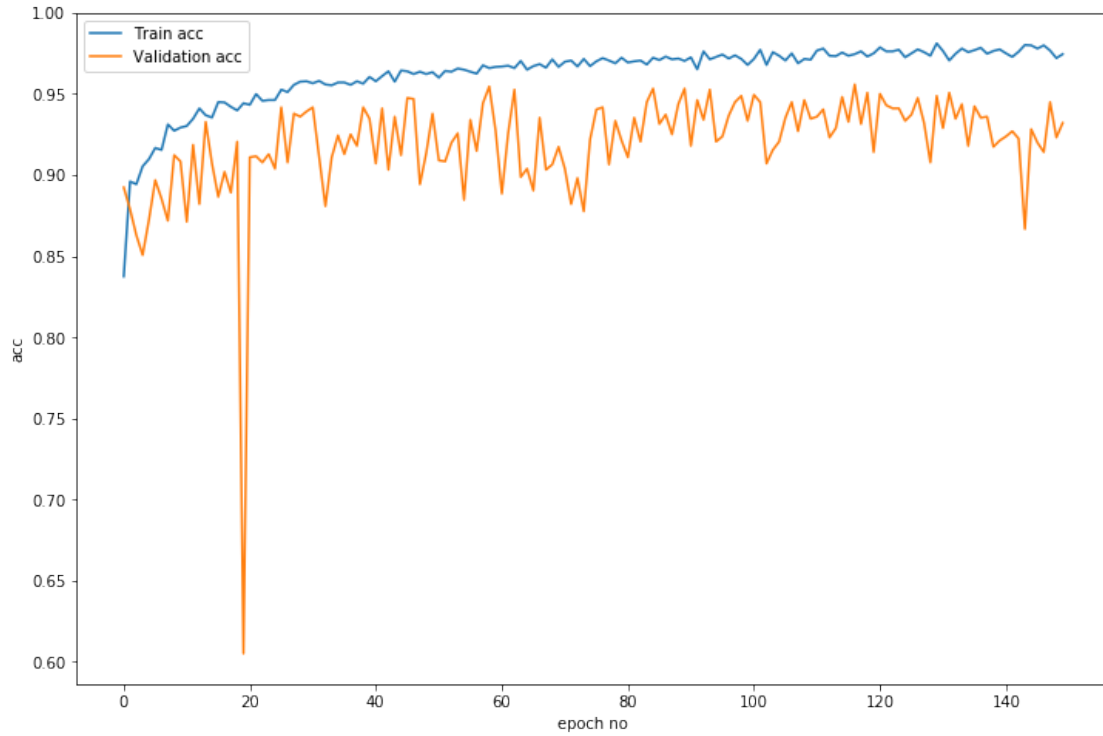




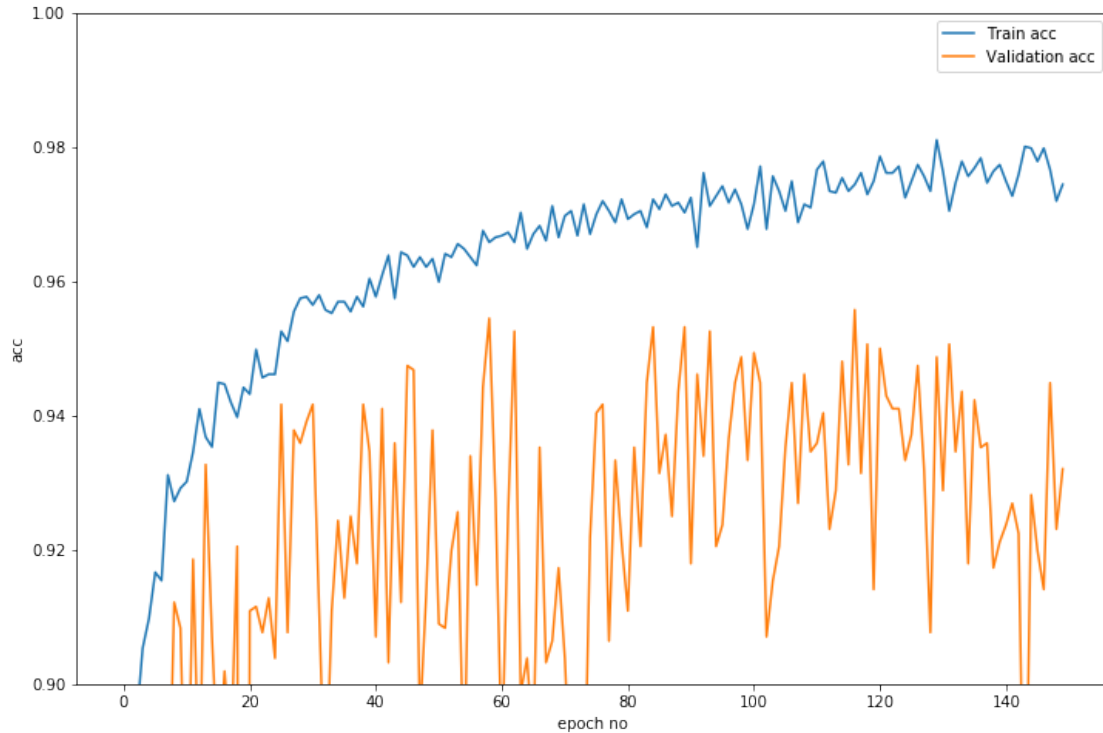
```
In [67]: plt.figure(figsize=(14,8))
plt.plot(result.history['loss'],label='Train loss')
plt.plot(result.history['val_loss'],label = 'Validation Loss')
plt.ylim(0,1)
plt.xlabel('epoch no')
plt.ylabel('loss')
plt.legend()
plt.show()
```



```
In [68]: plt.figure(figsize=(12,8))
plt.plot(result.history['acc'],label='Train acc')
plt.plot(result.history['val_acc'],label = 'Validation acc')
plt.xlabel('epoch no')
plt.ylabel('acc')
plt.legend()
plt.show()
```



```
In [69]: plt.figure(figsize=(12,8))
plt.plot(result.history['acc'],label='Train acc')
plt.plot(result.history['val_acc'],label = 'Validation acc')
plt.xlabel('epoch no')
plt.ylabel('acc')
plt.ylim(0.90,1)
plt.legend()
plt.show()
```



around 57-59 score is giving good accuracy wit less overfitting

```
In [77]: runtime_param['nb_epoch'] = 59
         best_model,result = keras_fmin_fnct(runtime_param)
```

```
Exception ignored in: <bound method BaseSession._Callable.__del__ of <tensorflow.python.client
Traceback (most recent call last):
  File "/glob/intel-python/versions/2018u2/intelpython3/lib/python3.6/site-packages/tensorflow,
    self._session._session, self._handle, status)
  File "/glob/intel-python/versions/2018u2/intelpython3/lib/python3.6/site-packages/tensorflow,
    c_api.TF_GetCode(self.status.status))
tensorflow.python.framework.errors_impl.InvalidArgumentError: No such callable handle: 1498424
/glob/intel-python/versions/2018u2/intelpython3/lib/python3.6/site-packages/ipykernel_launcher
```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 16)	1552
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1	(None, 61, 16)	0

flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

=====  
Total params: 65,747

Trainable params: 65,747

Non-trainable params: 0

-----  
None

Train on 4067 samples, validate on 1560 samples

Epoch 1/59

4067/4067 [=====] - 2s 383us/step - loss: 10.6708 - acc: 0.8375 - val\_

Epoch 2/59

4067/4067 [=====] - 1s 184us/step - loss: 1.2846 - acc: 0.8960 - val\_

Epoch 3/59

4067/4067 [=====] - 1s 184us/step - loss: 0.4912 - acc: 0.8943 - val\_

Epoch 4/59

4067/4067 [=====] - 1s 183us/step - loss: 0.3866 - acc: 0.9053 - val\_

Epoch 5/59

4067/4067 [=====] - 1s 184us/step - loss: 0.3421 - acc: 0.9098 - val\_

Epoch 6/59

4067/4067 [=====] - 1s 184us/step - loss: 0.3151 - acc: 0.9166 - val\_

Epoch 7/59

4067/4067 [=====] - 1s 184us/step - loss: 0.3091 - acc: 0.9154 - val\_

Epoch 8/59

4067/4067 [=====] - 1s 183us/step - loss: 0.2749 - acc: 0.9312 - val\_

Epoch 9/59

4067/4067 [=====] - 1s 184us/step - loss: 0.2743 - acc: 0.9272 - val\_

Epoch 10/59

4067/4067 [=====] - 1s 183us/step - loss: 0.2576 - acc: 0.9292 - val\_

Epoch 11/59

4067/4067 [=====] - 1s 184us/step - loss: 0.2791 - acc: 0.9302 - val\_

Epoch 12/59

4067/4067 [=====] - 1s 184us/step - loss: 0.2315 - acc: 0.9346 - val\_

Epoch 13/59

4067/4067 [=====] - 1s 183us/step - loss: 0.2301 - acc: 0.9410 - val\_

Epoch 14/59

4067/4067 [=====] - 1s 183us/step - loss: 0.2294 - acc: 0.9368 - val\_

Epoch 15/59

4067/4067 [=====] - 1s 183us/step - loss: 0.2371 - acc: 0.9353 - val\_

Epoch 16/59

4067/4067 [=====] - 1s 183us/step - loss: 0.2146 - acc: 0.9449 - val\_

Epoch 17/59

4067/4067 [=====] - 1s 184us/step - loss: 0.2065 - acc: 0.9447 - val\_

Epoch 18/59

```

4067/4067 [=====] - 1s 184us/step - loss: 0.2056 - acc: 0.9420 - val_
Epoch 19/59
4067/4067 [=====] - 1s 186us/step - loss: 0.2223 - acc: 0.9398 - val_
Epoch 20/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1979 - acc: 0.9442 - val_
Epoch 21/59
4067/4067 [=====] - 1s 184us/step - loss: 0.2421 - acc: 0.9432 - val_
Epoch 22/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1836 - acc: 0.9498 - val_
Epoch 23/59
4067/4067 [=====] - 1s 187us/step - loss: 0.1963 - acc: 0.9457 - val_
Epoch 24/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1863 - acc: 0.9462 - val_
Epoch 25/59
4067/4067 [=====] - 1s 186us/step - loss: 0.1844 - acc: 0.9462 - val_
Epoch 26/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1754 - acc: 0.9525 - val_
Epoch 27/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1793 - acc: 0.9511 - val_
Epoch 28/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1665 - acc: 0.9555 - val_
Epoch 29/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1705 - acc: 0.9575 - val_
Epoch 30/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1712 - acc: 0.9577 - val_
Epoch 31/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1698 - acc: 0.9565 - val_
Epoch 32/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1621 - acc: 0.9580 - val_
Epoch 33/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1537 - acc: 0.9557 - val_
Epoch 34/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1592 - acc: 0.9552 - val_
Epoch 35/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1598 - acc: 0.9570 - val_
Epoch 36/59
4067/4067 [=====] - 1s 195us/step - loss: 0.1561 - acc: 0.9570 - val_
Epoch 37/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1612 - acc: 0.9555 - val_
Epoch 38/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1535 - acc: 0.9577 - val_
Epoch 39/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1490 - acc: 0.9562 - val_
Epoch 40/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1476 - acc: 0.9604 - val_
Epoch 41/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1772 - acc: 0.9577 - val_
Epoch 42/59

```

```

4067/4067 [=====] - 1s 183us/step - loss: 0.1421 - acc: 0.9609 - val_
Epoch 43/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1492 - acc: 0.9639 - val_
Epoch 44/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1643 - acc: 0.9575 - val_
Epoch 45/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1510 - acc: 0.9643 - val_
Epoch 46/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1519 - acc: 0.9639 - val_
Epoch 47/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1437 - acc: 0.9621 - val_
Epoch 48/59
4067/4067 [=====] - 1s 187us/step - loss: 0.1351 - acc: 0.9636 - val_
Epoch 49/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1476 - acc: 0.9621 - val_
Epoch 50/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1399 - acc: 0.9634 - val_
Epoch 51/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1425 - acc: 0.9599 - val_
Epoch 52/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1390 - acc: 0.9641 - val_
Epoch 53/59
4067/4067 [=====] - 1s 184us/step - loss: 0.1492 - acc: 0.9636 - val_
Epoch 54/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1344 - acc: 0.9656 - val_
Epoch 55/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1410 - acc: 0.9648 - val_
Epoch 56/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1417 - acc: 0.9636 - val_
Epoch 57/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1436 - acc: 0.9624 - val_
Epoch 58/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1390 - acc: 0.9675 - val_
Epoch 59/59
4067/4067 [=====] - 1s 183us/step - loss: 0.1400 - acc: 0.9658 - val_

```

```

In [78]: _,acc_val = best_model.evaluate(X_val_s,Y_val_s,verbose=0)
         _,acc_train = best_model.evaluate(X_train_s,Y_train_s,verbose=0)
         print('Train_accuracy',acc_train,'test_accuracy',acc_val)

```

```

Train_accuracy 0.9741824440619621 test_accuracy 0.9544871794871795

```

```

In [81]: # Confusion Matrix
         # Activities are the class labels
         # It is a 3 class classification
         from sklearn import metrics

```

```

ACTIVITIES = {
    0: 'SITTING',
    1: 'STANDING',
    2: 'LAYING',
}

# Utility function to print the confusion matrix
def confusion_matrix_cnn(Y_true, Y_pred):
    Y_true = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_true, axis=1)])
    Y_pred = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_pred, axis=1)])

    #return pd.crosstab(Y_true, Y_pred, rownames=['True'], colnames=['Pred'])
    return metrics.confusion_matrix(Y_true, Y_pred)

# Confusion Matrix
print(confusion_matrix_cnn(Y_val_s, best_model.predict(X_val_s)))

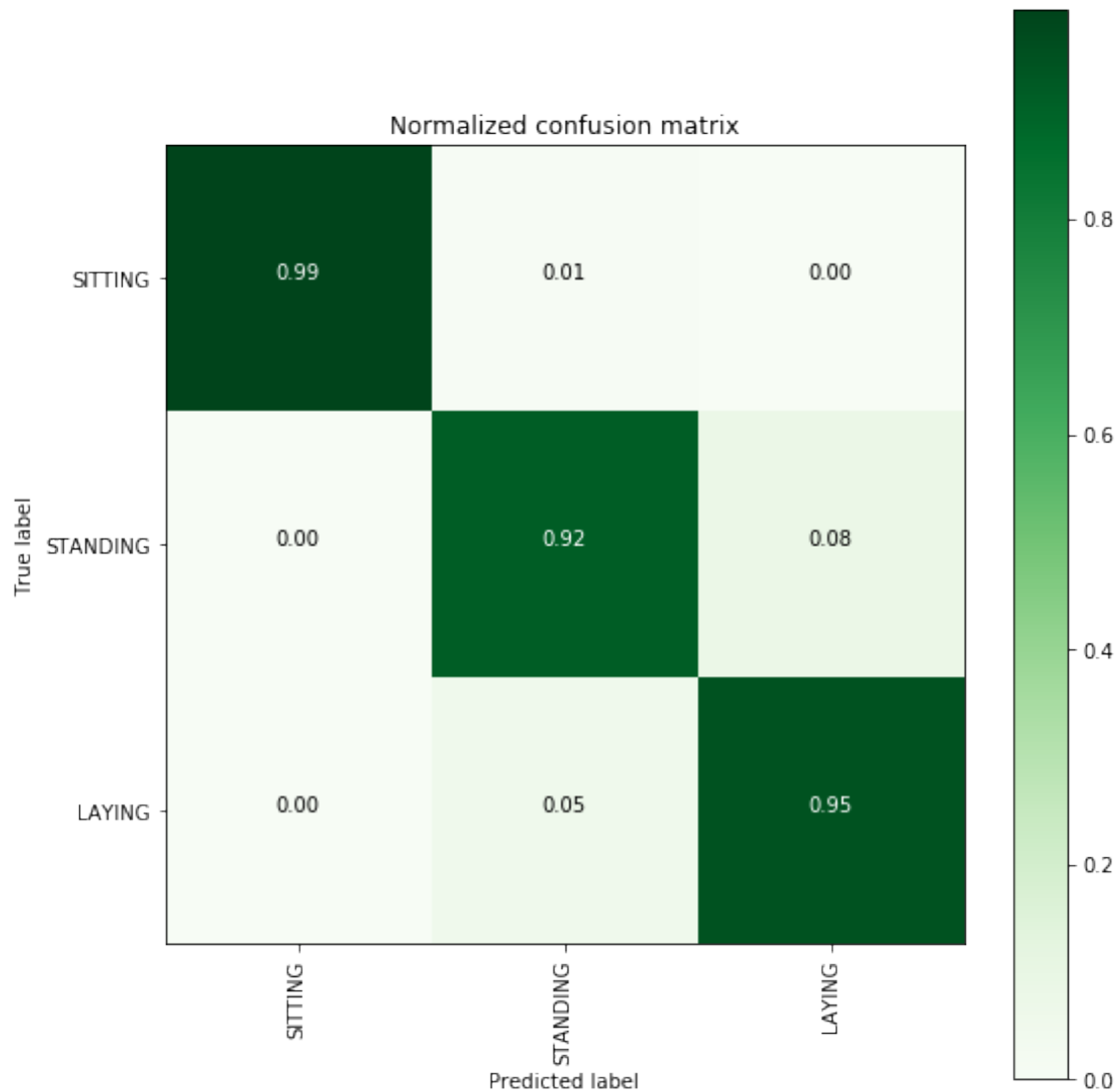
[[534   3   0]
 [  0 450  41]
 [  0  27 505]]

In [83]: plt.figure(figsize=(8,8))
         cm = confusion_matrix_cnn(Y_val_s, best_model.predict(X_val_s))
         plot_confusion_matrix(cm, classes=['SITTING', 'STANDING', 'LAYING'], normalize=True, ti
         plt.show()

<matplotlib.figure.Figure at 0x148471fbee10>

```





it was better than confusion metric with all data. We improved our model for classifying static activities a lot than previous approc models.

```
In [84]: ##saving model
         best_model.save('final_model_static.h5')
```

### 13.3.3 Classification of Dynamic activities :

```
In [151]: ##data preparation
         def data_scaled_dynamic():
             """
             Obtain the dataset from multiple files.
             Returns: X_train, X_test, y_train, y_test
             """
```

```

# Data directory
DATADIR = 'UCI_HAR_Dataset'
# Raw data signals
# Signals are from Accelerometer and Gyroscope
# The signals are in x,y,z directions
# Sensor signals are filtered to have only body acceleration
# excluding the acceleration due to gravity
# Triaxial acceleration from the accelerometer is total acceleration
SIGNALS = [
    "body_acc_x",
    "body_acc_y",
    "body_acc_z",
    "body_gyro_x",
    "body_gyro_y",
    "body_gyro_z",
    "total_acc_x",
    "total_acc_y",
    "total_acc_z"
]

from sklearn.base import BaseEstimator, TransformerMixin
class scaling_tseries_data(BaseEstimator, TransformerMixin):
    from sklearn.preprocessing import StandardScaler
    def __init__(self):
        self.scale = None

    def transform(self, X):
        temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
        temp_X1 = self.scale.transform(temp_X1)
        return temp_X1.reshape(X.shape)

    def fit(self, X):
        # remove overlaping
        remove = int(X.shape[1] / 2)
        temp_X = X[:, -remove:, :]
        # flatten data
        temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape[2]))
        scale = StandardScaler()
        scale.fit(temp_X)
        pickle.dump(scale, open('Scale_dynamic.p', 'wb'))
        self.scale = scale
        return self

# Utility function to read the data from csv file
def _read_csv(filename):
    return pd.read_csv(filename, delim_whitespace=True, header=None)

# Utility function to load the load
def load_signals(subset):

```

```

signals_data = []

for signal in SIGNALS:
    filename = f'UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}'
    signals_data.append( _read_csv(filename).as_matrix())

# Transpose is used to change the dimensionality of the output,
# aggregating the signals by combination of sample/timestep.
# Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
return np.transpose(signals_data, (1, 2, 0))

def load_y(subset):
    """
    The objective that we are trying to predict is a integer, from 1 to 6,
    that represents a human activity. We return a binary representation of
    every sample objective as a 6 bits vector using One Hot Encoding
    (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.h)
    """
    filename = f'UCI_HAR_Dataset/{subset}/y_{subset}.txt'
    y = _read_csv(filename)[0]
    y_subset = y[:3]
    y = y[y_subset]
    return pd.get_dummies(y).as_matrix(),y_subset

Y_train_d,y_train_sub = load_y('train')
Y_val_d,y_test_sub = load_y('test')
X_train_d, X_val_d = load_signals('train'), load_signals('test')
X_train_d = X_train_d[y_train_sub]
X_val_d = X_val_d[y_test_sub]

###Scaling data
Scale = scaling_tseries_data()
Scale.fit(X_train_d)
X_train_d = Scale.transform(X_train_d)
X_val_d = Scale.transform(X_val_d)

return X_train_d, Y_train_d, X_val_d, Y_val_d

In [152]: X_train_d, Y_train_d, X_val_d, Y_val_d = data_scaled_dynamic()

In [153]: print('Train X shape',X_train_d.shape,'Test X shape',X_val_d.shape)
          print('Train Y shape',Y_train_d.shape,'Test Y shape',Y_val_d.shape)

Train X shape (3285, 128, 9) Test X shape (1387, 128, 9)
Train Y shape (3285, 3) Test Y shape (1387, 3)

```

## Baseline Model

```
In [96]: np.random.seed(0)
         tf.set_random_seed(0)
         sess = tf.Session(graph=tf.get_default_graph())
         K.set_session(sess)
         model = Sequential()
         model.add(Conv1D(filters=64, kernel_size=7, activation='relu',kernel_initializer='he_
         model.add(Conv1D(filters=32, kernel_size=3, activation='relu',kernel_initializer='he_
         model.add(Dropout(0.6))
         model.add(MaxPooling1D(pool_size=3))
         model.add(Flatten())
         model.add(Dense(30, activation='relu'))
         model.add(Dense(3, activation='softmax'))
         model.summary()
```

```
-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 122, 64)            4096
-----
conv1d_2 (Conv1D)           (None, 120, 32)            6176
-----
dropout_1 (Dropout)         (None, 120, 32)            0
-----
max_pooling1d_1 (MaxPooling1 (None, 40, 32)            0
-----
flatten_1 (Flatten)         (None, 1280)                0
-----
dense_1 (Dense)             (None, 30)                  38430
-----
dense_2 (Dense)             (None, 3)                   93
=====
Total params: 48,795
Trainable params: 48,795
Non-trainable params: 0
-----
```

```
In [97]: import math
         adam = keras.optimizers.Adam(lr=0.004)
         model.compile(loss='categorical_crossentropy', optimizer=adam, metrics=['accuracy'])
         model.fit(X_train_s,Y_train_s, epochs=100, batch_size=16,validation_data=(X_val_s, Y_
         K.clear_session()
```

Train on 4067 samples, validate on 1560 samples

Epoch 1/100

4067/4067 [=====] - 3s 646us/step - loss: 0.3741 - acc: 0.8835 - val\_

Epoch 2/100

4067/4067 [=====] - 2s 469us/step - loss: 0.2112 - acc: 0.9179 - val\_

Epoch 3/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2055 - acc: 0.9179 - val\_  
Epoch 4/100  
4067/4067 [=====] - 2s 471us/step - loss: 0.1922 - acc: 0.9240 - val\_  
Epoch 5/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2058 - acc: 0.9292 - val\_  
Epoch 6/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1774 - acc: 0.9336 - val\_  
Epoch 7/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1617 - acc: 0.9405 - val\_  
Epoch 8/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1881 - acc: 0.9363 - val\_  
Epoch 9/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.2020 - acc: 0.9385 - val\_  
Epoch 10/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1497 - acc: 0.9476 - val\_  
Epoch 11/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2372 - acc: 0.9294 - val\_  
Epoch 12/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2053 - acc: 0.9348 - val\_  
Epoch 13/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2254 - acc: 0.9223 - val\_  
Epoch 14/100  
4067/4067 [=====] - 2s 482us/step - loss: 0.1488 - acc: 0.9410 - val\_  
Epoch 15/100  
4067/4067 [=====] - 2s 473us/step - loss: 0.1156 - acc: 0.9548 - val\_  
Epoch 16/100  
4067/4067 [=====] - 2s 474us/step - loss: 0.1348 - acc: 0.9523 - val\_  
Epoch 17/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2656 - acc: 0.9393 - val\_  
Epoch 18/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.4346 - acc: 0.9171 - val\_  
Epoch 19/100  
4067/4067 [=====] - 2s 467us/step - loss: 0.2026 - acc: 0.9385 - val\_  
Epoch 20/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.1679 - acc: 0.9511 - val\_  
Epoch 21/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.1626 - acc: 0.9525 - val\_  
Epoch 22/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1852 - acc: 0.9452 - val\_  
Epoch 23/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.2965 - acc: 0.9233 - val\_  
Epoch 24/100  
4067/4067 [=====] - 2s 475us/step - loss: 0.2631 - acc: 0.9358 - val\_  
Epoch 25/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2342 - acc: 0.9432 - val\_  
Epoch 26/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.3714 - acc: 0.9257 - val\_

Epoch 27/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.3692 - acc: 0.9312 - val\_  
Epoch 28/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.3338 - acc: 0.9380 - val\_  
Epoch 29/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.3166 - acc: 0.9462 - val\_  
Epoch 30/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.3306 - acc: 0.9437 - val\_  
Epoch 31/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.3000 - acc: 0.9466 - val\_  
Epoch 32/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2992 - acc: 0.9459 - val\_  
Epoch 33/100  
4067/4067 [=====] - 2s 476us/step - loss: 0.3235 - acc: 0.9430 - val\_  
Epoch 34/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2924 - acc: 0.9516 - val\_  
Epoch 35/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.2561 - acc: 0.9439 - val\_  
Epoch 36/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1771 - acc: 0.9587 - val\_  
Epoch 37/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1556 - acc: 0.9653 - val\_  
Epoch 38/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1674 - acc: 0.9643 - val\_  
Epoch 39/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1850 - acc: 0.9619 - val\_  
Epoch 40/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2294 - acc: 0.9565 - val\_  
Epoch 41/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.8426 - acc: 0.8618 - val\_  
Epoch 42/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.3695 - acc: 0.9095 - val\_  
Epoch 43/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2976 - acc: 0.8957 - val\_  
Epoch 44/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.3169 - acc: 0.8842 - val\_  
Epoch 45/100  
4067/4067 [=====] - 2s 481us/step - loss: 0.2832 - acc: 0.9299 - val\_  
Epoch 46/100  
4067/4067 [=====] - 2s 473us/step - loss: 0.2590 - acc: 0.9253 - val\_  
Epoch 47/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.2411 - acc: 0.9058 - val\_  
Epoch 48/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2444 - acc: 0.9339 - val\_  
Epoch 49/100  
4067/4067 [=====] - 2s 471us/step - loss: 0.2571 - acc: 0.9398 - val\_  
Epoch 50/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.2081 - acc: 0.9329 - val\_

Epoch 51/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.1975 - acc: 0.9459 - val\_  
Epoch 52/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.1934 - acc: 0.9506 - val\_  
Epoch 53/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1805 - acc: 0.9560 - val\_  
Epoch 54/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1955 - acc: 0.9422 - val\_  
Epoch 55/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.2695 - acc: 0.9420 - val\_  
Epoch 56/100  
4067/4067 [=====] - 2s 472us/step - loss: 0.2427 - acc: 0.9545 - val\_  
Epoch 57/100  
4067/4067 [=====] - 2s 472us/step - loss: 0.2529 - acc: 0.9486 - val\_  
Epoch 58/100  
4067/4067 [=====] - 2s 472us/step - loss: 0.2147 - acc: 0.9469 - val\_  
Epoch 59/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2057 - acc: 0.9599 - val\_  
Epoch 60/100  
4067/4067 [=====] - 2s 469us/step - loss: 1.0452 - acc: 0.8975 - val\_  
Epoch 61/100  
4067/4067 [=====] - 2s 470us/step - loss: 5.7147 - acc: 0.6027 - val\_  
Epoch 62/100  
4067/4067 [=====] - 2s 469us/step - loss: 5.6650 - acc: 0.6078 - val\_  
Epoch 63/100  
4067/4067 [=====] - 2s 469us/step - loss: 5.6250 - acc: 0.6164 - val\_  
Epoch 64/100  
4067/4067 [=====] - 2s 468us/step - loss: 5.5582 - acc: 0.6191 - val\_  
Epoch 65/100  
4067/4067 [=====] - 2s 469us/step - loss: 5.2745 - acc: 0.6410 - val\_  
Epoch 66/100  
4067/4067 [=====] - 2s 472us/step - loss: 0.2632 - acc: 0.9388 - val\_  
Epoch 67/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2281 - acc: 0.9550 - val\_  
Epoch 68/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.4060 - acc: 0.9353 - val\_  
Epoch 69/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.4286 - acc: 0.9071 - val\_  
Epoch 70/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.3854 - acc: 0.9142 - val\_  
Epoch 71/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.3436 - acc: 0.9415 - val\_  
Epoch 72/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2453 - acc: 0.9491 - val\_  
Epoch 73/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.1925 - acc: 0.9501 - val\_  
Epoch 74/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.1871 - acc: 0.9567 - val\_

Epoch 75/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.2512 - acc: 0.9444 - val\_  
Epoch 76/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.2315 - acc: 0.9481 - val\_  
Epoch 77/100  
4067/4067 [=====] - 2s 483us/step - loss: 0.2328 - acc: 0.9594 - val\_  
Epoch 78/100  
4067/4067 [=====] - 2s 471us/step - loss: 0.2192 - acc: 0.9619 - val\_  
Epoch 79/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.2219 - acc: 0.9584 - val\_  
Epoch 80/100  
4067/4067 [=====] - 2s 471us/step - loss: 0.2892 - acc: 0.9324 - val\_  
Epoch 81/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.2685 - acc: 0.9223 - val\_  
Epoch 82/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.2445 - acc: 0.9385 - val\_  
Epoch 83/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.2005 - acc: 0.9459 - val\_  
Epoch 84/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.2433 - acc: 0.9417 - val\_  
Epoch 85/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.2071 - acc: 0.9275 - val\_  
Epoch 86/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1931 - acc: 0.9511 - val\_  
Epoch 87/100  
4067/4067 [=====] - 2s 471us/step - loss: 0.1786 - acc: 0.9629 - val\_  
Epoch 88/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1616 - acc: 0.9648 - val\_  
Epoch 89/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.1567 - acc: 0.9592 - val\_  
Epoch 90/100  
4067/4067 [=====] - 2s 469us/step - loss: 0.1951 - acc: 0.9636 - val\_  
Epoch 91/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.1813 - acc: 0.9646 - val\_  
Epoch 92/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.1771 - acc: 0.9629 - val\_  
Epoch 93/100  
4067/4067 [=====] - 2s 468us/step - loss: 0.3397 - acc: 0.9570 - val\_  
Epoch 94/100  
4067/4067 [=====] - 2s 468us/step - loss: 3.7788 - acc: 0.7037 - val\_  
Epoch 95/100  
4067/4067 [=====] - 2s 468us/step - loss: 4.0658 - acc: 0.6922 - val\_  
Epoch 96/100  
4067/4067 [=====] - 2s 475us/step - loss: 3.0969 - acc: 0.7335 - val\_  
Epoch 97/100  
4067/4067 [=====] - 2s 467us/step - loss: 0.4589 - acc: 0.9171 - val\_  
Epoch 98/100  
4067/4067 [=====] - 2s 470us/step - loss: 0.3379 - acc: 0.9169 - val\_



Epoch 99/100

4067/4067 [=====] - 2s 468us/step - loss: 0.3399 - acc: 0.9184 - val\_

Epoch 100/100

4067/4067 [=====] - 2s 469us/step - loss: 0.2668 - acc: 0.9341 - val\_

```
In [7]: def model_cnn(X_train_d, Y_train_d, X_val_d, Y_val_d):
    np.random.seed(0)
    tf.set_random_seed(0)
    sess = tf.Session(graph=tf.get_default_graph())
    K.set_session(sess)
    # Initiliazing the sequential model
    model = Sequential()

    model.add(Conv1D(filters={{choice([28,32,42])}}, kernel_size={{choice([3,5,7])}}, kernel_regularizer=l2({{uniform(0,3)}}),input_shape=(128,9)))

    model.add(Conv1D(filters={{choice([16,24,32])}}, kernel_size={{choice([3,5,7])}}, activation='relu',kernel_regularizer=l2({{uniform(0,2)}}),kernel_

    model.add(Dropout({{uniform(0.45,0.7)}}))
    model.add(MaxPooling1D(pool_size={{choice([2,3,5])}}))
    model.add(Flatten())
    model.add(Dense({{choice([16,32,64])}}, activation='relu'))
    model.add(Dense(3, activation='softmax'))

    adam = keras.optimizers.Adam(lr={{uniform(0.00065,0.004)}})
    rmsprop = keras.optimizers.RMSprop(lr={{uniform(0.00065,0.004)}})

    choiceval = {{choice(['adam', 'rmsprop'])}}

    if choiceval == 'adam':
        optim = adam
    else:
        optim = rmsprop

    print(model.summary())

    model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=optim

    result = model.fit(X_train_d, Y_train_d,
        batch_size={{choice([16,32,64])}},
        nb_epoch={{choice([35,40,55])}},
        verbose=2,
        validation_data=(X_val_d, Y_val_d))

    score, acc = model.evaluate(X_val_d, Y_val_d, verbose=0)
    score1, acc1 = model.evaluate(X_train_d, Y_train_d, verbose=0)
    print('Train accuracy',acc1,'Test accuracy:', acc)
```

```

print('-----')
K.clear_session()
return {'loss': -acc, 'status': STATUS_OK, 'train_acc': acc1}

```

In [8]: `import pickle`

```

best_run, best_model, space = pickle.load(open('/home/u20112/final_result_cnn5.p', 'rb'))
trials = pickle.load(open('/home/u20112/trials_cnn5.p', 'rb'))

```

In [10]: `X_train_d, Y_train_d, X_val_d, Y_val_d = data_scaled_dynamic()`

```

trials = Trials()
best_run, best_model, space = optim.minimize(model=model_cnn,
                                              data=data_scaled_dynamic,
                                              algo=tpe.suggest,
                                              max_evals=120, rseed = 0,
                                              trials=trials, notebook_name='Human Activity Det
                                              return_space = True)

```

```

>>> Imports:
#coding=utf-8

```

```

try:
    import os
except:
    pass

```

```

try:
    import numpy as np
except:
    pass

```

```

try:
    import tensorflow as tf
except:
    pass

```

```

try:
    import random as rn
except:
    pass

```

```

try:
    from keras import backend as K
except:
    pass

```

```

try:
    import pickle
except:

```

```

        pass

    try:
        import keras
    except:
        pass

    try:
        from keras.models import Sequential
    except:
        pass

    try:
        from keras.layers import LSTM
    except:
        pass

    try:
        from keras.layers.core import Dense, Dropout
    except:
        pass

    try:
        from hyperopt import Trials, STATUS_OK, tpe
    except:
        pass

    try:
        from hyperas import optim
    except:
        pass

    try:
        from hyperas.distributions import choice, uniform
    except:
        pass

    try:
        import pandas as pd
    except:
        pass

    try:
        from matplotlib import pyplot
    except:
        pass

    try:

```

```

        from sklearn.preprocessing import StandardScaler
except:
    pass

try:
    from keras.models import Sequential
except:
    pass

try:
    from keras.layers import Flatten
except:
    pass

try:
    from keras.regularizers import l2
except:
    pass

try:
    from keras.layers.convolutional import Conv1D
except:
    pass

try:
    from keras.layers.convolutional import MaxPooling1D
except:
    pass

try:
    from keras.utils import to_categorical
except:
    pass

try:
    from sklearn.base import BaseEstimator, TransformerMixin
except:
    pass

try:
    from sklearn.preprocessing import StandardScaler
except:
    pass

>>> Hyperas search space:

def get_space():
    return {

```

```

'filters': hp.choice('filters', [28,32,42]),
'kernel_size': hp.choice('kernel_size', [3,5,7]),
'l2': hp.uniform('l2', 0,3),
'filters_1': hp.choice('filters_1', [16,24,32]),
'kernel_size_1': hp.choice('kernel_size_1', [3,5,7]),
'l2_1': hp.uniform('l2_1', 0,2),
'Dropout': hp.uniform('Dropout', 0.45,0.7),
'pool_size': hp.choice('pool_size', [2,3,5]),
'Dense': hp.choice('Dense', [16,32,64]),
'lr': hp.uniform('lr', 0.00065,0.004),
'lr_1': hp.uniform('lr_1', 0.00065,0.004),
'choiceval': hp.choice('choiceval', ['adam', 'rmsprop']),
'Dense_1': hp.choice('Dense_1', [16,32,64]),
'nb_epoch': hp.choice('nb_epoch', [35,40,55]),
}

```

>>> Data

```

1:
2: """
3: Obtain the dataset from multiple files.
4: Returns: X_train, X_test, y_train, y_test
5: """
6: # Data directory
7: DATADIR = 'UCI_HAR_Dataset'
8: # Raw data signals
9: # Signals are from Accelerometer and Gyroscope
10: # The signals are in x,y,z directions
11: # Sensor signals are filtered to have only body acceleration
12: # excluding the acceleration due to gravity
13: # Triaxial acceleration from the accelerometer is total acceleration
14: SIGNALS = [
15:     "body_acc_x",
16:     "body_acc_y",
17:     "body_acc_z",
18:     "body_gyro_x",
19:     "body_gyro_y",
20:     "body_gyro_z",
21:     "total_acc_x",
22:     "total_acc_y",
23:     "total_acc_z"
24: ]
25: from sklearn.base import BaseEstimator, TransformerMixin
26: class scaling_tseries_data(BaseEstimator, TransformerMixin):
27:     from sklearn.preprocessing import StandardScaler
28:     def __init__(self):
29:         self.scale = None
30:
31:     def transform(self, X):

```

```

32:         temp_X1 = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
33:         temp_X1 = self.scale.transform(temp_X1)
34:         return temp_X1.reshape(X.shape)
35:
36:     def fit(self, X):
37:         # remove overlapping
38:         remove = int(X.shape[1] / 2)
39:         temp_X = X[:, -remove:, :]
40:         # flatten data
41:         temp_X = temp_X.reshape((temp_X.shape[0] * temp_X.shape[1], temp_X.shape[2]))
42:         scale = StandardScaler()
43:         scale.fit(temp_X)
44:         self.scale = scale
45:         return self
46:
47: # Utility function to read the data from csv file
48: def _read_csv(filename):
49:     return pd.read_csv(filename, delim_whitespace=True, header=None)
50:
51: # Utility function to load the load
52: def load_signals(subset):
53:     signals_data = []
54:
55:     for signal in SIGNALS:
56:         filename = f'HAR/UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.txt'
57:         signals_data.append(_read_csv(filename).as_matrix())
58:
59:     # Transpose is used to change the dimensionality of the output,
60:     # aggregating the signals by combination of sample/timestep.
61:     # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
62:     return np.transpose(signals_data, (1, 2, 0))
63:
64: def load_y(subset):
65:     """
66:     The objective that we are trying to predict is a integer, from 1 to 6,
67:     that represents a human activity. We return a binary representation of
68:     every sample objective as a 6 bits vector using One Hot Encoding
69:     (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.html)
70:     """
71:     filename = f'HAR/UCI_HAR_Dataset/{subset}/y_{subset}.txt'
72:     y = _read_csv(filename)[0]
73:     y_subset = y<=3
74:     y = y[y_subset]
75:     return pd.get_dummies(y).as_matrix(), y_subset
76:
77: Y_train_d, y_train_sub = load_y('train')
78: Y_val_d, y_test_sub = load_y('test')
79: X_train_d, X_val_d = load_signals('train'), load_signals('test')

```

```

80: X_train_d = X_train_d[y_train_sub]
81: X_val_d = X_val_d[y_test_sub]
82:
83: ###Sciling data
84: Scale = scaling_tseries_data()
85: Scale.fit(X_train_d)
86: X_train_d = Scale.transform(X_train_d)
87: X_val_d = Scale.transform(X_val_d)
88:
89:
90:
91:
>>> Resulting replaced keras model:

1: def keras_fmin_fnct(space):
2:
3:     np.random.seed(0)
4:     tf.set_random_seed(0)
5:     sess = tf.Session(graph=tf.get_default_graph())
6:     K.set_session(sess)
7:     # Initiliazing the sequential model
8:     model = Sequential()
9:
10:    model.add(Conv1D(filters=space['filters'], kernel_size=space['kernel_size'],activation='relu',
11:                    kernel_regularizer=l2(space['l2']),input_shape=(128,9)))
12:
13:    model.add(Conv1D(filters=space['filters_1'], kernel_size=space['kernel_size_1'],
14:                    activation='relu',kernel_regularizer=l2(space['l2_1']),kernel_initializer='glorot_uniform'))
15:    model.add(Dropout(space['Dropout']))
16:    model.add(MaxPooling1D(pool_size=space['pool_size']))
17:    model.add(Flatten())
18:    model.add(Dense(space['Dense'], activation='relu'))
19:    model.add(Dense(3, activation='softmax'))
20:
21:    adam = keras.optimizers.Adam(lr=space['lr'])
22:    rmsprop = keras.optimizers.RMSprop(lr=space['lr_1'])
23:
24:    choiceval = space['choiceval']
25:
26:    if choiceval == 'adam':
27:        optim = adam
28:    else:
29:        optim = rmsprop
30:
31:    print(model.summary())
32:
33:    model.compile(loss='categorical_crossentropy', metrics=['accuracy'],optimizer=optim)
34:

```

```

35:     result = model.fit(X_train_d, Y_train_d,
36:                         batch_size=space['Dense_1'],
37:                         nb_epoch=space['nb_epoch'],
38:                         verbose=2,
39:                         validation_data=(X_val_d, Y_val_d))
40:
41:     score, acc = model.evaluate(X_val_d, Y_val_d, verbose=0)
42:     score1, acc1 = model.evaluate(X_train_d, Y_train_d, verbose=0)
43:     print('Train accuracy',acc1,'Test accuracy:', acc)
44:     print('-----')
45:     K.clear_session()
46:     return {'loss': -acc, 'status': STATUS_OK,'train_acc':acc1}
47:

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 120, 32)	5152
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 32)	0
flatten_1 (Flatten)	(None, 1920)	0
dense_1 (Dense)	(None, 64)	122944
dense_2 (Dense)	(None, 3)	195

Total params: 129,763

Trainable params: 129,763

Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 3s - loss: 51.9484 - acc: 0.5416 - val\_loss: 9.5868 - val\_acc: 0.4787

Epoch 2/55

- 2s - loss: 3.2914 - acc: 0.7802 - val\_loss: 0.9161 - val\_acc: 0.7924

Epoch 3/55

- 2s - loss: 0.5815 - acc: 0.8798 - val\_loss: 0.6775 - val\_acc: 0.8580

Epoch 4/55

- 2s - loss: 0.4724 - acc: 0.9020 - val\_loss: 0.5544 - val\_acc: 0.9056

Epoch 5/55

- 2s - loss: 0.4092 - acc: 0.9181 - val\_loss: 0.8361 - val\_acc: 0.7376

Epoch 6/55

- 2s - loss: 0.3511 - acc: 0.9339 - val\_loss: 0.6569 - val\_acc: 0.8003



Epoch 7/55  
- 2s - loss: 0.3429 - acc: 0.9339 - val\_loss: 0.6318 - val\_acc: 0.8089

Epoch 8/55  
- 2s - loss: 0.3054 - acc: 0.9470 - val\_loss: 0.4889 - val\_acc: 0.9092

Epoch 9/55  
- 2s - loss: 0.3004 - acc: 0.9489 - val\_loss: 0.4607 - val\_acc: 0.8976

Epoch 10/55  
- 2s - loss: 0.3015 - acc: 0.9476 - val\_loss: 0.4787 - val\_acc: 0.8875

Epoch 11/55  
- 2s - loss: 0.2931 - acc: 0.9461 - val\_loss: 0.5086 - val\_acc: 0.8983

Epoch 12/55  
- 2s - loss: 0.2855 - acc: 0.9495 - val\_loss: 0.3845 - val\_acc: 0.9315

Epoch 13/55  
- 2s - loss: 0.2777 - acc: 0.9522 - val\_loss: 1.4048 - val\_acc: 0.5487

Epoch 14/55  
- 2s - loss: 0.2851 - acc: 0.9522 - val\_loss: 0.5284 - val\_acc: 0.8998

Epoch 15/55  
- 2s - loss: 0.2665 - acc: 0.9559 - val\_loss: 0.4386 - val\_acc: 0.9041

Epoch 16/55  
- 2s - loss: 0.2828 - acc: 0.9495 - val\_loss: 0.3800 - val\_acc: 0.9257

Epoch 17/55  
- 2s - loss: 0.2655 - acc: 0.9516 - val\_loss: 0.5363 - val\_acc: 0.8991

Epoch 18/55  
- 2s - loss: 0.2663 - acc: 0.9562 - val\_loss: 0.8334 - val\_acc: 0.7650

Epoch 19/55  
- 2s - loss: 0.2544 - acc: 0.9549 - val\_loss: 0.6028 - val\_acc: 0.8688

Epoch 20/55  
- 2s - loss: 0.2510 - acc: 0.9626 - val\_loss: 0.4384 - val\_acc: 0.8933

Epoch 21/55  
- 2s - loss: 0.2559 - acc: 0.9577 - val\_loss: 0.5845 - val\_acc: 0.8493

Epoch 22/55  
- 2s - loss: 0.2706 - acc: 0.9525 - val\_loss: 0.4535 - val\_acc: 0.9012

Epoch 23/55  
- 2s - loss: 0.2573 - acc: 0.9619 - val\_loss: 0.4798 - val\_acc: 0.8890

Epoch 24/55  
- 2s - loss: 0.2718 - acc: 0.9534 - val\_loss: 0.4694 - val\_acc: 0.9257

Epoch 25/55  
- 2s - loss: 0.2564 - acc: 0.9610 - val\_loss: 0.4463 - val\_acc: 0.8962

Epoch 26/55  
- 2s - loss: 0.2522 - acc: 0.9577 - val\_loss: 0.4676 - val\_acc: 0.8782

Epoch 27/55  
- 2s - loss: 0.2605 - acc: 0.9525 - val\_loss: 0.4467 - val\_acc: 0.8955

Epoch 28/55  
- 2s - loss: 0.2633 - acc: 0.9543 - val\_loss: 0.4774 - val\_acc: 0.9092

Epoch 29/55  
- 2s - loss: 0.2319 - acc: 0.9638 - val\_loss: 0.3979 - val\_acc: 0.9056

Epoch 30/55  
- 2s - loss: 0.2639 - acc: 0.9537 - val\_loss: 0.7861 - val\_acc: 0.7376

Epoch 31/55  
- 2s - loss: 0.2537 - acc: 0.9574 - val\_loss: 0.3909 - val\_acc: 0.9164  
Epoch 32/55  
- 2s - loss: 0.2272 - acc: 0.9623 - val\_loss: 0.5666 - val\_acc: 0.8767  
Epoch 33/55  
- 2s - loss: 0.2679 - acc: 0.9546 - val\_loss: 0.4222 - val\_acc: 0.9005  
Epoch 34/55  
- 2s - loss: 0.2445 - acc: 0.9613 - val\_loss: 0.4334 - val\_acc: 0.8875  
Epoch 35/55  
- 2s - loss: 0.2531 - acc: 0.9559 - val\_loss: 0.3939 - val\_acc: 0.8983  
Epoch 36/55  
- 2s - loss: 0.2813 - acc: 0.9522 - val\_loss: 0.4539 - val\_acc: 0.9019  
Epoch 37/55  
- 2s - loss: 0.2535 - acc: 0.9626 - val\_loss: 0.4491 - val\_acc: 0.9005  
Epoch 38/55  
- 2s - loss: 0.2157 - acc: 0.9702 - val\_loss: 0.4433 - val\_acc: 0.9207  
Epoch 39/55  
- 2s - loss: 0.2420 - acc: 0.9571 - val\_loss: 0.6679 - val\_acc: 0.8320  
Epoch 40/55  
- 2s - loss: 0.2670 - acc: 0.9595 - val\_loss: 0.4645 - val\_acc: 0.8947  
Epoch 41/55  
- 2s - loss: 0.2520 - acc: 0.9580 - val\_loss: 0.4990 - val\_acc: 0.9012  
Epoch 42/55  
- 2s - loss: 0.2416 - acc: 0.9656 - val\_loss: 0.6509 - val\_acc: 0.8190  
Epoch 43/55  
- 2s - loss: 0.2564 - acc: 0.9531 - val\_loss: 0.5576 - val\_acc: 0.8825  
Epoch 44/55  
- 2s - loss: 0.2685 - acc: 0.9556 - val\_loss: 0.5112 - val\_acc: 0.8940  
Epoch 45/55  
- 2s - loss: 0.2315 - acc: 0.9616 - val\_loss: 0.5890 - val\_acc: 0.8515  
Epoch 46/55  
- 2s - loss: 0.2734 - acc: 0.9610 - val\_loss: 0.5982 - val\_acc: 0.8688  
Epoch 47/55  
- 2s - loss: 0.2443 - acc: 0.9577 - val\_loss: 0.4412 - val\_acc: 0.9113  
Epoch 48/55  
- 2s - loss: 0.2417 - acc: 0.9604 - val\_loss: 0.3964 - val\_acc: 0.9048  
Epoch 49/55  
- 2s - loss: 0.2642 - acc: 0.9586 - val\_loss: 1.3943 - val\_acc: 0.6431  
Epoch 50/55  
- 2s - loss: 0.2430 - acc: 0.9601 - val\_loss: 0.4900 - val\_acc: 0.8861  
Epoch 51/55  
- 2s - loss: 0.2345 - acc: 0.9571 - val\_loss: 0.5912 - val\_acc: 0.8226  
Epoch 52/55  
- 2s - loss: 0.2417 - acc: 0.9586 - val\_loss: 0.4408 - val\_acc: 0.9041  
Epoch 53/55  
- 2s - loss: 0.2210 - acc: 0.9632 - val\_loss: 0.3287 - val\_acc: 0.9380  
Epoch 54/55  
- 2s - loss: 0.2558 - acc: 0.9540 - val\_loss: 0.5351 - val\_acc: 0.8983

Epoch 55/55

- 2s - loss: 0.2214 - acc: 0.9626 - val\_loss: 0.4687 - val\_acc: 0.8940

Train accuracy 0.9899543378995433 Test accuracy: 0.8940158615717375

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
-----		
conv1d_2 (Conv1D)	(None, 120, 24)	2040
-----		
dropout_1 (Dropout)	(None, 120, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
-----		
flatten_1 (Flatten)	(None, 960)	0
-----		
dense_1 (Dense)	(None, 64)	61504
-----		
dense_2 (Dense)	(None, 3)	195
=====		

Total params: 65,531

Trainable params: 65,531

Non-trainable params: 0

---

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 2s - loss: 125.5755 - acc: 0.5626 - val\_loss: 43.7067 - val\_acc: 0.5984

Epoch 2/35

- 1s - loss: 19.3718 - acc: 0.7744 - val\_loss: 5.9414 - val\_acc: 0.6590

Epoch 3/35

- 1s - loss: 2.6292 - acc: 0.8438 - val\_loss: 1.4250 - val\_acc: 0.7008

Epoch 4/35

- 1s - loss: 0.8312 - acc: 0.8475 - val\_loss: 0.9140 - val\_acc: 0.8234

Epoch 5/35

- 1s - loss: 0.5784 - acc: 0.9078 - val\_loss: 0.8409 - val\_acc: 0.8262

Epoch 6/35

- 1s - loss: 0.5222 - acc: 0.9120 - val\_loss: 0.8383 - val\_acc: 0.7823

Epoch 7/35

- 1s - loss: 0.5027 - acc: 0.9129 - val\_loss: 0.7426 - val\_acc: 0.7844

Epoch 8/35

- 1s - loss: 0.4734 - acc: 0.9184 - val\_loss: 0.7192 - val\_acc: 0.8435

Epoch 9/35

- 1s - loss: 0.4529 - acc: 0.9282 - val\_loss: 0.6721 - val\_acc: 0.8760

Epoch 10/35

- 1s - loss: 0.4548 - acc: 0.9212 - val\_loss: 0.6644 - val\_acc: 0.8407

Epoch 11/35

- 1s - loss: 0.3786 - acc: 0.9464 - val\_loss: 0.6792 - val\_acc: 0.8443  
 Epoch 12/35  
 - 1s - loss: 0.4288 - acc: 0.9193 - val\_loss: 0.6608 - val\_acc: 0.8270  
 Epoch 13/35  
 - 1s - loss: 0.3800 - acc: 0.9394 - val\_loss: 0.6904 - val\_acc: 0.7758  
 Epoch 14/35  
 - 1s - loss: 0.3476 - acc: 0.9467 - val\_loss: 0.5656 - val\_acc: 0.8926  
 Epoch 15/35  
 - 1s - loss: 0.3388 - acc: 0.9516 - val\_loss: 0.5756 - val\_acc: 0.8601  
 Epoch 16/35  
 - 1s - loss: 0.3382 - acc: 0.9486 - val\_loss: 0.5478 - val\_acc: 0.8846  
 Epoch 17/35  
 - 1s - loss: 0.3839 - acc: 0.9355 - val\_loss: 0.5753 - val\_acc: 0.8861  
 Epoch 18/35  
 - 1s - loss: 0.3675 - acc: 0.9394 - val\_loss: 0.5744 - val\_acc: 0.8738  
 Epoch 19/35  
 - 1s - loss: 0.3014 - acc: 0.9574 - val\_loss: 0.5293 - val\_acc: 0.8868  
 Epoch 20/35  
 - 1s - loss: 0.3499 - acc: 0.9416 - val\_loss: 0.5377 - val\_acc: 0.8464  
 Epoch 21/35  
 - 1s - loss: 0.3017 - acc: 0.9559 - val\_loss: 0.5265 - val\_acc: 0.8911  
 Epoch 22/35  
 - 1s - loss: 0.3035 - acc: 0.9549 - val\_loss: 0.5609 - val\_acc: 0.8320  
 Epoch 23/35  
 - 1s - loss: 0.2899 - acc: 0.9580 - val\_loss: 0.5945 - val\_acc: 0.8226  
 Epoch 24/35  
 - 1s - loss: 0.2917 - acc: 0.9601 - val\_loss: 0.5205 - val\_acc: 0.8760  
 Epoch 25/35  
 - 1s - loss: 0.2708 - acc: 0.9702 - val\_loss: 0.5120 - val\_acc: 0.8601  
 Epoch 26/35  
 - 1s - loss: 0.3296 - acc: 0.9394 - val\_loss: 0.4779 - val\_acc: 0.9106  
 Epoch 27/35  
 - 1s - loss: 0.3039 - acc: 0.9492 - val\_loss: 0.5098 - val\_acc: 0.8810  
 Epoch 28/35  
 - 1s - loss: 0.2615 - acc: 0.9662 - val\_loss: 0.4525 - val\_acc: 0.8926  
 Epoch 29/35  
 - 1s - loss: 0.2797 - acc: 0.9601 - val\_loss: 0.4426 - val\_acc: 0.9106  
 Epoch 30/35  
 - 1s - loss: 0.3082 - acc: 0.9486 - val\_loss: 0.4373 - val\_acc: 0.9200  
 Epoch 31/35  
 - 1s - loss: 0.3073 - acc: 0.9549 - val\_loss: 0.4364 - val\_acc: 0.9027  
 Epoch 32/35  
 - 1s - loss: 0.2814 - acc: 0.9522 - val\_loss: 0.4718 - val\_acc: 0.9193  
 Epoch 33/35  
 - 1s - loss: 0.2525 - acc: 0.9708 - val\_loss: 0.4593 - val\_acc: 0.8969  
 Epoch 34/35  
 - 1s - loss: 0.2614 - acc: 0.9610 - val\_loss: 0.5758 - val\_acc: 0.8262  
 Epoch 35/35

- 1s - loss: 0.2837 - acc: 0.9534 - val\_loss: 0.5137 - val\_acc: 0.8882  
Train accuracy 0.9558599695585996 Test accuracy: 0.8882480173035328

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 122, 16)	2576
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 32)	20512
dense_2 (Dense)	(None, 3)	99

Total params: 24,083  
Trainable params: 24,083  
Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 2s - loss: 28.2762 - acc: 0.5674 - val\_loss: 16.6344 - val\_acc: 0.8061

Epoch 2/55

- 1s - loss: 10.5629 - acc: 0.9349 - val\_loss: 6.4170 - val\_acc: 0.8774

Epoch 3/55

- 1s - loss: 3.9662 - acc: 0.9766 - val\_loss: 2.5336 - val\_acc: 0.9387

Epoch 4/55

- 1s - loss: 1.5043 - acc: 0.9820 - val\_loss: 1.1191 - val\_acc: 0.9358

Epoch 5/55

- 1s - loss: 0.6249 - acc: 0.9857 - val\_loss: 0.6355 - val\_acc: 0.9337

Epoch 6/55

- 1s - loss: 0.3448 - acc: 0.9866 - val\_loss: 0.4590 - val\_acc: 0.9560

Epoch 7/55

- 1s - loss: 0.2718 - acc: 0.9817 - val\_loss: 0.4147 - val\_acc: 0.9466

Epoch 8/55

- 1s - loss: 0.2108 - acc: 0.9912 - val\_loss: 0.4151 - val\_acc: 0.9120

Epoch 9/55

- 1s - loss: 0.2157 - acc: 0.9836 - val\_loss: 0.3483 - val\_acc: 0.9567

Epoch 10/55

- 1s - loss: 0.1956 - acc: 0.9900 - val\_loss: 0.3472 - val\_acc: 0.9402

Epoch 11/55

- 1s - loss: 0.1772 - acc: 0.9884 - val\_loss: 0.3741 - val\_acc: 0.9293

Epoch 12/55  
- 1s - loss: 0.1610 - acc: 0.9936 - val\_loss: 0.3708 - val\_acc: 0.9012

Epoch 13/55  
- 1s - loss: 0.1490 - acc: 0.9927 - val\_loss: 0.3412 - val\_acc: 0.9351

Epoch 14/55  
- 1s - loss: 0.2224 - acc: 0.9741 - val\_loss: 0.2930 - val\_acc: 0.9553

Epoch 15/55  
- 1s - loss: 0.1672 - acc: 0.9890 - val\_loss: 0.3166 - val\_acc: 0.9279

Epoch 16/55  
- 1s - loss: 0.1442 - acc: 0.9939 - val\_loss: 0.3278 - val\_acc: 0.9120

Epoch 17/55  
- 1s - loss: 0.1519 - acc: 0.9906 - val\_loss: 0.2629 - val\_acc: 0.9495

Epoch 18/55  
- 1s - loss: 0.1212 - acc: 0.9951 - val\_loss: 0.2826 - val\_acc: 0.9394

Epoch 19/55  
- 1s - loss: 0.1379 - acc: 0.9884 - val\_loss: 0.2611 - val\_acc: 0.9690

Epoch 20/55  
- 1s - loss: 0.1511 - acc: 0.9893 - val\_loss: 0.2523 - val\_acc: 0.9560

Epoch 21/55  
- 1s - loss: 0.1236 - acc: 0.9930 - val\_loss: 0.2726 - val\_acc: 0.9539

Epoch 22/55  
- 1s - loss: 0.1247 - acc: 0.9915 - val\_loss: 0.2587 - val\_acc: 0.9466

Epoch 23/55  
- 1s - loss: 0.1257 - acc: 0.9912 - val\_loss: 0.2535 - val\_acc: 0.9495

Epoch 24/55  
- 1s - loss: 0.1862 - acc: 0.9708 - val\_loss: 0.3748 - val\_acc: 0.9423

Epoch 25/55  
- 1s - loss: 0.1690 - acc: 0.9942 - val\_loss: 0.3203 - val\_acc: 0.9077

Epoch 26/55  
- 1s - loss: 0.1076 - acc: 0.9973 - val\_loss: 0.2334 - val\_acc: 0.9531

Epoch 27/55  
- 1s - loss: 0.0982 - acc: 0.9951 - val\_loss: 0.2766 - val\_acc: 0.9315

Epoch 28/55  
- 1s - loss: 0.1034 - acc: 0.9948 - val\_loss: 0.2400 - val\_acc: 0.9430

Epoch 29/55  
- 1s - loss: 0.0908 - acc: 0.9957 - val\_loss: 0.4010 - val\_acc: 0.8738

Epoch 30/55  
- 1s - loss: 0.1261 - acc: 0.9833 - val\_loss: 0.3960 - val\_acc: 0.9005

Epoch 31/55  
- 1s - loss: 0.1247 - acc: 0.9936 - val\_loss: 0.2078 - val\_acc: 0.9690

Epoch 32/55  
- 1s - loss: 0.0972 - acc: 0.9933 - val\_loss: 0.2316 - val\_acc: 0.9466

Epoch 33/55  
- 1s - loss: 0.1963 - acc: 0.9799 - val\_loss: 0.2433 - val\_acc: 0.9510

Epoch 34/55  
- 1s - loss: 0.1033 - acc: 0.9963 - val\_loss: 0.2144 - val\_acc: 0.9611

Epoch 35/55  
- 1s - loss: 0.0859 - acc: 0.9954 - val\_loss: 0.2469 - val\_acc: 0.9409

```

Epoch 36/55
- 1s - loss: 0.0948 - acc: 0.9948 - val_loss: 0.3332 - val_acc: 0.8904
Epoch 37/55
- 1s - loss: 0.0858 - acc: 0.9960 - val_loss: 0.2169 - val_acc: 0.9539
Epoch 38/55
- 1s - loss: 0.1139 - acc: 0.9909 - val_loss: 0.1983 - val_acc: 0.9603
Epoch 39/55
- 1s - loss: 0.0899 - acc: 0.9948 - val_loss: 0.2630 - val_acc: 0.9250
Epoch 40/55
- 1s - loss: 0.0864 - acc: 0.9960 - val_loss: 0.2412 - val_acc: 0.9351
Epoch 41/55
- 1s - loss: 0.0808 - acc: 0.9951 - val_loss: 0.2144 - val_acc: 0.9539
Epoch 42/55
- 1s - loss: 0.0970 - acc: 0.9900 - val_loss: 0.2625 - val_acc: 0.9301
Epoch 43/55
- 1s - loss: 0.1001 - acc: 0.9915 - val_loss: 0.2295 - val_acc: 0.9387
Epoch 44/55
- 1s - loss: 0.0720 - acc: 0.9970 - val_loss: 0.1722 - val_acc: 0.9690
Epoch 45/55
- 1s - loss: 0.0997 - acc: 0.9906 - val_loss: 0.2253 - val_acc: 0.9575
Epoch 46/55
- 1s - loss: 0.0838 - acc: 0.9954 - val_loss: 0.1903 - val_acc: 0.9553
Epoch 47/55
- 1s - loss: 0.0783 - acc: 0.9948 - val_loss: 0.2360 - val_acc: 0.9524
Epoch 48/55
- 1s - loss: 0.0697 - acc: 0.9979 - val_loss: 0.2800 - val_acc: 0.9185
Epoch 49/55
- 1s - loss: 0.0744 - acc: 0.9945 - val_loss: 0.2005 - val_acc: 0.9466
Epoch 50/55
- 1s - loss: 0.0651 - acc: 0.9979 - val_loss: 0.2347 - val_acc: 0.9293
Epoch 51/55
- 1s - loss: 0.0949 - acc: 0.9887 - val_loss: 0.2967 - val_acc: 0.9156
Epoch 52/55
- 1s - loss: 0.0851 - acc: 0.9976 - val_loss: 0.1890 - val_acc: 0.9531
Epoch 53/55
- 1s - loss: 0.0767 - acc: 0.9948 - val_loss: 0.1632 - val_acc: 0.9632
Epoch 54/55
- 1s - loss: 0.0791 - acc: 0.9954 - val_loss: 0.1930 - val_acc: 0.9611
Epoch 55/55
- 1s - loss: 0.0789 - acc: 0.9942 - val_loss: 0.1825 - val_acc: 0.9582
Train accuracy 0.995738203957382 Test accuracy: 0.9581831290555155

```

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
<hr/>		
conv1d_2 (Conv1D)	(None, 122, 24)	2328

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dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

Total params: 97,755  
 Trainable params: 97,755  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 51.6618 - acc: 0.5431 - val\_loss: 40.7232 - val\_acc: 0.5955

Epoch 2/40

- 1s - loss: 32.8604 - acc: 0.7686 - val\_loss: 25.9306 - val\_acc: 0.6712

Epoch 3/40

- 1s - loss: 20.3436 - acc: 0.8706 - val\_loss: 15.9952 - val\_acc: 0.5999

Epoch 4/40

- 1s - loss: 12.0085 - acc: 0.9075 - val\_loss: 9.0286 - val\_acc: 0.8666

Epoch 5/40

- 1s - loss: 6.6221 - acc: 0.9245 - val\_loss: 4.9597 - val\_acc: 0.7916

Epoch 6/40

- 1s - loss: 3.4546 - acc: 0.9346 - val\_loss: 2.7363 - val\_acc: 0.7815

Epoch 7/40

- 1s - loss: 1.7466 - acc: 0.9434 - val\_loss: 1.4336 - val\_acc: 0.8580

Epoch 8/40

- 1s - loss: 0.9204 - acc: 0.9549 - val\_loss: 0.8829 - val\_acc: 0.8861

Epoch 9/40

- 1s - loss: 0.5880 - acc: 0.9553 - val\_loss: 0.7144 - val\_acc: 0.8991

Epoch 10/40

- 1s - loss: 0.4375 - acc: 0.9680 - val\_loss: 0.5876 - val\_acc: 0.8947

Epoch 11/40

- 1s - loss: 0.3712 - acc: 0.9619 - val\_loss: 0.5163 - val\_acc: 0.9113

Epoch 12/40

- 1s - loss: 0.3171 - acc: 0.9729 - val\_loss: 0.4638 - val\_acc: 0.9236

Epoch 13/40

- 1s - loss: 0.2821 - acc: 0.9711 - val\_loss: 1.1270 - val\_acc: 0.6294

Epoch 14/40

- 1s - loss: 0.2649 - acc: 0.9747 - val\_loss: 0.4786 - val\_acc: 0.8782

Epoch 15/40

- 1s - loss: 0.2617 - acc: 0.9689 - val\_loss: 0.3976 - val\_acc: 0.9200

Epoch 16/40



- 1s - loss: 0.2247 - acc: 0.9763 - val\_loss: 0.3359 - val\_acc: 0.9510  
 Epoch 17/40  
 - 1s - loss: 0.2190 - acc: 0.9744 - val\_loss: 0.3165 - val\_acc: 0.9524  
 Epoch 18/40  
 - 1s - loss: 0.1988 - acc: 0.9790 - val\_loss: 0.3194 - val\_acc: 0.9495  
 Epoch 19/40  
 - 1s - loss: 0.2010 - acc: 0.9763 - val\_loss: 0.3082 - val\_acc: 0.9546  
 Epoch 20/40  
 - 1s - loss: 0.1852 - acc: 0.9811 - val\_loss: 0.3149 - val\_acc: 0.9344  
 Epoch 21/40  
 - 1s - loss: 0.1836 - acc: 0.9799 - val\_loss: 0.3461 - val\_acc: 0.8998  
 Epoch 22/40  
 - 1s - loss: 0.1620 - acc: 0.9839 - val\_loss: 0.2855 - val\_acc: 0.9409  
 Epoch 23/40  
 - 1s - loss: 0.1668 - acc: 0.9820 - val\_loss: 0.2734 - val\_acc: 0.9503  
 Epoch 24/40  
 - 1s - loss: 0.1611 - acc: 0.9808 - val\_loss: 0.2603 - val\_acc: 0.9560  
 Epoch 25/40  
 - 1s - loss: 0.1541 - acc: 0.9836 - val\_loss: 0.2332 - val\_acc: 0.9567  
 Epoch 26/40  
 - 1s - loss: 0.1675 - acc: 0.9766 - val\_loss: 0.2634 - val\_acc: 0.9510  
 Epoch 27/40  
 - 1s - loss: 0.1511 - acc: 0.9817 - val\_loss: 0.3468 - val\_acc: 0.9164  
 Epoch 28/40  
 - 1s - loss: 0.1444 - acc: 0.9845 - val\_loss: 0.2191 - val\_acc: 0.9575  
 Epoch 29/40  
 - 1s - loss: 0.1707 - acc: 0.9744 - val\_loss: 0.2158 - val\_acc: 0.9683  
 Epoch 30/40  
 - 1s - loss: 0.1474 - acc: 0.9808 - val\_loss: 0.2148 - val\_acc: 0.9524  
 Epoch 31/40  
 - 1s - loss: 0.1343 - acc: 0.9814 - val\_loss: 0.2195 - val\_acc: 0.9697  
 Epoch 32/40  
 - 1s - loss: 0.1603 - acc: 0.9756 - val\_loss: 0.3197 - val\_acc: 0.9229  
 Epoch 33/40  
 - 1s - loss: 0.1201 - acc: 0.9887 - val\_loss: 0.2058 - val\_acc: 0.9654  
 Epoch 34/40  
 - 1s - loss: 0.1369 - acc: 0.9845 - val\_loss: 0.1893 - val\_acc: 0.9676  
 Epoch 35/40  
 - 1s - loss: 0.1479 - acc: 0.9756 - val\_loss: 0.2163 - val\_acc: 0.9488  
 Epoch 36/40  
 - 1s - loss: 0.1385 - acc: 0.9775 - val\_loss: 0.2342 - val\_acc: 0.9676  
 Epoch 37/40  
 - 1s - loss: 0.1219 - acc: 0.9863 - val\_loss: 0.2329 - val\_acc: 0.9430  
 Epoch 38/40  
 - 1s - loss: 0.1376 - acc: 0.9793 - val\_loss: 0.2594 - val\_acc: 0.9510  
 Epoch 39/40  
 - 1s - loss: 0.1038 - acc: 0.9912 - val\_loss: 0.2235 - val\_acc: 0.9560  
 Epoch 40/40

- 1s - loss: 0.1486 - acc: 0.9769 - val\_loss: 0.1948 - val\_acc: 0.9683  
 Train accuracy 0.9990867579908675 Test accuracy: 0.9682768565248738

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 118, 16)	4720
dropout_1 (Dropout)	(None, 118, 16)	0
max_pooling1d_1 (MaxPooling1	(None, 39, 16)	0
flatten_1 (Flatten)	(None, 624)	0
dense_1 (Dense)	(None, 32)	20000
dense_2 (Dense)	(None, 3)	99

Total params: 26,751  
 Trainable params: 26,751  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 21.9190 - acc: 0.7589 - val\_loss: 1.3465 - val\_acc: 0.8544

Epoch 2/40

- 1s - loss: 0.5407 - acc: 0.9157 - val\_loss: 0.5788 - val\_acc: 0.8536

Epoch 3/40

- 1s - loss: 0.3383 - acc: 0.9434 - val\_loss: 0.5668 - val\_acc: 0.8580

Epoch 4/40

- 1s - loss: 0.2782 - acc: 0.9546 - val\_loss: 0.4676 - val\_acc: 0.8890

Epoch 5/40

- 1s - loss: 0.2664 - acc: 0.9546 - val\_loss: 0.4415 - val\_acc: 0.9128

Epoch 6/40

- 1s - loss: 0.2351 - acc: 0.9623 - val\_loss: 0.5409 - val\_acc: 0.8457

Epoch 7/40

- 1s - loss: 0.2201 - acc: 0.9632 - val\_loss: 0.3675 - val\_acc: 0.9077

Epoch 8/40

- 1s - loss: 0.1888 - acc: 0.9696 - val\_loss: 0.8028 - val\_acc: 0.7030

Epoch 9/40

- 1s - loss: 0.1969 - acc: 0.9680 - val\_loss: 0.3532 - val\_acc: 0.9308

Epoch 10/40

- 1s - loss: 0.1872 - acc: 0.9693 - val\_loss: 0.3576 - val\_acc: 0.8911

Epoch 11/40

- 1s - loss: 0.1808 - acc: 0.9696 - val\_loss: 0.3077 - val\_acc: 0.9344

Epoch 12/40  
- 1s - loss: 0.1712 - acc: 0.9756 - val\_loss: 0.3154 - val\_acc: 0.9351

Epoch 13/40  
- 1s - loss: 0.1779 - acc: 0.9717 - val\_loss: 0.4534 - val\_acc: 0.8616

Epoch 14/40  
- 1s - loss: 0.1760 - acc: 0.9753 - val\_loss: 0.3493 - val\_acc: 0.9358

Epoch 15/40  
- 1s - loss: 0.1565 - acc: 0.9756 - val\_loss: 0.2595 - val\_acc: 0.9503

Epoch 16/40  
- 1s - loss: 0.1656 - acc: 0.9769 - val\_loss: 0.2797 - val\_acc: 0.9329

Epoch 17/40  
- 1s - loss: 0.1566 - acc: 0.9766 - val\_loss: 0.8777 - val\_acc: 0.7152

Epoch 18/40  
- 1s - loss: 0.1488 - acc: 0.9793 - val\_loss: 0.2892 - val\_acc: 0.9301

Epoch 19/40  
- 1s - loss: 0.1585 - acc: 0.9753 - val\_loss: 0.2901 - val\_acc: 0.9344

Epoch 20/40  
- 1s - loss: 0.1504 - acc: 0.9799 - val\_loss: 0.3182 - val\_acc: 0.9495

Epoch 21/40  
- 1s - loss: 0.1551 - acc: 0.9790 - val\_loss: 0.8581 - val\_acc: 0.7347

Epoch 22/40  
- 1s - loss: 0.1487 - acc: 0.9775 - val\_loss: 0.2690 - val\_acc: 0.9301

Epoch 23/40  
- 1s - loss: 0.1638 - acc: 0.9750 - val\_loss: 0.2135 - val\_acc: 0.9640

Epoch 24/40  
- 2s - loss: 0.1583 - acc: 0.9787 - val\_loss: 0.2214 - val\_acc: 0.9495

Epoch 25/40  
- 2s - loss: 0.1475 - acc: 0.9763 - val\_loss: 0.2524 - val\_acc: 0.9452

Epoch 26/40  
- 1s - loss: 0.1490 - acc: 0.9802 - val\_loss: 0.2289 - val\_acc: 0.9394

Epoch 27/40  
- 1s - loss: 0.1483 - acc: 0.9769 - val\_loss: 0.2979 - val\_acc: 0.9488

Epoch 28/40  
- 1s - loss: 0.1449 - acc: 0.9817 - val\_loss: 0.2277 - val\_acc: 0.9575

Epoch 29/40  
- 1s - loss: 0.1327 - acc: 0.9830 - val\_loss: 0.1941 - val\_acc: 0.9582

Epoch 30/40  
- 2s - loss: 0.1662 - acc: 0.9760 - val\_loss: 0.1870 - val\_acc: 0.9596

Epoch 31/40  
- 1s - loss: 0.1432 - acc: 0.9793 - val\_loss: 0.2426 - val\_acc: 0.9366

Epoch 32/40  
- 1s - loss: 0.1273 - acc: 0.9811 - val\_loss: 0.2175 - val\_acc: 0.9553

Epoch 33/40  
- 1s - loss: 0.1469 - acc: 0.9814 - val\_loss: 0.2442 - val\_acc: 0.9510

Epoch 34/40  
- 1s - loss: 0.1374 - acc: 0.9799 - val\_loss: 0.2585 - val\_acc: 0.9546

Epoch 35/40  
- 2s - loss: 0.1335 - acc: 0.9805 - val\_loss: 0.2048 - val\_acc: 0.9567

```

Epoch 36/40
- 1s - loss: 0.1380 - acc: 0.9790 - val_loss: 0.2130 - val_acc: 0.9495
Epoch 37/40
- 1s - loss: 0.1322 - acc: 0.9799 - val_loss: 0.8820 - val_acc: 0.7224
Epoch 38/40
- 1s - loss: 0.1330 - acc: 0.9820 - val_loss: 0.1879 - val_acc: 0.9704
Epoch 39/40
- 1s - loss: 0.1466 - acc: 0.9772 - val_loss: 1.3834 - val_acc: 0.6294
Epoch 40/40
- 1s - loss: 0.1500 - acc: 0.9763 - val_loss: 0.2762 - val_acc: 0.9488
Train accuracy 0.995738203957382 Test accuracy: 0.9488103821196827
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```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 118, 24)	7080
dropout_1 (Dropout)	(None, 118, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 39, 24)	0
flatten_1 (Flatten)	(None, 936)	0
dense_1 (Dense)	(None, 32)	29984
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 39,095
Trainable params: 39,095
Non-trainable params: 0
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```

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None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
- 2s - loss: 52.5636 - acc: 0.7559 - val_loss: 1.0339 - val_acc: 0.6294
Epoch 2/55
- 2s - loss: 0.5715 - acc: 0.8767 - val_loss: 0.6873 - val_acc: 0.7938
Epoch 3/55
- 2s - loss: 0.4493 - acc: 0.9117 - val_loss: 0.6357 - val_acc: 0.8587
Epoch 4/55
- 2s - loss: 0.3747 - acc: 0.9297 - val_loss: 0.5079 - val_acc: 0.8919
Epoch 5/55
- 2s - loss: 0.3641 - acc: 0.9306 - val_loss: 0.4944 - val_acc: 0.9019
Epoch 6/55
- 2s - loss: 0.3472 - acc: 0.9394 - val_loss: 0.7986 - val_acc: 0.8010
Epoch 7/55

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- 2s - loss: 0.3374 - acc: 0.9434 - val\_loss: 0.8779 - val\_acc: 0.7686  
 Epoch 8/55  
 - 2s - loss: 0.3151 - acc: 0.9470 - val\_loss: 0.5562 - val\_acc: 0.8652  
 Epoch 9/55  
 - 2s - loss: 0.3252 - acc: 0.9434 - val\_loss: 0.5070 - val\_acc: 0.8991  
 Epoch 10/55  
 - 2s - loss: 0.3068 - acc: 0.9519 - val\_loss: 0.4363 - val\_acc: 0.8897  
 Epoch 11/55  
 - 2s - loss: 0.3167 - acc: 0.9464 - val\_loss: 0.3636 - val\_acc: 0.9337  
 Epoch 12/55  
 - 2s - loss: 0.2938 - acc: 0.9549 - val\_loss: 0.3725 - val\_acc: 0.9178  
 Epoch 13/55  
 - 2s - loss: 0.2903 - acc: 0.9546 - val\_loss: 0.3852 - val\_acc: 0.9394  
 Epoch 14/55  
 - 2s - loss: 0.2777 - acc: 0.9580 - val\_loss: 0.4562 - val\_acc: 0.9120  
 Epoch 15/55  
 - 2s - loss: 0.2710 - acc: 0.9626 - val\_loss: 0.6434 - val\_acc: 0.8176  
 Epoch 16/55  
 - 2s - loss: 0.2814 - acc: 0.9607 - val\_loss: 0.6420 - val\_acc: 0.7988  
 Epoch 17/55  
 - 2s - loss: 0.2830 - acc: 0.9592 - val\_loss: 0.9929 - val\_acc: 0.7210  
 Epoch 18/55  
 - 2s - loss: 0.2720 - acc: 0.9629 - val\_loss: 0.7271 - val\_acc: 0.7671  
 Epoch 19/55  
 - 2s - loss: 0.2874 - acc: 0.9583 - val\_loss: 0.3698 - val\_acc: 0.9409  
 Epoch 20/55  
 - 2s - loss: 0.2883 - acc: 0.9559 - val\_loss: 0.9324 - val\_acc: 0.7505  
 Epoch 21/55  
 - 2s - loss: 0.2734 - acc: 0.9616 - val\_loss: 0.4358 - val\_acc: 0.8825  
 Epoch 22/55  
 - 2s - loss: 0.2721 - acc: 0.9589 - val\_loss: 1.2508 - val\_acc: 0.7743  
 Epoch 23/55  
 - 2s - loss: 0.2634 - acc: 0.9610 - val\_loss: 0.5189 - val\_acc: 0.8702  
 Epoch 24/55  
 - 2s - loss: 0.2913 - acc: 0.9592 - val\_loss: 0.2939 - val\_acc: 0.9459  
 Epoch 25/55  
 - 2s - loss: 0.2831 - acc: 0.9525 - val\_loss: 0.4293 - val\_acc: 0.9113  
 Epoch 26/55  
 - 2s - loss: 0.2620 - acc: 0.9641 - val\_loss: 0.3098 - val\_acc: 0.9351  
 Epoch 27/55  
 - 2s - loss: 0.2703 - acc: 0.9589 - val\_loss: 0.3576 - val\_acc: 0.9156  
 Epoch 28/55  
 - 2s - loss: 0.2686 - acc: 0.9610 - val\_loss: 0.3386 - val\_acc: 0.9229  
 Epoch 29/55  
 - 2s - loss: 0.2553 - acc: 0.9659 - val\_loss: 0.3240 - val\_acc: 0.9301  
 Epoch 30/55  
 - 2s - loss: 0.2633 - acc: 0.9638 - val\_loss: 0.3620 - val\_acc: 0.9128  
 Epoch 31/55

- 2s - loss: 0.2777 - acc: 0.9601 - val\_loss: 0.3609 - val\_acc: 0.9041  
 Epoch 32/55  
 - 2s - loss: 0.2902 - acc: 0.9562 - val\_loss: 0.4645 - val\_acc: 0.9034  
 Epoch 33/55  
 - 2s - loss: 0.2551 - acc: 0.9641 - val\_loss: 0.2906 - val\_acc: 0.9438  
 Epoch 34/55  
 - 2s - loss: 0.2972 - acc: 0.9568 - val\_loss: 0.3937 - val\_acc: 0.8962  
 Epoch 35/55  
 - 2s - loss: 0.2799 - acc: 0.9562 - val\_loss: 0.6142 - val\_acc: 0.8421  
 Epoch 36/55  
 - 2s - loss: 0.2663 - acc: 0.9601 - val\_loss: 0.4002 - val\_acc: 0.9315  
 Epoch 37/55  
 - 2s - loss: 0.2489 - acc: 0.9638 - val\_loss: 0.4220 - val\_acc: 0.8976  
 Epoch 38/55  
 - 2s - loss: 0.2854 - acc: 0.9589 - val\_loss: 0.3728 - val\_acc: 0.9056  
 Epoch 39/55  
 - 2s - loss: 0.2644 - acc: 0.9589 - val\_loss: 1.0101 - val\_acc: 0.6994  
 Epoch 40/55  
 - 2s - loss: 0.2724 - acc: 0.9546 - val\_loss: 0.3500 - val\_acc: 0.9308  
 Epoch 41/55  
 - 2s - loss: 0.2548 - acc: 0.9610 - val\_loss: 0.3670 - val\_acc: 0.9149  
 Epoch 42/55  
 - 2s - loss: 0.2737 - acc: 0.9613 - val\_loss: 0.3554 - val\_acc: 0.9358  
 Epoch 43/55  
 - 2s - loss: 0.2458 - acc: 0.9610 - val\_loss: 0.2616 - val\_acc: 0.9560  
 Epoch 44/55  
 - 2s - loss: 0.2626 - acc: 0.9574 - val\_loss: 0.3573 - val\_acc: 0.9322  
 Epoch 45/55  
 - 2s - loss: 0.2367 - acc: 0.9671 - val\_loss: 0.3610 - val\_acc: 0.9322  
 Epoch 46/55  
 - 2s - loss: 0.2694 - acc: 0.9662 - val\_loss: 0.4521 - val\_acc: 0.8738  
 Epoch 47/55  
 - 2s - loss: 0.2515 - acc: 0.9610 - val\_loss: 0.4352 - val\_acc: 0.8846  
 Epoch 48/55  
 - 2s - loss: 0.2537 - acc: 0.9574 - val\_loss: 0.3574 - val\_acc: 0.9344  
 Epoch 49/55  
 - 2s - loss: 0.2528 - acc: 0.9644 - val\_loss: 1.1213 - val\_acc: 0.6107  
 Epoch 50/55  
 - 2s - loss: 0.2698 - acc: 0.9559 - val\_loss: 0.3919 - val\_acc: 0.9120  
 Epoch 51/55  
 - 2s - loss: 0.2465 - acc: 0.9668 - val\_loss: 0.4081 - val\_acc: 0.9084  
 Epoch 52/55  
 - 2s - loss: 0.2499 - acc: 0.9626 - val\_loss: 0.3204 - val\_acc: 0.9337  
 Epoch 53/55  
 - 2s - loss: 0.2365 - acc: 0.9680 - val\_loss: 0.6229 - val\_acc: 0.8522  
 Epoch 54/55  
 - 2s - loss: 0.2391 - acc: 0.9607 - val\_loss: 0.7255 - val\_acc: 0.7931  
 Epoch 55/55

- 2s - loss: 0.2501 - acc: 0.9650 - val\_loss: 0.3252 - val\_acc: 0.9250  
Train accuracy 0.9875190258751902 Test accuracy: 0.9250180245133381

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 118, 32)	4512
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 39, 32)	0
flatten_1 (Flatten)	(None, 1248)	0
dense_1 (Dense)	(None, 64)	79936
dense_2 (Dense)	(None, 3)	195

Total params: 86,435  
Trainable params: 86,435  
Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 2s - loss: 8.7280 - acc: 0.6971 - val\_loss: 0.7152 - val\_acc: 0.8536

Epoch 2/55

- 2s - loss: 0.5778 - acc: 0.8651 - val\_loss: 0.7288 - val\_acc: 0.7469

Epoch 3/55

- 2s - loss: 0.4836 - acc: 0.8932 - val\_loss: 0.5946 - val\_acc: 0.8594

Epoch 4/55

- 2s - loss: 0.4406 - acc: 0.9142 - val\_loss: 0.6556 - val\_acc: 0.8284

Epoch 5/55

- 2s - loss: 0.4581 - acc: 0.9218 - val\_loss: 0.5723 - val\_acc: 0.8587

Epoch 6/55

- 2s - loss: 0.4255 - acc: 0.9227 - val\_loss: 0.5282 - val\_acc: 0.8673

Epoch 7/55

- 2s - loss: 0.4130 - acc: 0.9279 - val\_loss: 0.8265 - val\_acc: 0.7549

Epoch 8/55

- 2s - loss: 0.3894 - acc: 0.9330 - val\_loss: 1.0518 - val\_acc: 0.6777

Epoch 9/55

- 2s - loss: 0.3946 - acc: 0.9291 - val\_loss: 0.5045 - val\_acc: 0.9135

Epoch 10/55

- 2s - loss: 0.3791 - acc: 0.9315 - val\_loss: 0.5421 - val\_acc: 0.8911

Epoch 11/55

- 2s - loss: 0.3765 - acc: 0.9367 - val\_loss: 0.4627 - val\_acc: 0.9113

Epoch 12/55  
- 2s - loss: 0.3931 - acc: 0.9382 - val\_loss: 0.6028 - val\_acc: 0.8976  
Epoch 13/55  
- 2s - loss: 0.3693 - acc: 0.9385 - val\_loss: 0.5311 - val\_acc: 0.9077  
Epoch 14/55  
- 2s - loss: 0.3639 - acc: 0.9419 - val\_loss: 0.5526 - val\_acc: 0.8515  
Epoch 15/55  
- 2s - loss: 0.3452 - acc: 0.9434 - val\_loss: 0.7504 - val\_acc: 0.7606  
Epoch 16/55  
- 2s - loss: 0.3733 - acc: 0.9388 - val\_loss: 0.5266 - val\_acc: 0.8724  
Epoch 17/55  
- 2s - loss: 0.3560 - acc: 0.9446 - val\_loss: 0.7940 - val\_acc: 0.7844  
Epoch 18/55  
- 2s - loss: 0.3578 - acc: 0.9400 - val\_loss: 1.0112 - val\_acc: 0.6756  
Epoch 19/55  
- 2s - loss: 0.3708 - acc: 0.9409 - val\_loss: 0.4420 - val\_acc: 0.9308  
Epoch 20/55  
- 2s - loss: 0.3557 - acc: 0.9373 - val\_loss: 0.4187 - val\_acc: 0.9329  
Epoch 21/55  
- 2s - loss: 0.3465 - acc: 0.9440 - val\_loss: 0.5257 - val\_acc: 0.8580  
Epoch 22/55  
- 2s - loss: 0.3521 - acc: 0.9412 - val\_loss: 0.5139 - val\_acc: 0.9077  
Epoch 23/55  
- 2s - loss: 0.3591 - acc: 0.9446 - val\_loss: 0.4956 - val\_acc: 0.9164  
Epoch 24/55  
- 2s - loss: 0.3607 - acc: 0.9379 - val\_loss: 0.6208 - val\_acc: 0.8205  
Epoch 25/55  
- 2s - loss: 0.3583 - acc: 0.9440 - val\_loss: 0.5110 - val\_acc: 0.9221  
Epoch 26/55  
- 2s - loss: 0.3514 - acc: 0.9464 - val\_loss: 0.4019 - val\_acc: 0.9200  
Epoch 27/55  
- 2s - loss: 0.3589 - acc: 0.9428 - val\_loss: 0.4475 - val\_acc: 0.9322  
Epoch 28/55  
- 2s - loss: 0.3501 - acc: 0.9434 - val\_loss: 0.4365 - val\_acc: 0.9012  
Epoch 29/55  
- 2s - loss: 0.3257 - acc: 0.9476 - val\_loss: 0.4408 - val\_acc: 0.9084  
Epoch 30/55  
- 2s - loss: 0.3408 - acc: 0.9434 - val\_loss: 0.5070 - val\_acc: 0.8349  
Epoch 31/55  
- 2s - loss: 0.3441 - acc: 0.9458 - val\_loss: 0.4351 - val\_acc: 0.8926  
Epoch 32/55  
- 2s - loss: 0.3517 - acc: 0.9431 - val\_loss: 0.4317 - val\_acc: 0.9019  
Epoch 33/55  
- 2s - loss: 0.3481 - acc: 0.9449 - val\_loss: 1.7227 - val\_acc: 0.5768  
Epoch 34/55  
- 2s - loss: 0.3526 - acc: 0.9458 - val\_loss: 0.8041 - val\_acc: 0.7967  
Epoch 35/55  
- 2s - loss: 0.3561 - acc: 0.9446 - val\_loss: 0.6262 - val\_acc: 0.8356



```

Epoch 36/55
  - 2s - loss: 0.3374 - acc: 0.9428 - val_loss: 0.9065 - val_acc: 0.7455
Epoch 37/55
  - 2s - loss: 0.3453 - acc: 0.9452 - val_loss: 0.4597 - val_acc: 0.9063
Epoch 38/55
  - 2s - loss: 0.3479 - acc: 0.9431 - val_loss: 0.5338 - val_acc: 0.8565
Epoch 39/55
  - 2s - loss: 0.3364 - acc: 0.9467 - val_loss: 1.2659 - val_acc: 0.6251
Epoch 40/55
  - 2s - loss: 0.3417 - acc: 0.9464 - val_loss: 0.4662 - val_acc: 0.8652
Epoch 41/55
  - 2s - loss: 0.3407 - acc: 0.9379 - val_loss: 0.6980 - val_acc: 0.7981
Epoch 42/55
  - 2s - loss: 0.3424 - acc: 0.9443 - val_loss: 0.6002 - val_acc: 0.8198
Epoch 43/55
  - 2s - loss: 0.3223 - acc: 0.9461 - val_loss: 0.7452 - val_acc: 0.7058
Epoch 44/55
  - 2s - loss: 0.3468 - acc: 0.9397 - val_loss: 0.5374 - val_acc: 0.8421
Epoch 45/55
  - 2s - loss: 0.3263 - acc: 0.9403 - val_loss: 0.3459 - val_acc: 0.9524
Epoch 46/55
  - 2s - loss: 0.3302 - acc: 0.9437 - val_loss: 0.5176 - val_acc: 0.8450
Epoch 47/55
  - 2s - loss: 0.3188 - acc: 0.9458 - val_loss: 1.0189 - val_acc: 0.6864
Epoch 48/55
  - 2s - loss: 0.3404 - acc: 0.9397 - val_loss: 0.5271 - val_acc: 0.8435
Epoch 49/55
  - 2s - loss: 0.3234 - acc: 0.9452 - val_loss: 0.4461 - val_acc: 0.8789
Epoch 50/55
  - 2s - loss: 0.3290 - acc: 0.9403 - val_loss: 0.7060 - val_acc: 0.7924
Epoch 51/55
  - 2s - loss: 0.3050 - acc: 0.9495 - val_loss: 0.8587 - val_acc: 0.7751
Epoch 52/55
  - 2s - loss: 0.3309 - acc: 0.9428 - val_loss: 0.5563 - val_acc: 0.8407
Epoch 53/55
  - 2s - loss: 0.3049 - acc: 0.9434 - val_loss: 0.5133 - val_acc: 0.8479
Epoch 54/55
  - 2s - loss: 0.3184 - acc: 0.9461 - val_loss: 0.5947 - val_acc: 0.8760
Epoch 55/55
  - 2s - loss: 0.3195 - acc: 0.9452 - val_loss: 1.1686 - val_acc: 0.5768
Train accuracy 0.6821917808491346 Test accuracy: 0.5767844268419627

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 126, 42)	1176
<hr/>		
conv1d_2 (Conv1D)	(None, 124, 32)	4064

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-----
dropout_1 (Dropout)          (None, 124, 32)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 62, 32)          0
-----
flatten_1 (Flatten)          (None, 1984)             0
-----
dense_1 (Dense)               (None, 16)                31760
-----
dense_2 (Dense)               (None, 3)                 51
=====
Total params: 37,051
Trainable params: 37,051
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
  - 2s - loss: 23.4528 - acc: 0.5519 - val_loss: 3.0340 - val_acc: 0.6114
Epoch 2/35
  - 1s - loss: 1.1015 - acc: 0.7875 - val_loss: 0.8889 - val_acc: 0.6878
Epoch 3/35
  - 1s - loss: 0.5961 - acc: 0.8548 - val_loss: 1.0774 - val_acc: 0.6525
Epoch 4/35
  - 1s - loss: 0.5061 - acc: 0.8773 - val_loss: 0.6353 - val_acc: 0.8335
Epoch 5/35
  - 1s - loss: 0.4545 - acc: 0.8977 - val_loss: 0.7941 - val_acc: 0.7267
Epoch 6/35
  - 1s - loss: 0.4194 - acc: 0.9078 - val_loss: 0.6599 - val_acc: 0.8198
Epoch 7/35
  - 1s - loss: 0.4131 - acc: 0.9117 - val_loss: 1.0075 - val_acc: 0.7066
Epoch 8/35
  - 1s - loss: 0.3933 - acc: 0.9215 - val_loss: 0.6010 - val_acc: 0.8479
Epoch 9/35
  - 1s - loss: 0.3786 - acc: 0.9205 - val_loss: 0.6193 - val_acc: 0.8378
Epoch 10/35
  - 1s - loss: 0.3597 - acc: 0.9227 - val_loss: 0.5554 - val_acc: 0.8479
Epoch 11/35
  - 1s - loss: 0.3586 - acc: 0.9215 - val_loss: 0.9227 - val_acc: 0.7066
Epoch 12/35
  - 1s - loss: 0.3650 - acc: 0.9218 - val_loss: 0.6627 - val_acc: 0.8118
Epoch 13/35
  - 1s - loss: 0.3405 - acc: 0.9352 - val_loss: 1.0211 - val_acc: 0.6460
Epoch 14/35
  - 1s - loss: 0.3535 - acc: 0.9254 - val_loss: 0.5645 - val_acc: 0.8508
Epoch 15/35
  - 1s - loss: 0.3471 - acc: 0.9321 - val_loss: 0.6164 - val_acc: 0.8255
Epoch 16/35

```

```

- 1s - loss: 0.3306 - acc: 0.9370 - val_loss: 0.6660 - val_acc: 0.8125
Epoch 17/35
- 1s - loss: 0.3346 - acc: 0.9327 - val_loss: 0.5251 - val_acc: 0.8738
Epoch 18/35
- 1s - loss: 0.3503 - acc: 0.9300 - val_loss: 0.7160 - val_acc: 0.8010
Epoch 19/35
- 1s - loss: 0.3267 - acc: 0.9358 - val_loss: 0.5577 - val_acc: 0.8666
Epoch 20/35
- 1s - loss: 0.3318 - acc: 0.9358 - val_loss: 0.5640 - val_acc: 0.8594
Epoch 21/35
- 1s - loss: 0.3488 - acc: 0.9312 - val_loss: 0.6625 - val_acc: 0.8169
Epoch 22/35
- 1s - loss: 0.3511 - acc: 0.9294 - val_loss: 0.8688 - val_acc: 0.7527
Epoch 23/35
- 1s - loss: 0.3243 - acc: 0.9355 - val_loss: 0.4566 - val_acc: 0.9063
Epoch 24/35
- 1s - loss: 0.3412 - acc: 0.9342 - val_loss: 0.4717 - val_acc: 0.9149
Epoch 25/35
- 1s - loss: 0.3115 - acc: 0.9452 - val_loss: 0.4459 - val_acc: 0.8983
Epoch 26/35
- 1s - loss: 0.3313 - acc: 0.9400 - val_loss: 0.5215 - val_acc: 0.8810
Epoch 27/35
- 1s - loss: 0.3099 - acc: 0.9394 - val_loss: 0.6833 - val_acc: 0.7988
Epoch 28/35
- 1s - loss: 0.3338 - acc: 0.9361 - val_loss: 0.4430 - val_acc: 0.8868
Epoch 29/35
- 1s - loss: 0.3073 - acc: 0.9437 - val_loss: 0.4927 - val_acc: 0.8998
Epoch 30/35
- 1s - loss: 0.3156 - acc: 0.9397 - val_loss: 0.5164 - val_acc: 0.8745
Epoch 31/35
- 1s - loss: 0.3132 - acc: 0.9409 - val_loss: 0.5715 - val_acc: 0.8652
Epoch 32/35
- 1s - loss: 0.3254 - acc: 0.9406 - val_loss: 0.5323 - val_acc: 0.8839
Epoch 33/35
- 1s - loss: 0.3126 - acc: 0.9452 - val_loss: 0.7513 - val_acc: 0.8068
Epoch 34/35
- 1s - loss: 0.3180 - acc: 0.9406 - val_loss: 0.5241 - val_acc: 0.8745
Epoch 35/35
- 1s - loss: 0.3073 - acc: 0.9452 - val_loss: 0.4203 - val_acc: 0.8976
Train accuracy 0.9747336377473363 Test accuracy: 0.8976207642393655

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 28)	784
conv1d_2 (Conv1D)	(None, 122, 16)	2256

dropout_1 (Dropout)	(None, 122, 16)	0
-----		
max_pooling1d_1 (MaxPooling1d)	(None, 61, 16)	0
-----		
flatten_1 (Flatten)	(None, 976)	0
-----		
dense_1 (Dense)	(None, 32)	31264
-----		
dense_2 (Dense)	(None, 3)	99
=====		
Total params: 34,403		
Trainable params: 34,403		
Non-trainable params: 0		
-----		
None		
Train on 3285 samples, validate on 1387 samples		
Epoch 1/55		
- 2s - loss: 138.2000 - acc: 0.5434 - val_loss: 87.4715 - val_acc: 0.5869		
Epoch 2/55		
- 1s - loss: 60.0253 - acc: 0.7714 - val_loss: 39.0568 - val_acc: 0.6756		
Epoch 3/55		
- 1s - loss: 26.7701 - acc: 0.8874 - val_loss: 17.5310 - val_acc: 0.7556		
Epoch 4/55		
- 1s - loss: 11.7832 - acc: 0.9172 - val_loss: 7.7392 - val_acc: 0.7787		
Epoch 5/55		
- 1s - loss: 5.0709 - acc: 0.9227 - val_loss: 3.4664 - val_acc: 0.8234		
Epoch 6/55		
- 1s - loss: 2.2252 - acc: 0.9397 - val_loss: 1.7176 - val_acc: 0.8536		
Epoch 7/55		
- 1s - loss: 1.1189 - acc: 0.9391 - val_loss: 1.0935 - val_acc: 0.7967		
Epoch 8/55		
- 1s - loss: 0.7236 - acc: 0.9309 - val_loss: 0.8259 - val_acc: 0.8630		
Epoch 9/55		
- 1s - loss: 0.5725 - acc: 0.9355 - val_loss: 0.7340 - val_acc: 0.8717		
Epoch 10/55		
- 1s - loss: 0.5121 - acc: 0.9416 - val_loss: 0.7958 - val_acc: 0.7671		
Epoch 11/55		
- 1s - loss: 0.4668 - acc: 0.9391 - val_loss: 0.5968 - val_acc: 0.9344		
Epoch 12/55		
- 1s - loss: 0.4253 - acc: 0.9525 - val_loss: 0.6158 - val_acc: 0.8890		
Epoch 13/55		
- 1s - loss: 0.4088 - acc: 0.9531 - val_loss: 0.6211 - val_acc: 0.8623		
Epoch 14/55		
- 1s - loss: 0.3863 - acc: 0.9540 - val_loss: 0.5313 - val_acc: 0.9423		
Epoch 15/55		
- 1s - loss: 0.3628 - acc: 0.9623 - val_loss: 0.4968 - val_acc: 0.9466		
Epoch 16/55		
- 1s - loss: 0.3527 - acc: 0.9638 - val_loss: 0.5537 - val_acc: 0.8673		

Epoch 17/55  
- 1s - loss: 0.3547 - acc: 0.9595 - val\_loss: 0.5056 - val\_acc: 0.9250

Epoch 18/55  
- 1s - loss: 0.3138 - acc: 0.9720 - val\_loss: 0.4726 - val\_acc: 0.9430

Epoch 19/55  
- 1s - loss: 0.3126 - acc: 0.9662 - val\_loss: 0.5051 - val\_acc: 0.8897

Epoch 20/55  
- 1s - loss: 0.3115 - acc: 0.9671 - val\_loss: 0.4226 - val\_acc: 0.9668

Epoch 21/55  
- 1s - loss: 0.2942 - acc: 0.9696 - val\_loss: 0.4723 - val\_acc: 0.9200

Epoch 22/55  
- 1s - loss: 0.2959 - acc: 0.9696 - val\_loss: 0.4484 - val\_acc: 0.9452

Epoch 23/55  
- 1s - loss: 0.2850 - acc: 0.9708 - val\_loss: 0.4439 - val\_acc: 0.9423

Epoch 24/55  
- 1s - loss: 0.2916 - acc: 0.9632 - val\_loss: 0.3855 - val\_acc: 0.9676

Epoch 25/55  
- 1s - loss: 0.2624 - acc: 0.9784 - val\_loss: 0.4021 - val\_acc: 0.9481

Epoch 26/55  
- 1s - loss: 0.2598 - acc: 0.9766 - val\_loss: 0.3956 - val\_acc: 0.9373

Epoch 27/55  
- 1s - loss: 0.2584 - acc: 0.9720 - val\_loss: 0.4424 - val\_acc: 0.9156

Epoch 28/55  
- 1s - loss: 0.2473 - acc: 0.9784 - val\_loss: 0.3968 - val\_acc: 0.9351

Epoch 29/55  
- 1s - loss: 0.2503 - acc: 0.9726 - val\_loss: 0.4069 - val\_acc: 0.9286

Epoch 30/55  
- 1s - loss: 0.2494 - acc: 0.9778 - val\_loss: 0.3786 - val\_acc: 0.9430

Epoch 31/55  
- 1s - loss: 0.2336 - acc: 0.9766 - val\_loss: 0.3381 - val\_acc: 0.9531

Epoch 32/55  
- 1s - loss: 0.2522 - acc: 0.9653 - val\_loss: 0.4257 - val\_acc: 0.9063

Epoch 33/55  
- 1s - loss: 0.2350 - acc: 0.9799 - val\_loss: 0.4018 - val\_acc: 0.9077

Epoch 34/55  
- 1s - loss: 0.2103 - acc: 0.9808 - val\_loss: 0.3774 - val\_acc: 0.9560

Epoch 35/55  
- 1s - loss: 0.2163 - acc: 0.9808 - val\_loss: 0.4825 - val\_acc: 0.8479

Epoch 36/55  
- 1s - loss: 0.2172 - acc: 0.9781 - val\_loss: 0.3321 - val\_acc: 0.9524

Epoch 37/55  
- 1s - loss: 0.2118 - acc: 0.9796 - val\_loss: 0.3399 - val\_acc: 0.9272

Epoch 38/55  
- 1s - loss: 0.2112 - acc: 0.9787 - val\_loss: 0.3357 - val\_acc: 0.9474

Epoch 39/55  
- 1s - loss: 0.1997 - acc: 0.9839 - val\_loss: 0.3142 - val\_acc: 0.9632

Epoch 40/55  
- 1s - loss: 0.1945 - acc: 0.9836 - val\_loss: 0.3328 - val\_acc: 0.9596

Epoch 41/55  
 - 1s - loss: 0.1936 - acc: 0.9814 - val\_loss: 0.3878 - val\_acc: 0.9279  
 Epoch 42/55  
 - 1s - loss: 0.2337 - acc: 0.9729 - val\_loss: 0.3927 - val\_acc: 0.9200  
 Epoch 43/55  
 - 1s - loss: 0.1875 - acc: 0.9860 - val\_loss: 0.3667 - val\_acc: 0.8882  
 Epoch 44/55  
 - 1s - loss: 0.1810 - acc: 0.9884 - val\_loss: 0.3306 - val\_acc: 0.9488  
 Epoch 45/55  
 - 1s - loss: 0.1977 - acc: 0.9799 - val\_loss: 0.4497 - val\_acc: 0.9027  
 Epoch 46/55  
 - 1s - loss: 0.2017 - acc: 0.9802 - val\_loss: 0.2973 - val\_acc: 0.9517  
 Epoch 47/55  
 - 1s - loss: 0.1781 - acc: 0.9805 - val\_loss: 0.3138 - val\_acc: 0.9438  
 Epoch 48/55  
 - 1s - loss: 0.1777 - acc: 0.9799 - val\_loss: 0.4464 - val\_acc: 0.8630  
 Epoch 49/55  
 - 1s - loss: 0.1948 - acc: 0.9799 - val\_loss: 0.3044 - val\_acc: 0.9625  
 Epoch 50/55  
 - 1s - loss: 0.1871 - acc: 0.9814 - val\_loss: 0.2988 - val\_acc: 0.9503  
 Epoch 51/55  
 - 1s - loss: 0.1796 - acc: 0.9799 - val\_loss: 0.4418 - val\_acc: 0.8630  
 Epoch 52/55  
 - 1s - loss: 0.1676 - acc: 0.9869 - val\_loss: 0.2914 - val\_acc: 0.9575  
 Epoch 53/55  
 - 1s - loss: 0.1931 - acc: 0.9766 - val\_loss: 0.3448 - val\_acc: 0.9445  
 Epoch 54/55  
 - 1s - loss: 0.1806 - acc: 0.9839 - val\_loss: 0.3004 - val\_acc: 0.9589  
 Epoch 55/55  
 - 1s - loss: 0.1468 - acc: 0.9903 - val\_loss: 0.2748 - val\_acc: 0.9510  
 Train accuracy 0.9899543378995433 Test accuracy: 0.9509733237202596

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 120, 24)	5064
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 24)	0
flatten_1 (Flatten)	(None, 576)	0
dense_1 (Dense)	(None, 32)	18464
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 25,559
Trainable params: 25,559
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 2s - loss: 32.0117 - acc: 0.5251 - val_loss: 1.0820 - val_acc: 0.6691
Epoch 2/55
  - 2s - loss: 0.7649 - acc: 0.7534 - val_loss: 1.1165 - val_acc: 0.5119
Epoch 3/55
  - 2s - loss: 0.6777 - acc: 0.7948 - val_loss: 0.7769 - val_acc: 0.7830
Epoch 4/55
  - 2s - loss: 0.6377 - acc: 0.8149 - val_loss: 0.8609 - val_acc: 0.7513
Epoch 5/55
  - 2s - loss: 0.5717 - acc: 0.8621 - val_loss: 0.6948 - val_acc: 0.8774
Epoch 6/55
  - 2s - loss: 0.5568 - acc: 0.8694 - val_loss: 0.9440 - val_acc: 0.7563
Epoch 7/55
  - 2s - loss: 0.5312 - acc: 0.8788 - val_loss: 0.9818 - val_acc: 0.6359
Epoch 8/55
  - 2s - loss: 0.5160 - acc: 0.8861 - val_loss: 0.9606 - val_acc: 0.6006
Epoch 9/55
  - 2s - loss: 0.5276 - acc: 0.8828 - val_loss: 0.6106 - val_acc: 0.9142
Epoch 10/55
  - 2s - loss: 0.4975 - acc: 0.8959 - val_loss: 0.7108 - val_acc: 0.8594
Epoch 11/55
  - 2s - loss: 0.4842 - acc: 0.8983 - val_loss: 0.6303 - val_acc: 0.8558
Epoch 12/55
  - 2s - loss: 0.5106 - acc: 0.8944 - val_loss: 0.7753 - val_acc: 0.7931
Epoch 13/55
  - 2s - loss: 0.5170 - acc: 0.8971 - val_loss: 0.7631 - val_acc: 0.8342
Epoch 14/55
  - 2s - loss: 0.5088 - acc: 0.9005 - val_loss: 0.8247 - val_acc: 0.8262
Epoch 15/55
  - 2s - loss: 0.4950 - acc: 0.9105 - val_loss: 0.7549 - val_acc: 0.8342
Epoch 16/55
  - 2s - loss: 0.4967 - acc: 0.9017 - val_loss: 1.5809 - val_acc: 0.4758
Epoch 17/55
  - 2s - loss: 0.5020 - acc: 0.9081 - val_loss: 1.3523 - val_acc: 0.7383
Epoch 18/55
  - 2s - loss: 0.4951 - acc: 0.9053 - val_loss: 1.0570 - val_acc: 0.6027
Epoch 19/55
  - 2s - loss: 0.5088 - acc: 0.9047 - val_loss: 0.6761 - val_acc: 0.8443
Epoch 20/55
  - 2s - loss: 0.4696 - acc: 0.9047 - val_loss: 0.7718 - val_acc: 0.7203
Epoch 21/55

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- 2s - loss: 0.4835 - acc: 0.9093 - val\_loss: 0.6957 - val\_acc: 0.8169  
 Epoch 22/55  
 - 2s - loss: 0.4871 - acc: 0.9059 - val\_loss: 0.5920 - val\_acc: 0.9200  
 Epoch 23/55  
 - 2s - loss: 0.4985 - acc: 0.9078 - val\_loss: 0.6320 - val\_acc: 0.8745  
 Epoch 24/55  
 - 2s - loss: 0.4869 - acc: 0.9084 - val\_loss: 0.7574 - val\_acc: 0.8320  
 Epoch 25/55  
 - 2s - loss: 0.4875 - acc: 0.9099 - val\_loss: 0.7111 - val\_acc: 0.7823  
 Epoch 26/55  
 - 2s - loss: 0.4743 - acc: 0.9078 - val\_loss: 0.7986 - val\_acc: 0.8270  
 Epoch 27/55  
 - 2s - loss: 0.5010 - acc: 0.9102 - val\_loss: 0.6926 - val\_acc: 0.8846  
 Epoch 28/55  
 - 2s - loss: 0.4733 - acc: 0.9129 - val\_loss: 0.6714 - val\_acc: 0.8745  
 Epoch 29/55  
 - 2s - loss: 0.4744 - acc: 0.9111 - val\_loss: 0.6180 - val\_acc: 0.8738  
 Epoch 30/55  
 - 2s - loss: 0.4532 - acc: 0.9202 - val\_loss: 1.1736 - val\_acc: 0.5970  
 Epoch 31/55  
 - 2s - loss: 0.4628 - acc: 0.9193 - val\_loss: 0.6903 - val\_acc: 0.8356  
 Epoch 32/55  
 - 2s - loss: 0.4614 - acc: 0.9129 - val\_loss: 0.5444 - val\_acc: 0.8854  
 Epoch 33/55  
 - 2s - loss: 0.4381 - acc: 0.9248 - val\_loss: 1.4653 - val\_acc: 0.5516  
 Epoch 34/55  
 - 2s - loss: 0.4370 - acc: 0.9242 - val\_loss: 0.7165 - val\_acc: 0.7743  
 Epoch 35/55  
 - 2s - loss: 0.4403 - acc: 0.9205 - val\_loss: 0.5658 - val\_acc: 0.8846  
 Epoch 36/55  
 - 2s - loss: 0.4470 - acc: 0.9142 - val\_loss: 0.6108 - val\_acc: 0.8803  
 Epoch 37/55  
 - 2s - loss: 0.4384 - acc: 0.9236 - val\_loss: 1.7567 - val\_acc: 0.5220  
 Epoch 38/55  
 - 2s - loss: 0.4589 - acc: 0.9126 - val\_loss: 0.6287 - val\_acc: 0.8479  
 Epoch 39/55  
 - 2s - loss: 0.4384 - acc: 0.9242 - val\_loss: 2.5639 - val\_acc: 0.3691  
 Epoch 40/55  
 - 2s - loss: 0.4329 - acc: 0.9242 - val\_loss: 1.2882 - val\_acc: 0.6128  
 Epoch 41/55  
 - 2s - loss: 0.4434 - acc: 0.9221 - val\_loss: 0.5637 - val\_acc: 0.8839  
 Epoch 42/55  
 - 2s - loss: 0.4268 - acc: 0.9279 - val\_loss: 0.6116 - val\_acc: 0.8623  
 Epoch 43/55  
 - 2s - loss: 0.4292 - acc: 0.9233 - val\_loss: 0.7056 - val\_acc: 0.8089  
 Epoch 44/55  
 - 2s - loss: 0.4231 - acc: 0.9233 - val\_loss: 0.7956 - val\_acc: 0.7837  
 Epoch 45/55



```

- 2s - loss: 0.4174 - acc: 0.9205 - val_loss: 0.7062 - val_acc: 0.7851
Epoch 46/55
- 2s - loss: 0.4271 - acc: 0.9233 - val_loss: 0.8442 - val_acc: 0.7765
Epoch 47/55
- 2s - loss: 0.4251 - acc: 0.9209 - val_loss: 1.5217 - val_acc: 0.5948
Epoch 48/55
- 2s - loss: 0.4229 - acc: 0.9285 - val_loss: 0.7092 - val_acc: 0.7924
Epoch 49/55
- 2s - loss: 0.4322 - acc: 0.9196 - val_loss: 0.7042 - val_acc: 0.8320
Epoch 50/55
- 2s - loss: 0.4275 - acc: 0.9215 - val_loss: 0.5904 - val_acc: 0.8666
Epoch 51/55
- 2s - loss: 0.4063 - acc: 0.9279 - val_loss: 0.9713 - val_acc: 0.7484
Epoch 52/55
- 2s - loss: 0.4357 - acc: 0.9233 - val_loss: 0.7171 - val_acc: 0.7960
Epoch 53/55
- 2s - loss: 0.4194 - acc: 0.9260 - val_loss: 1.1177 - val_acc: 0.5963
Epoch 54/55
- 2s - loss: 0.4124 - acc: 0.9233 - val_loss: 0.5981 - val_acc: 0.8558
Epoch 55/55
- 2s - loss: 0.4214 - acc: 0.9263 - val_loss: 0.9880 - val_acc: 0.7549
Train accuracy 0.8724505327245053 Test accuracy: 0.7548666186012978
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 32)	4064
dropout_1 (Dropout)	(None, 122, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 16)	12304
dense_2 (Dense)	(None, 3)	51

```

=====
Total params: 18,351
Trainable params: 18,351
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 54.7856 - acc: 0.6152 - val_loss: 2.3591 - val_acc: 0.7145

```

Epoch 2/35  
- 1s - loss: 0.7831 - acc: 0.8581 - val\_loss: 0.8226 - val\_acc: 0.7815

Epoch 3/35  
- 1s - loss: 0.4652 - acc: 0.9065 - val\_loss: 0.7021 - val\_acc: 0.8277

Epoch 4/35  
- 1s - loss: 0.3838 - acc: 0.9279 - val\_loss: 0.5550 - val\_acc: 0.9056

Epoch 5/35  
- 1s - loss: 0.3464 - acc: 0.9355 - val\_loss: 0.5566 - val\_acc: 0.8911

Epoch 6/35  
- 1s - loss: 0.3309 - acc: 0.9364 - val\_loss: 0.5986 - val\_acc: 0.8825

Epoch 7/35  
- 1s - loss: 0.3049 - acc: 0.9473 - val\_loss: 0.5237 - val\_acc: 0.9041

Epoch 8/35  
- 1s - loss: 0.2864 - acc: 0.9546 - val\_loss: 0.7817 - val\_acc: 0.7051

Epoch 9/35  
- 1s - loss: 0.2963 - acc: 0.9507 - val\_loss: 0.5124 - val\_acc: 0.9113

Epoch 10/35  
- 1s - loss: 0.2843 - acc: 0.9540 - val\_loss: 0.4625 - val\_acc: 0.9164

Epoch 11/35  
- 1s - loss: 0.2737 - acc: 0.9522 - val\_loss: 0.5824 - val\_acc: 0.8133

Epoch 12/35  
- 1s - loss: 0.2660 - acc: 0.9583 - val\_loss: 0.4173 - val\_acc: 0.9315

Epoch 13/35  
- 1s - loss: 0.2673 - acc: 0.9574 - val\_loss: 0.8013 - val\_acc: 0.7650

Epoch 14/35  
- 1s - loss: 0.2690 - acc: 0.9519 - val\_loss: 0.4297 - val\_acc: 0.9185

Epoch 15/35  
- 1s - loss: 0.2468 - acc: 0.9641 - val\_loss: 0.5762 - val\_acc: 0.7981

Epoch 16/35  
- 1s - loss: 0.2485 - acc: 0.9562 - val\_loss: 0.3884 - val\_acc: 0.9286

Epoch 17/35  
- 1s - loss: 0.2418 - acc: 0.9635 - val\_loss: 0.9449 - val\_acc: 0.7001

Epoch 18/35  
- 1s - loss: 0.2419 - acc: 0.9613 - val\_loss: 0.6635 - val\_acc: 0.7787

Epoch 19/35  
- 1s - loss: 0.2462 - acc: 0.9595 - val\_loss: 0.4043 - val\_acc: 0.9351

Epoch 20/35  
- 1s - loss: 0.2368 - acc: 0.9641 - val\_loss: 0.4625 - val\_acc: 0.8991

Epoch 21/35  
- 1s - loss: 0.2374 - acc: 0.9635 - val\_loss: 0.6909 - val\_acc: 0.7549

Epoch 22/35  
- 1s - loss: 0.2333 - acc: 0.9623 - val\_loss: 0.6555 - val\_acc: 0.8536

Epoch 23/35  
- 1s - loss: 0.2342 - acc: 0.9607 - val\_loss: 0.4107 - val\_acc: 0.8882

Epoch 24/35  
- 1s - loss: 0.2295 - acc: 0.9638 - val\_loss: 0.3595 - val\_acc: 0.9243

Epoch 25/35  
- 1s - loss: 0.2393 - acc: 0.9629 - val\_loss: 0.4479 - val\_acc: 0.8861

Epoch 26/35  
 - 1s - loss: 0.2354 - acc: 0.9604 - val\_loss: 0.3572 - val\_acc: 0.9236  
 Epoch 27/35  
 - 1s - loss: 0.2352 - acc: 0.9650 - val\_loss: 0.3233 - val\_acc: 0.9488  
 Epoch 28/35  
 - 1s - loss: 0.2269 - acc: 0.9653 - val\_loss: 0.3694 - val\_acc: 0.9366  
 Epoch 29/35  
 - 1s - loss: 0.2139 - acc: 0.9708 - val\_loss: 0.3571 - val\_acc: 0.9207  
 Epoch 30/35  
 - 1s - loss: 0.2332 - acc: 0.9607 - val\_loss: 0.4245 - val\_acc: 0.8774  
 Epoch 31/35  
 - 1s - loss: 0.2297 - acc: 0.9638 - val\_loss: 0.3657 - val\_acc: 0.9322  
 Epoch 32/35  
 - 1s - loss: 0.2174 - acc: 0.9671 - val\_loss: 0.3873 - val\_acc: 0.9387  
 Epoch 33/35  
 - 1s - loss: 0.2185 - acc: 0.9683 - val\_loss: 0.4320 - val\_acc: 0.8861  
 Epoch 34/35  
 - 1s - loss: 0.2362 - acc: 0.9623 - val\_loss: 0.3228 - val\_acc: 0.9474  
 Epoch 35/35  
 - 1s - loss: 0.2281 - acc: 0.9641 - val\_loss: 0.4292 - val\_acc: 0.8926  
 Train accuracy 0.9707762557077626 Test accuracy: 0.8925739005046863

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 120, 16)	4720
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 32)	20512
dense_2 (Dense)	(None, 3)	99

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Total params: 26,507  
 Trainable params: 26,507  
 Non-trainable params: 0

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None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/55  
 - 2s - loss: 28.4644 - acc: 0.7416 - val\_loss: 7.5923 - val\_acc: 0.8154  
 Epoch 2/55

- 1s - loss: 2.9050 - acc: 0.9507 - val\_loss: 1.1387 - val\_acc: 0.8472  
 Epoch 3/55  
 - 2s - loss: 0.5378 - acc: 0.9553 - val\_loss: 0.6367 - val\_acc: 0.8789  
 Epoch 4/55  
 - 1s - loss: 0.3659 - acc: 0.9592 - val\_loss: 0.5642 - val\_acc: 0.8868  
 Epoch 5/55  
 - 2s - loss: 0.3013 - acc: 0.9665 - val\_loss: 0.5453 - val\_acc: 0.8940  
 Epoch 6/55  
 - 2s - loss: 0.2587 - acc: 0.9760 - val\_loss: 0.4063 - val\_acc: 0.9416  
 Epoch 7/55  
 - 2s - loss: 0.2648 - acc: 0.9726 - val\_loss: 0.4659 - val\_acc: 0.8861  
 Epoch 8/55  
 - 2s - loss: 0.2448 - acc: 0.9729 - val\_loss: 0.4797 - val\_acc: 0.8969  
 Epoch 9/55  
 - 2s - loss: 0.2126 - acc: 0.9769 - val\_loss: 0.3707 - val\_acc: 0.9704  
 Epoch 10/55  
 - 2s - loss: 0.2030 - acc: 0.9814 - val\_loss: 0.3931 - val\_acc: 0.9351  
 Epoch 11/55  
 - 2s - loss: 0.2123 - acc: 0.9790 - val\_loss: 0.3378 - val\_acc: 0.9416  
 Epoch 12/55  
 - 2s - loss: 0.1965 - acc: 0.9793 - val\_loss: 0.3120 - val\_acc: 0.9474  
 Epoch 13/55  
 - 2s - loss: 0.1649 - acc: 0.9863 - val\_loss: 0.3907 - val\_acc: 0.9293  
 Epoch 14/55  
 - 2s - loss: 0.1766 - acc: 0.9848 - val\_loss: 0.3124 - val\_acc: 0.9351  
 Epoch 15/55  
 - 2s - loss: 0.1466 - acc: 0.9906 - val\_loss: 0.2992 - val\_acc: 0.9416  
 Epoch 16/55  
 - 2s - loss: 0.1519 - acc: 0.9863 - val\_loss: 0.2831 - val\_acc: 0.9488  
 Epoch 17/55  
 - 2s - loss: 0.2105 - acc: 0.9717 - val\_loss: 0.2804 - val\_acc: 0.9560  
 Epoch 18/55  
 - 2s - loss: 0.1331 - acc: 0.9918 - val\_loss: 0.2772 - val\_acc: 0.9387  
 Epoch 19/55  
 - 2s - loss: 0.1457 - acc: 0.9851 - val\_loss: 0.2670 - val\_acc: 0.9452  
 Epoch 20/55  
 - 2s - loss: 0.1416 - acc: 0.9893 - val\_loss: 0.3589 - val\_acc: 0.9221  
 Epoch 21/55  
 - 2s - loss: 0.1595 - acc: 0.9808 - val\_loss: 0.3005 - val\_acc: 0.9387  
 Epoch 22/55  
 - 2s - loss: 0.1705 - acc: 0.9775 - val\_loss: 0.2969 - val\_acc: 0.9474  
 Epoch 23/55  
 - 2s - loss: 0.1359 - acc: 0.9900 - val\_loss: 0.2513 - val\_acc: 0.9510  
 Epoch 24/55  
 - 2s - loss: 0.1581 - acc: 0.9811 - val\_loss: 0.3707 - val\_acc: 0.9293  
 Epoch 25/55  
 - 2s - loss: 0.1388 - acc: 0.9884 - val\_loss: 0.2974 - val\_acc: 0.9387  
 Epoch 26/55

- 2s - loss: 0.1273 - acc: 0.9884 - val\_loss: 0.2848 - val\_acc: 0.9358  
 Epoch 27/55  
 - 2s - loss: 0.1224 - acc: 0.9884 - val\_loss: 0.2629 - val\_acc: 0.9409  
 Epoch 28/55  
 - 1s - loss: 0.1516 - acc: 0.9836 - val\_loss: 0.3156 - val\_acc: 0.9084  
 Epoch 29/55  
 - 2s - loss: 0.1116 - acc: 0.9924 - val\_loss: 0.3689 - val\_acc: 0.9135  
 Epoch 30/55  
 - 2s - loss: 0.1353 - acc: 0.9872 - val\_loss: 0.4475 - val\_acc: 0.8500  
 Epoch 31/55  
 - 2s - loss: 0.1459 - acc: 0.9857 - val\_loss: 0.3477 - val\_acc: 0.9113  
 Epoch 32/55  
 - 2s - loss: 0.1275 - acc: 0.9869 - val\_loss: 0.3138 - val\_acc: 0.9221  
 Epoch 33/55  
 - 2s - loss: 0.1106 - acc: 0.9900 - val\_loss: 0.3453 - val\_acc: 0.9005  
 Epoch 34/55  
 - 2s - loss: 0.1559 - acc: 0.9842 - val\_loss: 0.3551 - val\_acc: 0.9092  
 Epoch 35/55  
 - 2s - loss: 0.1262 - acc: 0.9875 - val\_loss: 0.3875 - val\_acc: 0.8825  
 Epoch 36/55  
 - 2s - loss: 0.1273 - acc: 0.9854 - val\_loss: 0.4322 - val\_acc: 0.8659  
 Epoch 37/55  
 - 2s - loss: 0.1369 - acc: 0.9884 - val\_loss: 0.3638 - val\_acc: 0.9214  
 Epoch 38/55  
 - 2s - loss: 0.1538 - acc: 0.9848 - val\_loss: 0.2814 - val\_acc: 0.9358  
 Epoch 39/55  
 - 2s - loss: 0.1691 - acc: 0.9808 - val\_loss: 0.4038 - val\_acc: 0.8789  
 Epoch 40/55  
 - 2s - loss: 0.1491 - acc: 0.9845 - val\_loss: 0.3964 - val\_acc: 0.9106  
 Epoch 41/55  
 - 2s - loss: 0.1560 - acc: 0.9784 - val\_loss: 0.4678 - val\_acc: 0.9185  
 Epoch 42/55  
 - 2s - loss: 0.1246 - acc: 0.9903 - val\_loss: 0.4327 - val\_acc: 0.8947  
 Epoch 43/55  
 - 2s - loss: 0.1319 - acc: 0.9839 - val\_loss: 0.3348 - val\_acc: 0.9257  
 Epoch 44/55  
 - 2s - loss: 0.1082 - acc: 0.9924 - val\_loss: 0.3509 - val\_acc: 0.9200  
 Epoch 45/55  
 - 2s - loss: 0.1542 - acc: 0.9775 - val\_loss: 0.5506 - val\_acc: 0.8407  
 Epoch 46/55  
 - 1s - loss: 0.1271 - acc: 0.9866 - val\_loss: 0.3663 - val\_acc: 0.9221  
 Epoch 47/55  
 - 2s - loss: 0.1178 - acc: 0.9866 - val\_loss: 0.3634 - val\_acc: 0.8940  
 Epoch 48/55  
 - 2s - loss: 0.1355 - acc: 0.9842 - val\_loss: 0.2705 - val\_acc: 0.9373  
 Epoch 49/55  
 - 2s - loss: 0.1339 - acc: 0.9842 - val\_loss: 0.3740 - val\_acc: 0.9063  
 Epoch 50/55

```

- 2s - loss: 0.1177 - acc: 0.9848 - val_loss: 0.3472 - val_acc: 0.9084
Epoch 51/55
- 1s - loss: 0.1404 - acc: 0.9814 - val_loss: 0.4542 - val_acc: 0.9128
Epoch 52/55
- 2s - loss: 0.1449 - acc: 0.9872 - val_loss: 0.4119 - val_acc: 0.9019
Epoch 53/55
- 2s - loss: 0.1280 - acc: 0.9887 - val_loss: 0.2186 - val_acc: 0.9481
Epoch 54/55
- 2s - loss: 0.1346 - acc: 0.9833 - val_loss: 0.3687 - val_acc: 0.9257
Epoch 55/55
- 2s - loss: 0.1437 - acc: 0.9866 - val_loss: 0.3049 - val_acc: 0.9394
Train accuracy 0.997869101978691 Test accuracy: 0.93943763518385

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 116, 24)	7080
dropout_1 (Dropout)	(None, 116, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 58, 24)	0
flatten_1 (Flatten)	(None, 1392)	0
dense_1 (Dense)	(None, 32)	44576
dense_2 (Dense)	(None, 3)	99

---

```

Total params: 54,443
Trainable params: 54,443
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
- 2s - loss: 44.5118 - acc: 0.7452 - val_loss: 0.9315 - val_acc: 0.6936
Epoch 2/55
- 2s - loss: 0.5590 - acc: 0.8965 - val_loss: 0.6744 - val_acc: 0.8053
Epoch 3/55
- 2s - loss: 0.4779 - acc: 0.9041 - val_loss: 0.6955 - val_acc: 0.8248
Epoch 4/55
- 2s - loss: 0.4760 - acc: 0.9032 - val_loss: 0.6007 - val_acc: 0.8609
Epoch 5/55
- 2s - loss: 0.4152 - acc: 0.9218 - val_loss: 0.5213 - val_acc: 0.9229
Epoch 6/55
- 2s - loss: 0.3777 - acc: 0.9318 - val_loss: 0.5880 - val_acc: 0.8226

```

Epoch 7/55  
- 2s - loss: 0.3963 - acc: 0.9297 - val\_loss: 0.7228 - val\_acc: 0.8536  
Epoch 8/55  
- 2s - loss: 0.3518 - acc: 0.9397 - val\_loss: 0.4974 - val\_acc: 0.8832  
Epoch 9/55  
- 2s - loss: 0.3823 - acc: 0.9303 - val\_loss: 0.4852 - val\_acc: 0.9056  
Epoch 10/55  
- 2s - loss: 0.3791 - acc: 0.9318 - val\_loss: 0.6130 - val\_acc: 0.8385  
Epoch 11/55  
- 2s - loss: 0.3951 - acc: 0.9297 - val\_loss: 0.4726 - val\_acc: 0.9092  
Epoch 12/55  
- 2s - loss: 0.3434 - acc: 0.9406 - val\_loss: 0.6734 - val\_acc: 0.8796  
Epoch 13/55  
- 2s - loss: 0.3412 - acc: 0.9373 - val\_loss: 0.4951 - val\_acc: 0.8991  
Epoch 14/55  
- 2s - loss: 0.3269 - acc: 0.9452 - val\_loss: 0.6933 - val\_acc: 0.8601  
Epoch 15/55  
- 2s - loss: 0.3963 - acc: 0.9233 - val\_loss: 0.6766 - val\_acc: 0.8392  
Epoch 16/55  
- 2s - loss: 0.3194 - acc: 0.9461 - val\_loss: 0.5510 - val\_acc: 0.8738  
Epoch 17/55  
- 2s - loss: 0.3490 - acc: 0.9400 - val\_loss: 0.5323 - val\_acc: 0.8515  
Epoch 18/55  
- 2s - loss: 0.3093 - acc: 0.9458 - val\_loss: 0.5361 - val\_acc: 0.8839  
Epoch 19/55  
- 2s - loss: 0.3478 - acc: 0.9376 - val\_loss: 0.5095 - val\_acc: 0.8738  
Epoch 20/55  
- 2s - loss: 0.3425 - acc: 0.9373 - val\_loss: 0.5057 - val\_acc: 0.8854  
Epoch 21/55  
- 2s - loss: 0.3447 - acc: 0.9367 - val\_loss: 0.5154 - val\_acc: 0.9164  
Epoch 22/55  
- 2s - loss: 0.3447 - acc: 0.9385 - val\_loss: 0.5577 - val\_acc: 0.8904  
Epoch 23/55  
- 2s - loss: 0.2775 - acc: 0.9516 - val\_loss: 0.5036 - val\_acc: 0.8673  
Epoch 24/55  
- 2s - loss: 0.3623 - acc: 0.9297 - val\_loss: 0.5883 - val\_acc: 0.8464  
Epoch 25/55  
- 2s - loss: 0.3179 - acc: 0.9458 - val\_loss: 0.5279 - val\_acc: 0.8695  
Epoch 26/55  
- 2s - loss: 0.2929 - acc: 0.9531 - val\_loss: 0.5582 - val\_acc: 0.8623  
Epoch 27/55  
- 2s - loss: 0.3316 - acc: 0.9440 - val\_loss: 0.6394 - val\_acc: 0.8738  
Epoch 28/55  
- 2s - loss: 0.3239 - acc: 0.9440 - val\_loss: 0.4072 - val\_acc: 0.9012  
Epoch 29/55  
- 2s - loss: 0.3413 - acc: 0.9388 - val\_loss: 0.4610 - val\_acc: 0.8911  
Epoch 30/55  
- 2s - loss: 0.3787 - acc: 0.9330 - val\_loss: 0.4763 - val\_acc: 0.8688

Epoch 31/55  
- 2s - loss: 0.2919 - acc: 0.9492 - val\_loss: 0.4912 - val\_acc: 0.9041

Epoch 32/55  
- 2s - loss: 0.3054 - acc: 0.9437 - val\_loss: 0.5216 - val\_acc: 0.8565

Epoch 33/55  
- 2s - loss: 0.3102 - acc: 0.9449 - val\_loss: 0.5359 - val\_acc: 0.8738

Epoch 34/55  
- 2s - loss: 0.3148 - acc: 0.9431 - val\_loss: 0.4207 - val\_acc: 0.9156

Epoch 35/55  
- 2s - loss: 0.3130 - acc: 0.9412 - val\_loss: 0.5339 - val\_acc: 0.9084

Epoch 36/55  
- 2s - loss: 0.3004 - acc: 0.9504 - val\_loss: 0.4776 - val\_acc: 0.9034

Epoch 37/55  
- 2s - loss: 0.3118 - acc: 0.9443 - val\_loss: 0.4777 - val\_acc: 0.8933

Epoch 38/55  
- 2s - loss: 0.2978 - acc: 0.9479 - val\_loss: 0.7795 - val\_acc: 0.7347

Epoch 39/55  
- 2s - loss: 0.2999 - acc: 0.9455 - val\_loss: 0.7837 - val\_acc: 0.7873

Epoch 40/55  
- 2s - loss: 0.3392 - acc: 0.9409 - val\_loss: 0.5640 - val\_acc: 0.8825

Epoch 41/55  
- 2s - loss: 0.3181 - acc: 0.9492 - val\_loss: 0.5489 - val\_acc: 0.8796

Epoch 42/55  
- 2s - loss: 0.3250 - acc: 0.9461 - val\_loss: 0.5183 - val\_acc: 0.8738

Epoch 43/55  
- 2s - loss: 0.2481 - acc: 0.9580 - val\_loss: 0.5551 - val\_acc: 0.8248

Epoch 44/55  
- 2s - loss: 0.2675 - acc: 0.9528 - val\_loss: 0.3985 - val\_acc: 0.9250

Epoch 45/55  
- 2s - loss: 0.3214 - acc: 0.9412 - val\_loss: 0.4146 - val\_acc: 0.9301

Epoch 46/55  
- 2s - loss: 0.2832 - acc: 0.9519 - val\_loss: 0.9030 - val\_acc: 0.7311

Epoch 47/55  
- 2s - loss: 0.3583 - acc: 0.9312 - val\_loss: 0.7931 - val\_acc: 0.8421

Epoch 48/55  
- 2s - loss: 0.2985 - acc: 0.9476 - val\_loss: 0.7842 - val\_acc: 0.7981

Epoch 49/55  
- 2s - loss: 0.3033 - acc: 0.9519 - val\_loss: 0.4369 - val\_acc: 0.9142

Epoch 50/55  
- 2s - loss: 0.3563 - acc: 0.9355 - val\_loss: 0.5136 - val\_acc: 0.8796

Epoch 51/55  
- 2s - loss: 0.2677 - acc: 0.9577 - val\_loss: 0.5134 - val\_acc: 0.8745

Epoch 52/55  
- 2s - loss: 0.3046 - acc: 0.9452 - val\_loss: 0.6087 - val\_acc: 0.8464

Epoch 53/55  
- 2s - loss: 0.2747 - acc: 0.9568 - val\_loss: 0.7035 - val\_acc: 0.8226

Epoch 54/55  
- 2s - loss: 0.3255 - acc: 0.9409 - val\_loss: 0.6753 - val\_acc: 0.8428



Epoch 55/55

- 2s - loss: 0.3057 - acc: 0.9449 - val\_loss: 0.5029 - val\_acc: 0.8955

Train accuracy 0.9765601217656013 Test accuracy: 0.8954578226387887

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 122, 24)	3864
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

---

Total params: 98,715

Trainable params: 98,715

Non-trainable params: 0

---

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 2s - loss: 82.7846 - acc: 0.5820 - val\_loss: 16.3916 - val\_acc: 0.7008

Epoch 2/55

- 1s - loss: 6.0142 - acc: 0.8283 - val\_loss: 1.6941 - val\_acc: 0.7650

Epoch 3/55

- 1s - loss: 0.9027 - acc: 0.8499 - val\_loss: 0.7755 - val\_acc: 0.8673

Epoch 4/55

- 1s - loss: 0.6070 - acc: 0.8740 - val\_loss: 0.8220 - val\_acc: 0.7758

Epoch 5/55

- 1s - loss: 0.5335 - acc: 0.8959 - val\_loss: 0.7900 - val\_acc: 0.8125

Epoch 6/55

- 1s - loss: 0.5072 - acc: 0.9014 - val\_loss: 0.6782 - val\_acc: 0.8385

Epoch 7/55

- 1s - loss: 0.4560 - acc: 0.9126 - val\_loss: 0.5942 - val\_acc: 0.8947

Epoch 8/55

- 1s - loss: 0.4652 - acc: 0.8998 - val\_loss: 0.6559 - val\_acc: 0.8623

Epoch 9/55

- 1s - loss: 0.4256 - acc: 0.9190 - val\_loss: 0.5804 - val\_acc: 0.8882

Epoch 10/55

- 1s - loss: 0.5829 - acc: 0.8673 - val\_loss: 0.8639 - val\_acc: 0.8392

Epoch 11/55

- 1s - loss: 0.4611 - acc: 0.9087 - val\_loss: 0.5363 - val\_acc: 0.9048  
Epoch 12/55  
- 1s - loss: 0.3933 - acc: 0.9330 - val\_loss: 0.6186 - val\_acc: 0.8421  
Epoch 13/55  
- 1s - loss: 0.4701 - acc: 0.9002 - val\_loss: 0.7332 - val\_acc: 0.7880  
Epoch 14/55  
- 1s - loss: 0.4152 - acc: 0.9242 - val\_loss: 0.5494 - val\_acc: 0.8825  
Epoch 15/55  
- 1s - loss: 0.4086 - acc: 0.9224 - val\_loss: 0.4986 - val\_acc: 0.8926  
Epoch 16/55  
- 1s - loss: 0.3507 - acc: 0.9339 - val\_loss: 0.6542 - val\_acc: 0.7765  
Epoch 17/55  
- 1s - loss: 0.3664 - acc: 0.9391 - val\_loss: 0.4103 - val\_acc: 0.9315  
Epoch 18/55  
- 1s - loss: 0.3912 - acc: 0.9248 - val\_loss: 0.5111 - val\_acc: 0.9120  
Epoch 19/55  
- 1s - loss: 0.3632 - acc: 0.9346 - val\_loss: 0.4488 - val\_acc: 0.9214  
Epoch 20/55  
- 1s - loss: 0.4422 - acc: 0.9135 - val\_loss: 0.5838 - val\_acc: 0.9164  
Epoch 21/55  
- 1s - loss: 0.3708 - acc: 0.9422 - val\_loss: 0.5031 - val\_acc: 0.9034  
Epoch 22/55  
- 1s - loss: 0.3323 - acc: 0.9385 - val\_loss: 0.4582 - val\_acc: 0.9185  
Epoch 23/55  
- 1s - loss: 0.3095 - acc: 0.9482 - val\_loss: 0.4863 - val\_acc: 0.8976  
Epoch 24/55  
- 1s - loss: 0.3560 - acc: 0.9349 - val\_loss: 0.4377 - val\_acc: 0.9056  
Epoch 25/55  
- 1s - loss: 0.3592 - acc: 0.9330 - val\_loss: 0.4285 - val\_acc: 0.9272  
Epoch 26/55  
- 1s - loss: 0.3133 - acc: 0.9513 - val\_loss: 0.4425 - val\_acc: 0.9048  
Epoch 27/55  
- 1s - loss: 0.2903 - acc: 0.9528 - val\_loss: 0.4872 - val\_acc: 0.8839  
Epoch 28/55  
- 1s - loss: 0.3273 - acc: 0.9416 - val\_loss: 0.6466 - val\_acc: 0.7967  
Epoch 29/55  
- 1s - loss: 0.3459 - acc: 0.9333 - val\_loss: 0.5911 - val\_acc: 0.8544  
Epoch 30/55  
- 1s - loss: 0.3145 - acc: 0.9510 - val\_loss: 0.5538 - val\_acc: 0.8609  
Epoch 31/55  
- 1s - loss: 0.3342 - acc: 0.9428 - val\_loss: 0.4887 - val\_acc: 0.8767  
Epoch 32/55  
- 1s - loss: 0.2890 - acc: 0.9516 - val\_loss: 0.5177 - val\_acc: 0.8839  
Epoch 33/55  
- 1s - loss: 0.3659 - acc: 0.9355 - val\_loss: 0.5414 - val\_acc: 0.8572  
Epoch 34/55  
- 1s - loss: 0.3128 - acc: 0.9528 - val\_loss: 0.5219 - val\_acc: 0.8846  
Epoch 35/55

```

- 1s - loss: 0.3608 - acc: 0.9355 - val_loss: 0.4993 - val_acc: 0.8601
Epoch 36/55
- 1s - loss: 0.3170 - acc: 0.9455 - val_loss: 0.5202 - val_acc: 0.8529
Epoch 37/55
- 1s - loss: 0.3030 - acc: 0.9525 - val_loss: 0.4707 - val_acc: 0.9236
Epoch 38/55
- 1s - loss: 0.2803 - acc: 0.9592 - val_loss: 0.3960 - val_acc: 0.9229
Epoch 39/55
- 1s - loss: 0.3076 - acc: 0.9467 - val_loss: 0.4876 - val_acc: 0.9178
Epoch 40/55
- 1s - loss: 0.3180 - acc: 0.9464 - val_loss: 0.5215 - val_acc: 0.9012
Epoch 41/55
- 1s - loss: 0.4000 - acc: 0.9294 - val_loss: 0.4896 - val_acc: 0.8839
Epoch 42/55
- 1s - loss: 0.3235 - acc: 0.9437 - val_loss: 0.4359 - val_acc: 0.9063
Epoch 43/55
- 1s - loss: 0.3761 - acc: 0.9297 - val_loss: 0.5142 - val_acc: 0.8818
Epoch 44/55
- 1s - loss: 0.3502 - acc: 0.9355 - val_loss: 0.5018 - val_acc: 0.8983
Epoch 45/55
- 1s - loss: 0.3634 - acc: 0.9324 - val_loss: 0.6018 - val_acc: 0.8536
Epoch 46/55
- 1s - loss: 0.3464 - acc: 0.9419 - val_loss: 0.5298 - val_acc: 0.8832
Epoch 47/55
- 1s - loss: 0.3469 - acc: 0.9385 - val_loss: 0.5465 - val_acc: 0.8652
Epoch 48/55
- 1s - loss: 0.3607 - acc: 0.9397 - val_loss: 0.4754 - val_acc: 0.8998
Epoch 49/55
- 1s - loss: 0.3080 - acc: 0.9473 - val_loss: 0.7684 - val_acc: 0.7779
Epoch 50/55
- 1s - loss: 0.3273 - acc: 0.9428 - val_loss: 0.4133 - val_acc: 0.9293
Epoch 51/55
- 1s - loss: 0.3596 - acc: 0.9257 - val_loss: 0.4448 - val_acc: 0.9142
Epoch 52/55
- 1s - loss: 0.3180 - acc: 0.9467 - val_loss: 0.6559 - val_acc: 0.8169
Epoch 53/55
- 1s - loss: 0.3250 - acc: 0.9458 - val_loss: 0.3928 - val_acc: 0.9229
Epoch 54/55
- 1s - loss: 0.4115 - acc: 0.9248 - val_loss: 0.4735 - val_acc: 0.8955
Epoch 55/55
- 1s - loss: 0.3015 - acc: 0.9470 - val_loss: 0.6110 - val_acc: 0.8046
Train accuracy 0.8840182648401826 Test accuracy: 0.8046142754145638

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 124, 32)            1472
-----

```

conv1d_2 (Conv1D)	(None, 120, 24)	3864
-----		
dropout_1 (Dropout)	(None, 120, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 24, 24)	0
-----		
flatten_1 (Flatten)	(None, 576)	0
-----		
dense_1 (Dense)	(None, 32)	18464
-----		
dense_2 (Dense)	(None, 3)	99
=====		
Total params: 23,899		
Trainable params: 23,899		
Non-trainable params: 0		
-----		
None		
Train on 3285 samples, validate on 1387 samples		
Epoch 1/35		
- 2s - loss: 108.5729 - acc: 0.5747 - val_loss: 58.5087 - val_acc: 0.7217		
Epoch 2/35		
- 1s - loss: 35.0013 - acc: 0.8499 - val_loss: 18.7340 - val_acc: 0.8522		
Epoch 3/35		
- 1s - loss: 10.9079 - acc: 0.9199 - val_loss: 5.9124 - val_acc: 0.8493		
Epoch 4/35		
- 1s - loss: 3.3061 - acc: 0.9431 - val_loss: 2.0256 - val_acc: 0.9286		
Epoch 5/35		
- 1s - loss: 1.1283 - acc: 0.9482 - val_loss: 1.0124 - val_acc: 0.8832		
Epoch 6/35		
- 1s - loss: 0.5651 - acc: 0.9583 - val_loss: 0.7246 - val_acc: 0.9452		
Epoch 7/35		
- 1s - loss: 0.4219 - acc: 0.9613 - val_loss: 0.6519 - val_acc: 0.9113		
Epoch 8/35		
- 1s - loss: 0.3742 - acc: 0.9607 - val_loss: 0.6244 - val_acc: 0.9257		
Epoch 9/35		
- 1s - loss: 0.3390 - acc: 0.9683 - val_loss: 0.6045 - val_acc: 0.9084		
Epoch 10/35		
- 1s - loss: 0.3437 - acc: 0.9619 - val_loss: 0.6695 - val_acc: 0.8306		
Epoch 11/35		
- 1s - loss: 0.3129 - acc: 0.9686 - val_loss: 0.5445 - val_acc: 0.9250		
Epoch 12/35		
- 1s - loss: 0.2911 - acc: 0.9729 - val_loss: 0.5464 - val_acc: 0.9106		
Epoch 13/35		
- 1s - loss: 0.2621 - acc: 0.9833 - val_loss: 0.5277 - val_acc: 0.9257		
Epoch 14/35		
- 1s - loss: 0.2504 - acc: 0.9830 - val_loss: 0.4910 - val_acc: 0.9322		
Epoch 15/35		
- 1s - loss: 0.2765 - acc: 0.9686 - val_loss: 0.4655 - val_acc: 0.9531		

```

Epoch 16/35
- 1s - loss: 0.2306 - acc: 0.9836 - val_loss: 0.4810 - val_acc: 0.9387
Epoch 17/35
- 1s - loss: 0.2408 - acc: 0.9781 - val_loss: 0.4301 - val_acc: 0.9603
Epoch 18/35
- 1s - loss: 0.2109 - acc: 0.9887 - val_loss: 0.4495 - val_acc: 0.9373
Epoch 19/35
- 1s - loss: 0.2488 - acc: 0.9702 - val_loss: 0.4297 - val_acc: 0.9553
Epoch 20/35
- 1s - loss: 0.2111 - acc: 0.9836 - val_loss: 0.4044 - val_acc: 0.9539
Epoch 21/35
- 1s - loss: 0.1989 - acc: 0.9848 - val_loss: 0.4902 - val_acc: 0.8818
Epoch 22/35
- 1s - loss: 0.1878 - acc: 0.9887 - val_loss: 0.3900 - val_acc: 0.9531
Epoch 23/35
- 1s - loss: 0.1886 - acc: 0.9869 - val_loss: 0.4037 - val_acc: 0.9394
Epoch 24/35
- 1s - loss: 0.2139 - acc: 0.9753 - val_loss: 0.3903 - val_acc: 0.9488
Epoch 25/35
- 1s - loss: 0.1757 - acc: 0.9893 - val_loss: 0.3822 - val_acc: 0.9423
Epoch 26/35
- 1s - loss: 0.1873 - acc: 0.9826 - val_loss: 0.3838 - val_acc: 0.9488
Epoch 27/35
- 1s - loss: 0.2036 - acc: 0.9763 - val_loss: 0.4516 - val_acc: 0.9164
Epoch 28/35
- 1s - loss: 0.1804 - acc: 0.9866 - val_loss: 0.4332 - val_acc: 0.9034
Epoch 29/35
- 1s - loss: 0.1742 - acc: 0.9866 - val_loss: 0.3755 - val_acc: 0.9438
Epoch 30/35
- 1s - loss: 0.1546 - acc: 0.9909 - val_loss: 0.3517 - val_acc: 0.9423
Epoch 31/35
- 1s - loss: 0.1570 - acc: 0.9872 - val_loss: 0.3205 - val_acc: 0.9632
Epoch 32/35
- 1s - loss: 0.1833 - acc: 0.9778 - val_loss: 0.3808 - val_acc: 0.9344
Epoch 33/35
- 1s - loss: 0.1704 - acc: 0.9836 - val_loss: 0.4720 - val_acc: 0.9012
Epoch 34/35
- 1s - loss: 0.1776 - acc: 0.9826 - val_loss: 0.4516 - val_acc: 0.9106
Epoch 35/35
- 1s - loss: 0.1670 - acc: 0.9863 - val_loss: 0.3924 - val_acc: 0.9301
Train accuracy 0.9817351598173516 Test accuracy: 0.9300648882480173

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 28)	784
conv1d_2 (Conv1D)	(None, 124, 16)	1360

```

-----
dropout_1 (Dropout)                (None, 124, 16)                0
-----
max_pooling1d_1 (MaxPooling1D)      (None, 41, 16)                0
-----
flatten_1 (Flatten)                 (None, 656)                   0
-----
dense_1 (Dense)                     (None, 64)                    42048
-----
dense_2 (Dense)                     (None, 3)                     195
=====
Total params: 44,387
Trainable params: 44,387
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
  - 2s - loss: 48.2485 - acc: 0.6240 - val_loss: 5.8736 - val_acc: 0.6229
Epoch 2/35
  - 1s - loss: 1.5410 - acc: 0.8033 - val_loss: 0.9214 - val_acc: 0.7167
Epoch 3/35
  - 1s - loss: 0.5971 - acc: 0.8557 - val_loss: 0.7990 - val_acc: 0.7823
Epoch 4/35
  - 1s - loss: 0.5133 - acc: 0.8773 - val_loss: 0.7069 - val_acc: 0.7837
Epoch 5/35
  - 1s - loss: 0.4665 - acc: 0.8956 - val_loss: 0.7327 - val_acc: 0.8327
Epoch 6/35
  - 1s - loss: 0.4398 - acc: 0.8977 - val_loss: 0.6458 - val_acc: 0.8219
Epoch 7/35
  - 1s - loss: 0.4304 - acc: 0.9075 - val_loss: 0.7424 - val_acc: 0.7722
Epoch 8/35
  - 1s - loss: 0.3986 - acc: 0.9151 - val_loss: 0.9455 - val_acc: 0.6316
Epoch 9/35
  - 1s - loss: 0.3893 - acc: 0.9221 - val_loss: 0.5072 - val_acc: 0.8897
Epoch 10/35
  - 1s - loss: 0.3804 - acc: 0.9209 - val_loss: 0.5693 - val_acc: 0.8659
Epoch 11/35
  - 1s - loss: 0.3730 - acc: 0.9218 - val_loss: 0.7394 - val_acc: 0.7311
Epoch 12/35
  - 1s - loss: 0.3628 - acc: 0.9282 - val_loss: 0.4802 - val_acc: 0.8890
Epoch 13/35
  - 1s - loss: 0.3492 - acc: 0.9303 - val_loss: 0.5821 - val_acc: 0.8717
Epoch 14/35
  - 1s - loss: 0.3525 - acc: 0.9275 - val_loss: 0.5234 - val_acc: 0.8673
Epoch 15/35
  - 1s - loss: 0.3303 - acc: 0.9370 - val_loss: 0.8273 - val_acc: 0.7181
Epoch 16/35

```

```

- 1s - loss: 0.3334 - acc: 0.9370 - val_loss: 0.5803 - val_acc: 0.8277
Epoch 17/35
- 1s - loss: 0.3361 - acc: 0.9403 - val_loss: 1.1432 - val_acc: 0.7051
Epoch 18/35
- 1s - loss: 0.3314 - acc: 0.9379 - val_loss: 0.7253 - val_acc: 0.7952
Epoch 19/35
- 1s - loss: 0.3220 - acc: 0.9370 - val_loss: 0.5290 - val_acc: 0.8536
Epoch 20/35
- 1s - loss: 0.3326 - acc: 0.9373 - val_loss: 0.5625 - val_acc: 0.8630
Epoch 21/35
- 1s - loss: 0.3224 - acc: 0.9361 - val_loss: 0.8055 - val_acc: 0.7830
Epoch 22/35
- 1s - loss: 0.3151 - acc: 0.9425 - val_loss: 0.7265 - val_acc: 0.7635
Epoch 23/35
- 1s - loss: 0.3359 - acc: 0.9376 - val_loss: 0.5619 - val_acc: 0.8493
Epoch 24/35
- 1s - loss: 0.3138 - acc: 0.9416 - val_loss: 0.6181 - val_acc: 0.8198
Epoch 25/35
- 1s - loss: 0.3091 - acc: 0.9461 - val_loss: 0.5318 - val_acc: 0.8479
Epoch 26/35
- 1s - loss: 0.3178 - acc: 0.9388 - val_loss: 0.7968 - val_acc: 0.7859
Epoch 27/35
- 1s - loss: 0.3063 - acc: 0.9409 - val_loss: 0.6380 - val_acc: 0.8464
Epoch 28/35
- 1s - loss: 0.3012 - acc: 0.9446 - val_loss: 0.4938 - val_acc: 0.8688
Epoch 29/35
- 1s - loss: 0.3136 - acc: 0.9437 - val_loss: 0.5382 - val_acc: 0.8803
Epoch 30/35
- 1s - loss: 0.3050 - acc: 0.9431 - val_loss: 0.6502 - val_acc: 0.7888
Epoch 31/35
- 1s - loss: 0.3027 - acc: 0.9467 - val_loss: 0.5022 - val_acc: 0.8767
Epoch 32/35
- 1s - loss: 0.3063 - acc: 0.9440 - val_loss: 0.5957 - val_acc: 0.8760
Epoch 33/35
- 1s - loss: 0.2955 - acc: 0.9452 - val_loss: 0.7796 - val_acc: 0.8010
Epoch 34/35
- 1s - loss: 0.2999 - acc: 0.9464 - val_loss: 0.6464 - val_acc: 0.8262
Epoch 35/35
- 1s - loss: 0.3021 - acc: 0.9406 - val_loss: 0.6297 - val_acc: 0.8443
Train accuracy 0.9360730593607306 Test accuracy: 0.8442682047584715

```

```

-----
Layer (type)                Output Shape                Param #
-----
conv1d_1 (Conv1D)           (None, 122, 28)            1792
-----
conv1d_2 (Conv1D)           (None, 120, 24)            2040
-----

```

dropout_1 (Dropout)	(None, 120, 24)	0
-----		
max_pooling1d_1 (MaxPooling1d)	(None, 24, 24)	0
-----		
flatten_1 (Flatten)	(None, 576)	0
-----		
dense_1 (Dense)	(None, 16)	9232
-----		
dense_2 (Dense)	(None, 3)	51
=====		

Total params: 13,115  
 Trainable params: 13,115  
 Non-trainable params: 0

-----

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 1s - loss: 29.3135 - acc: 0.6000 - val\_loss: 7.7892 - val\_acc: 0.7981

Epoch 2/55

- 1s - loss: 2.9721 - acc: 0.8219 - val\_loss: 1.3881 - val\_acc: 0.7051

Epoch 3/55

- 1s - loss: 0.8016 - acc: 0.8801 - val\_loss: 1.6854 - val\_acc: 0.4607

Epoch 4/55

- 1s - loss: 0.6110 - acc: 0.9026 - val\_loss: 0.6197 - val\_acc: 0.9373

Epoch 5/55

- 1s - loss: 0.4904 - acc: 0.9111 - val\_loss: 0.5982 - val\_acc: 0.9077

Epoch 6/55

- 1s - loss: 0.4253 - acc: 0.9349 - val\_loss: 0.7381 - val\_acc: 0.8313

Epoch 7/55

- 1s - loss: 0.3938 - acc: 0.9455 - val\_loss: 0.5153 - val\_acc: 0.9293

Epoch 8/55

- 1s - loss: 0.3834 - acc: 0.9364 - val\_loss: 0.5473 - val\_acc: 0.9019

Epoch 9/55

- 1s - loss: 0.3448 - acc: 0.9470 - val\_loss: 0.4388 - val\_acc: 0.9402

Epoch 10/55

- 1s - loss: 0.3055 - acc: 0.9595 - val\_loss: 0.3709 - val\_acc: 0.9560

Epoch 11/55

- 1s - loss: 0.3161 - acc: 0.9473 - val\_loss: 0.4167 - val\_acc: 0.9229

Epoch 12/55

- 1s - loss: 0.3385 - acc: 0.9501 - val\_loss: 0.5301 - val\_acc: 0.8709

Epoch 13/55

- 1s - loss: 0.2848 - acc: 0.9613 - val\_loss: 0.5217 - val\_acc: 0.8515

Epoch 14/55

- 1s - loss: 0.3723 - acc: 0.9376 - val\_loss: 0.5367 - val\_acc: 0.8637

Epoch 15/55

- 1s - loss: 0.3092 - acc: 0.9540 - val\_loss: 0.4560 - val\_acc: 0.8904

Epoch 16/55

- 1s - loss: 0.2785 - acc: 0.9613 - val\_loss: 0.3751 - val\_acc: 0.9387



Epoch 17/55  
 - 1s - loss: 0.3290 - acc: 0.9449 - val\_loss: 0.3674 - val\_acc: 0.9481  
 Epoch 18/55  
 - 1s - loss: 0.3014 - acc: 0.9559 - val\_loss: 0.3540 - val\_acc: 0.9409  
 Epoch 19/55  
 - 1s - loss: 0.3365 - acc: 0.9540 - val\_loss: 0.3279 - val\_acc: 0.9611  
 Epoch 20/55  
 - 1s - loss: 0.3122 - acc: 0.9479 - val\_loss: 0.3785 - val\_acc: 0.9402  
 Epoch 21/55  
 - 1s - loss: 0.2878 - acc: 0.9540 - val\_loss: 0.6014 - val\_acc: 0.8053  
 Epoch 22/55  
 - 1s - loss: 0.2785 - acc: 0.9644 - val\_loss: 0.3821 - val\_acc: 0.9351  
 Epoch 23/55  
 - 1s - loss: 0.2570 - acc: 0.9598 - val\_loss: 0.3598 - val\_acc: 0.9466  
 Epoch 24/55  
 - 1s - loss: 0.2497 - acc: 0.9665 - val\_loss: 0.3262 - val\_acc: 0.9531  
 Epoch 25/55  
 - 1s - loss: 0.2823 - acc: 0.9604 - val\_loss: 0.3239 - val\_acc: 0.9358  
 Epoch 26/55  
 - 1s - loss: 0.2595 - acc: 0.9607 - val\_loss: 0.3112 - val\_acc: 0.9524  
 Epoch 27/55  
 - 1s - loss: 0.2697 - acc: 0.9595 - val\_loss: 0.3774 - val\_acc: 0.9236  
 Epoch 28/55  
 - 1s - loss: 0.2986 - acc: 0.9534 - val\_loss: 0.3325 - val\_acc: 0.9416  
 Epoch 29/55  
 - 1s - loss: 0.2932 - acc: 0.9546 - val\_loss: 0.3127 - val\_acc: 0.9546  
 Epoch 30/55  
 - 1s - loss: 0.2980 - acc: 0.9525 - val\_loss: 0.3501 - val\_acc: 0.9394  
 Epoch 31/55  
 - 1s - loss: 0.2275 - acc: 0.9756 - val\_loss: 0.2849 - val\_acc: 0.9618  
 Epoch 32/55  
 - 1s - loss: 0.2773 - acc: 0.9592 - val\_loss: 0.3277 - val\_acc: 0.9351  
 Epoch 33/55  
 - 1s - loss: 0.2524 - acc: 0.9650 - val\_loss: 2.0771 - val\_acc: 0.4730  
 Epoch 34/55  
 - 1s - loss: 0.2820 - acc: 0.9562 - val\_loss: 0.3141 - val\_acc: 0.9416  
 Epoch 35/55  
 - 1s - loss: 0.2940 - acc: 0.9464 - val\_loss: 0.3777 - val\_acc: 0.9438  
 Epoch 36/55  
 - 1s - loss: 0.2274 - acc: 0.9699 - val\_loss: 0.3068 - val\_acc: 0.9466  
 Epoch 37/55  
 - 1s - loss: 0.3298 - acc: 0.9443 - val\_loss: 0.4727 - val\_acc: 0.8709  
 Epoch 38/55  
 - 1s - loss: 0.2340 - acc: 0.9717 - val\_loss: 0.3166 - val\_acc: 0.9373  
 Epoch 39/55  
 - 1s - loss: 0.2863 - acc: 0.9607 - val\_loss: 0.2817 - val\_acc: 0.9531  
 Epoch 40/55  
 - 1s - loss: 0.2498 - acc: 0.9644 - val\_loss: 0.3719 - val\_acc: 0.9128

```

Epoch 41/55
- 1s - loss: 0.2987 - acc: 0.9610 - val_loss: 0.3748 - val_acc: 0.9135
Epoch 42/55
- 1s - loss: 0.2359 - acc: 0.9680 - val_loss: 0.4147 - val_acc: 0.8767
Epoch 43/55
- 1s - loss: 0.3210 - acc: 0.9531 - val_loss: 0.2731 - val_acc: 0.9560
Epoch 44/55
- 1s - loss: 0.2329 - acc: 0.9629 - val_loss: 0.2800 - val_acc: 0.9560
Epoch 45/55
- 1s - loss: 0.2500 - acc: 0.9623 - val_loss: 0.3005 - val_acc: 0.9466
Epoch 46/55
- 1s - loss: 0.2492 - acc: 0.9653 - val_loss: 0.3526 - val_acc: 0.9193
Epoch 47/55
- 1s - loss: 0.2381 - acc: 0.9689 - val_loss: 0.3617 - val_acc: 0.9171
Epoch 48/55
- 1s - loss: 0.2948 - acc: 0.9525 - val_loss: 0.2921 - val_acc: 0.9611
Epoch 49/55
- 1s - loss: 0.2866 - acc: 0.9601 - val_loss: 0.6125 - val_acc: 0.8435
Epoch 50/55
- 1s - loss: 0.2718 - acc: 0.9662 - val_loss: 0.2698 - val_acc: 0.9546
Epoch 51/55
- 1s - loss: 0.2960 - acc: 0.9571 - val_loss: 0.4566 - val_acc: 0.8717
Epoch 52/55
- 1s - loss: 0.2208 - acc: 0.9741 - val_loss: 0.2958 - val_acc: 0.9402
Epoch 53/55
- 1s - loss: 0.3009 - acc: 0.9592 - val_loss: 0.3041 - val_acc: 0.9402
Epoch 54/55
- 1s - loss: 0.1855 - acc: 0.9799 - val_loss: 1.1516 - val_acc: 0.7008
Epoch 55/55
- 1s - loss: 0.3230 - acc: 0.9559 - val_loss: 0.2878 - val_acc: 0.9510
Train accuracy 0.9963470319634703 Test accuracy: 0.9509733237202596

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 118, 32)	4512
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 32)	0
flatten_1 (Flatten)	(None, 1888)	0
dense_1 (Dense)	(None, 32)	60448
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 66,851
Trainable params: 66,851
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
  - 2s - loss: 19.6802 - acc: 0.6271 - val_loss: 0.9131 - val_acc: 0.8125
Epoch 2/35
  - 1s - loss: 0.5932 - acc: 0.8810 - val_loss: 0.6998 - val_acc: 0.7751
Epoch 3/35
  - 1s - loss: 0.4060 - acc: 0.9342 - val_loss: 0.4753 - val_acc: 0.9077
Epoch 4/35
  - 1s - loss: 0.3425 - acc: 0.9498 - val_loss: 1.0625 - val_acc: 0.7282
Epoch 5/35
  - 1s - loss: 0.2992 - acc: 0.9571 - val_loss: 0.4183 - val_acc: 0.9214
Epoch 6/35
  - 1s - loss: 0.2885 - acc: 0.9595 - val_loss: 0.3325 - val_acc: 0.9488
Epoch 7/35
  - 1s - loss: 0.2759 - acc: 0.9601 - val_loss: 0.6696 - val_acc: 0.8219
Epoch 8/35
  - 1s - loss: 0.2730 - acc: 0.9549 - val_loss: 0.3160 - val_acc: 0.9524
Epoch 9/35
  - 1s - loss: 0.2424 - acc: 0.9677 - val_loss: 1.2398 - val_acc: 0.6792
Epoch 10/35
  - 1s - loss: 0.2518 - acc: 0.9641 - val_loss: 0.2850 - val_acc: 0.9546
Epoch 11/35
  - 1s - loss: 0.2325 - acc: 0.9677 - val_loss: 0.3865 - val_acc: 0.9092
Epoch 12/35
  - 1s - loss: 0.2177 - acc: 0.9686 - val_loss: 0.2696 - val_acc: 0.9618
Epoch 13/35
  - 1s - loss: 0.2199 - acc: 0.9677 - val_loss: 1.1256 - val_acc: 0.7441
Epoch 14/35
  - 1s - loss: 0.2590 - acc: 0.9632 - val_loss: 0.2905 - val_acc: 0.9567
Epoch 15/35
  - 1s - loss: 0.2118 - acc: 0.9735 - val_loss: 0.2592 - val_acc: 0.9452
Epoch 16/35
  - 1s - loss: 0.2300 - acc: 0.9650 - val_loss: 0.3090 - val_acc: 0.9409
Epoch 17/35
  - 1s - loss: 0.2355 - acc: 0.9671 - val_loss: 0.2885 - val_acc: 0.9409
Epoch 18/35
  - 1s - loss: 0.2115 - acc: 0.9708 - val_loss: 0.3402 - val_acc: 0.9301
Epoch 19/35
  - 1s - loss: 0.2206 - acc: 0.9662 - val_loss: 0.2514 - val_acc: 0.9603
Epoch 20/35
  - 1s - loss: 0.1985 - acc: 0.9708 - val_loss: 0.3219 - val_acc: 0.9293
Epoch 21/35

```

```

- 1s - loss: 0.2488 - acc: 0.9653 - val_loss: 0.3690 - val_acc: 0.9358
Epoch 22/35
- 1s - loss: 0.1965 - acc: 0.9735 - val_loss: 0.3755 - val_acc: 0.9128
Epoch 23/35
- 1s - loss: 0.2113 - acc: 0.9711 - val_loss: 0.2905 - val_acc: 0.9366
Epoch 24/35
- 1s - loss: 0.2444 - acc: 0.9635 - val_loss: 0.3364 - val_acc: 0.9200
Epoch 25/35
- 1s - loss: 0.2248 - acc: 0.9668 - val_loss: 0.3211 - val_acc: 0.9221
Epoch 26/35
- 1s - loss: 0.1995 - acc: 0.9720 - val_loss: 0.2774 - val_acc: 0.9373
Epoch 27/35
- 1s - loss: 0.1930 - acc: 0.9705 - val_loss: 0.3421 - val_acc: 0.9301
Epoch 28/35
- 1s - loss: 0.1980 - acc: 0.9738 - val_loss: 0.2708 - val_acc: 0.9409
Epoch 29/35
- 1s - loss: 0.1904 - acc: 0.9723 - val_loss: 0.3314 - val_acc: 0.9099
Epoch 30/35
- 1s - loss: 0.2011 - acc: 0.9708 - val_loss: 0.2918 - val_acc: 0.9416
Epoch 31/35
- 1s - loss: 0.2049 - acc: 0.9738 - val_loss: 0.2583 - val_acc: 0.9488
Epoch 32/35
- 1s - loss: 0.2028 - acc: 0.9729 - val_loss: 0.2554 - val_acc: 0.9452
Epoch 33/35
- 1s - loss: 0.1898 - acc: 0.9750 - val_loss: 0.3153 - val_acc: 0.9358
Epoch 34/35
- 1s - loss: 0.1847 - acc: 0.9750 - val_loss: 0.3360 - val_acc: 0.9394
Epoch 35/35
- 1s - loss: 0.2085 - acc: 0.9723 - val_loss: 0.2669 - val_acc: 0.9481
Train accuracy 0.9933028919330289 Test accuracy: 0.9480894015861572

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 28)	784
conv1d_2 (Conv1D)	(None, 120, 32)	6304
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 32)	0
flatten_1 (Flatten)	(None, 1920)	0
dense_1 (Dense)	(None, 32)	61472
dense_2 (Dense)	(None, 3)	99

Total params: 68,659  
Trainable params: 68,659  
Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 2s - loss: 95.4337 - acc: 0.5126 - val\_loss: 55.2795 - val\_acc: 0.6337

Epoch 2/55

- 1s - loss: 36.4584 - acc: 0.7823 - val\_loss: 22.7771 - val\_acc: 0.7794

Epoch 3/55

- 1s - loss: 16.0509 - acc: 0.9142 - val\_loss: 11.4714 - val\_acc: 0.7361

Epoch 4/55

- 1s - loss: 8.5271 - acc: 0.9135 - val\_loss: 6.5640 - val\_acc: 0.8681

Epoch 5/55

- 1s - loss: 4.9886 - acc: 0.9519 - val\_loss: 4.1052 - val\_acc: 0.8133

Epoch 6/55

- 1s - loss: 3.0604 - acc: 0.9540 - val\_loss: 2.5909 - val\_acc: 0.8839

Epoch 7/55

- 1s - loss: 1.9087 - acc: 0.9638 - val\_loss: 1.7950 - val\_acc: 0.7952

Epoch 8/55

- 1s - loss: 1.2285 - acc: 0.9632 - val\_loss: 1.2314 - val\_acc: 0.8529

Epoch 9/55

- 1s - loss: 0.8407 - acc: 0.9626 - val\_loss: 0.9079 - val\_acc: 0.9012

Epoch 10/55

- 1s - loss: 0.6388 - acc: 0.9601 - val\_loss: 0.7614 - val\_acc: 0.8854

Epoch 11/55

- 1s - loss: 0.4823 - acc: 0.9693 - val\_loss: 0.6700 - val\_acc: 0.8796

Epoch 12/55

- 1s - loss: 0.4158 - acc: 0.9662 - val\_loss: 0.6266 - val\_acc: 0.8673

Epoch 13/55

- 1s - loss: 0.3668 - acc: 0.9729 - val\_loss: 0.5746 - val\_acc: 0.9164

Epoch 14/55

- 1s - loss: 0.3466 - acc: 0.9689 - val\_loss: 0.5622 - val\_acc: 0.9084

Epoch 15/55

- 1s - loss: 0.3306 - acc: 0.9753 - val\_loss: 0.4808 - val\_acc: 0.9229

Epoch 16/55

- 1s - loss: 0.3065 - acc: 0.9723 - val\_loss: 0.4493 - val\_acc: 0.9575

Epoch 17/55

- 1s - loss: 0.3170 - acc: 0.9708 - val\_loss: 0.4463 - val\_acc: 0.9423

Epoch 18/55

- 1s - loss: 0.2880 - acc: 0.9778 - val\_loss: 0.4248 - val\_acc: 0.9430

Epoch 19/55

- 1s - loss: 0.2545 - acc: 0.9839 - val\_loss: 0.4274 - val\_acc: 0.9301

Epoch 20/55

- 1s - loss: 0.2721 - acc: 0.9763 - val\_loss: 0.3898 - val\_acc: 0.9517

Epoch 21/55

- 1s - loss: 0.2488 - acc: 0.9823 - val\_loss: 0.4761 - val\_acc: 0.8818

Epoch 22/55  
- 1s - loss: 0.2557 - acc: 0.9769 - val\_loss: 0.4775 - val\_acc: 0.8803

Epoch 23/55  
- 1s - loss: 0.2456 - acc: 0.9787 - val\_loss: 0.4484 - val\_acc: 0.9056

Epoch 24/55  
- 1s - loss: 0.2484 - acc: 0.9814 - val\_loss: 0.4017 - val\_acc: 0.9301

Epoch 25/55  
- 1s - loss: 0.2215 - acc: 0.9851 - val\_loss: 0.4198 - val\_acc: 0.9135

Epoch 26/55  
- 1s - loss: 0.2440 - acc: 0.9753 - val\_loss: 0.4460 - val\_acc: 0.8919

Epoch 27/55  
- 1s - loss: 0.2143 - acc: 0.9884 - val\_loss: 0.3737 - val\_acc: 0.9546

Epoch 28/55  
- 1s - loss: 0.2047 - acc: 0.9842 - val\_loss: 0.3686 - val\_acc: 0.9380

Epoch 29/55  
- 1s - loss: 0.2642 - acc: 0.9677 - val\_loss: 0.3501 - val\_acc: 0.9603

Epoch 30/55  
- 1s - loss: 0.2133 - acc: 0.9860 - val\_loss: 0.3633 - val\_acc: 0.9423

Epoch 31/55  
- 1s - loss: 0.2674 - acc: 0.9729 - val\_loss: 0.3325 - val\_acc: 0.9560

Epoch 32/55  
- 1s - loss: 0.2271 - acc: 0.9747 - val\_loss: 0.3805 - val\_acc: 0.9416

Epoch 33/55  
- 1s - loss: 0.1873 - acc: 0.9906 - val\_loss: 0.3400 - val\_acc: 0.9503

Epoch 34/55  
- 1s - loss: 0.1923 - acc: 0.9857 - val\_loss: 0.3601 - val\_acc: 0.9387

Epoch 35/55  
- 1s - loss: 0.1795 - acc: 0.9878 - val\_loss: 0.3172 - val\_acc: 0.9632

Epoch 36/55  
- 1s - loss: 0.1808 - acc: 0.9890 - val\_loss: 0.3080 - val\_acc: 0.9618

Epoch 37/55  
- 1s - loss: 0.1851 - acc: 0.9814 - val\_loss: 0.3457 - val\_acc: 0.9560

Epoch 38/55  
- 1s - loss: 0.1978 - acc: 0.9833 - val\_loss: 0.3197 - val\_acc: 0.9582

Epoch 39/55  
- 1s - loss: 0.1804 - acc: 0.9842 - val\_loss: 0.4270 - val\_acc: 0.8926

Epoch 40/55  
- 1s - loss: 0.1712 - acc: 0.9893 - val\_loss: 0.3222 - val\_acc: 0.9466

Epoch 41/55  
- 1s - loss: 0.1670 - acc: 0.9896 - val\_loss: 0.2998 - val\_acc: 0.9618

Epoch 42/55  
- 1s - loss: 0.1586 - acc: 0.9915 - val\_loss: 0.3370 - val\_acc: 0.9394

Epoch 43/55  
- 1s - loss: 0.1545 - acc: 0.9903 - val\_loss: 0.3191 - val\_acc: 0.9322

Epoch 44/55  
- 1s - loss: 0.1717 - acc: 0.9872 - val\_loss: 0.3326 - val\_acc: 0.9546

Epoch 45/55  
- 1s - loss: 0.1638 - acc: 0.9900 - val\_loss: 0.2884 - val\_acc: 0.9640

Epoch 46/55  
 - 1s - loss: 0.1414 - acc: 0.9970 - val\_loss: 0.3286 - val\_acc: 0.9380  
 Epoch 47/55  
 - 1s - loss: 0.1535 - acc: 0.9854 - val\_loss: 0.3711 - val\_acc: 0.9265  
 Epoch 48/55  
 - 1s - loss: 0.1531 - acc: 0.9915 - val\_loss: 0.3159 - val\_acc: 0.9344  
 Epoch 49/55  
 - 1s - loss: 0.1588 - acc: 0.9857 - val\_loss: 0.2789 - val\_acc: 0.9668  
 Epoch 50/55  
 - 1s - loss: 0.1466 - acc: 0.9924 - val\_loss: 0.2765 - val\_acc: 0.9582  
 Epoch 51/55  
 - 1s - loss: 0.1420 - acc: 0.9912 - val\_loss: 0.3139 - val\_acc: 0.9416  
 Epoch 52/55  
 - 1s - loss: 0.1470 - acc: 0.9906 - val\_loss: 0.2778 - val\_acc: 0.9596  
 Epoch 53/55  
 - 1s - loss: 0.1296 - acc: 0.9939 - val\_loss: 0.2560 - val\_acc: 0.9596  
 Epoch 54/55  
 - 1s - loss: 0.1377 - acc: 0.9909 - val\_loss: 0.2633 - val\_acc: 0.9676  
 Epoch 55/55  
 - 1s - loss: 0.1322 - acc: 0.9909 - val\_loss: 0.3027 - val\_acc: 0.9596  
 Train accuracy 0.9996955859969558 Test accuracy: 0.9596250901225667

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 118, 24)	7080
dropout_1 (Dropout)	(None, 118, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 39, 24)	0
flatten_1 (Flatten)	(None, 936)	0
dense_1 (Dense)	(None, 16)	14992
dense_2 (Dense)	(None, 3)	51

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Total params: 24,055  
 Trainable params: 24,055  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/35  
 - 2s - loss: 87.5415 - acc: 0.5409 - val\_loss: 36.6075 - val\_acc: 0.8025  
 Epoch 2/35

- 1s - loss: 18.9570 - acc: 0.8460 - val\_loss: 8.1154 - val\_acc: 0.8688  
Epoch 3/35  
- 1s - loss: 3.9785 - acc: 0.9294 - val\_loss: 1.9917 - val\_acc: 0.7866  
Epoch 4/35  
- 1s - loss: 0.9943 - acc: 0.9367 - val\_loss: 0.9098 - val\_acc: 0.8428  
Epoch 5/35  
- 1s - loss: 0.5195 - acc: 0.9315 - val\_loss: 0.7598 - val\_acc: 0.8572  
Epoch 6/35  
- 1s - loss: 0.4200 - acc: 0.9400 - val\_loss: 0.7159 - val\_acc: 0.8363  
Epoch 7/35  
- 1s - loss: 0.3844 - acc: 0.9461 - val\_loss: 0.6051 - val\_acc: 0.9106  
Epoch 8/35  
- 1s - loss: 0.3446 - acc: 0.9607 - val\_loss: 0.5975 - val\_acc: 0.8774  
Epoch 9/35  
- 1s - loss: 0.3181 - acc: 0.9686 - val\_loss: 0.5575 - val\_acc: 0.8976  
Epoch 10/35  
- 1s - loss: 0.3145 - acc: 0.9607 - val\_loss: 0.5424 - val\_acc: 0.9099  
Epoch 11/35  
- 1s - loss: 0.2863 - acc: 0.9729 - val\_loss: 0.4923 - val\_acc: 0.9394  
Epoch 12/35  
- 1s - loss: 0.2645 - acc: 0.9769 - val\_loss: 0.4939 - val\_acc: 0.9286  
Epoch 13/35  
- 1s - loss: 0.2706 - acc: 0.9753 - val\_loss: 0.4751 - val\_acc: 0.9430  
Epoch 14/35  
- 1s - loss: 0.2242 - acc: 0.9845 - val\_loss: 0.4586 - val\_acc: 0.9351  
Epoch 15/35  
- 1s - loss: 0.2674 - acc: 0.9686 - val\_loss: 0.4372 - val\_acc: 0.9416  
Epoch 16/35  
- 1s - loss: 0.2170 - acc: 0.9830 - val\_loss: 0.5706 - val\_acc: 0.8183  
Epoch 17/35  
- 1s - loss: 0.2365 - acc: 0.9766 - val\_loss: 0.4478 - val\_acc: 0.8955  
Epoch 18/35  
- 1s - loss: 0.2371 - acc: 0.9756 - val\_loss: 0.4430 - val\_acc: 0.9221  
Epoch 19/35  
- 1s - loss: 0.1968 - acc: 0.9866 - val\_loss: 0.3913 - val\_acc: 0.9503  
Epoch 20/35  
- 1s - loss: 0.2556 - acc: 0.9693 - val\_loss: 0.3845 - val\_acc: 0.9575  
Epoch 21/35  
- 1s - loss: 0.1875 - acc: 0.9866 - val\_loss: 0.3915 - val\_acc: 0.9394  
Epoch 22/35  
- 1s - loss: 0.1742 - acc: 0.9893 - val\_loss: 0.3786 - val\_acc: 0.9560  
Epoch 23/35  
- 1s - loss: 0.1728 - acc: 0.9884 - val\_loss: 0.3756 - val\_acc: 0.9308  
Epoch 24/35  
- 1s - loss: 0.1859 - acc: 0.9787 - val\_loss: 0.3833 - val\_acc: 0.9156  
Epoch 25/35  
- 1s - loss: 0.1790 - acc: 0.9836 - val\_loss: 0.3460 - val\_acc: 0.9539  
Epoch 26/35



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- 1s - loss: 0.2200 - acc: 0.9689 - val_loss: 0.4282 - val_acc: 0.8947
Epoch 27/35
- 1s - loss: 0.2361 - acc: 0.9641 - val_loss: 0.4356 - val_acc: 0.9250
Epoch 28/35
- 1s - loss: 0.1993 - acc: 0.9823 - val_loss: 0.3629 - val_acc: 0.9495
Epoch 29/35
- 1s - loss: 0.1626 - acc: 0.9881 - val_loss: 0.3385 - val_acc: 0.9495
Epoch 30/35
- 1s - loss: 0.1517 - acc: 0.9887 - val_loss: 0.3407 - val_acc: 0.9524
Epoch 31/35
- 1s - loss: 0.1469 - acc: 0.9915 - val_loss: 0.3395 - val_acc: 0.9466
Epoch 32/35
- 1s - loss: 0.2824 - acc: 0.9546 - val_loss: 0.3741 - val_acc: 0.9582
Epoch 33/35
- 1s - loss: 0.1700 - acc: 0.9893 - val_loss: 0.3984 - val_acc: 0.8825
Epoch 34/35
- 1s - loss: 0.1573 - acc: 0.9872 - val_loss: 0.4015 - val_acc: 0.9077
Epoch 35/35
- 1s - loss: 0.1664 - acc: 0.9826 - val_loss: 0.2986 - val_acc: 0.9625
Train accuracy 0.9914764079147641 Test accuracy: 0.9625090122566691

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_2 (Conv1D)	(None, 118, 24)	5400
-----		
dropout_1 (Dropout)	(None, 118, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 39, 24)	0
-----		
flatten_1 (Flatten)	(None, 936)	0
-----		
dense_1 (Dense)	(None, 16)	14992
-----		
dense_2 (Dense)	(None, 3)	51
=====		

```

Total params: 21,915
Trainable params: 21,915
Non-trainable params: 0

```

```

-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
- 2s - loss: 85.1565 - acc: 0.4460 - val_loss: 49.3456 - val_acc: 0.5141
Epoch 2/40
- 1s - loss: 32.3933 - acc: 0.6180 - val_loss: 19.6011 - val_acc: 0.5429

```

Epoch 3/40  
- 1s - loss: 12.9653 - acc: 0.7577 - val\_loss: 7.9837 - val\_acc: 0.8125  
Epoch 4/40  
- 1s - loss: 5.1502 - acc: 0.9157 - val\_loss: 3.2855 - val\_acc: 0.9272  
Epoch 5/40  
- 1s - loss: 2.0406 - acc: 0.9626 - val\_loss: 1.5167 - val\_acc: 0.9135  
Epoch 6/40  
- 1s - loss: 0.9360 - acc: 0.9650 - val\_loss: 0.8992 - val\_acc: 0.9293  
Epoch 7/40  
- 1s - loss: 0.5685 - acc: 0.9598 - val\_loss: 0.6918 - val\_acc: 0.9034  
Epoch 8/40  
- 1s - loss: 0.4304 - acc: 0.9699 - val\_loss: 0.6078 - val\_acc: 0.9135  
Epoch 9/40  
- 1s - loss: 0.3659 - acc: 0.9784 - val\_loss: 0.5444 - val\_acc: 0.9510  
Epoch 10/40  
- 1s - loss: 0.3370 - acc: 0.9760 - val\_loss: 0.5407 - val\_acc: 0.9070  
Epoch 11/40  
- 1s - loss: 0.3190 - acc: 0.9732 - val\_loss: 0.5221 - val\_acc: 0.9257  
Epoch 12/40  
- 1s - loss: 0.3090 - acc: 0.9753 - val\_loss: 0.4770 - val\_acc: 0.9553  
Epoch 13/40  
- 1s - loss: 0.2736 - acc: 0.9845 - val\_loss: 0.5106 - val\_acc: 0.8875  
Epoch 14/40  
- 1s - loss: 0.2749 - acc: 0.9763 - val\_loss: 0.4519 - val\_acc: 0.9279  
Epoch 15/40  
- 1s - loss: 0.2535 - acc: 0.9857 - val\_loss: 0.4465 - val\_acc: 0.9178  
Epoch 16/40  
- 1s - loss: 0.2491 - acc: 0.9826 - val\_loss: 0.4006 - val\_acc: 0.9596  
Epoch 17/40  
- 1s - loss: 0.2992 - acc: 0.9616 - val\_loss: 0.3988 - val\_acc: 0.9567  
Epoch 18/40  
- 1s - loss: 0.2349 - acc: 0.9842 - val\_loss: 0.3993 - val\_acc: 0.9430  
Epoch 19/40  
- 1s - loss: 0.2160 - acc: 0.9884 - val\_loss: 0.3914 - val\_acc: 0.9409  
Epoch 20/40  
- 1s - loss: 0.2274 - acc: 0.9817 - val\_loss: 0.3453 - val\_acc: 0.9632  
Epoch 21/40  
- 1s - loss: 0.2069 - acc: 0.9893 - val\_loss: 0.4010 - val\_acc: 0.9459  
Epoch 22/40  
- 1s - loss: 0.2150 - acc: 0.9830 - val\_loss: 0.4046 - val\_acc: 0.9351  
Epoch 23/40  
- 1s - loss: 0.3346 - acc: 0.9425 - val\_loss: 0.7621 - val\_acc: 0.7678  
Epoch 24/40  
- 1s - loss: 0.2809 - acc: 0.9784 - val\_loss: 0.4118 - val\_acc: 0.9315  
Epoch 25/40  
- 1s - loss: 0.1915 - acc: 0.9921 - val\_loss: 0.3870 - val\_acc: 0.9373  
Epoch 26/40  
- 1s - loss: 0.1751 - acc: 0.9942 - val\_loss: 0.3772 - val\_acc: 0.9402

```

Epoch 27/40
- 1s - loss: 0.1755 - acc: 0.9942 - val_loss: 0.3491 - val_acc: 0.9589
Epoch 28/40
- 1s - loss: 0.1799 - acc: 0.9900 - val_loss: 0.3251 - val_acc: 0.9647
Epoch 29/40
- 1s - loss: 0.1843 - acc: 0.9884 - val_loss: 0.3398 - val_acc: 0.9466
Epoch 30/40
- 1s - loss: 0.1886 - acc: 0.9817 - val_loss: 0.3237 - val_acc: 0.9618
Epoch 31/40
- 1s - loss: 0.1584 - acc: 0.9918 - val_loss: 0.3268 - val_acc: 0.9416
Epoch 32/40
- 1s - loss: 0.1680 - acc: 0.9896 - val_loss: 0.3537 - val_acc: 0.9394
Epoch 33/40
- 1s - loss: 0.1955 - acc: 0.9784 - val_loss: 0.3502 - val_acc: 0.9279
Epoch 34/40
- 1s - loss: 0.1818 - acc: 0.9854 - val_loss: 0.3326 - val_acc: 0.9589
Epoch 35/40
- 1s - loss: 0.1500 - acc: 0.9945 - val_loss: 0.2975 - val_acc: 0.9740
Epoch 36/40
- 1s - loss: 0.1430 - acc: 0.9942 - val_loss: 0.3193 - val_acc: 0.9510
Epoch 37/40
- 1s - loss: 0.1734 - acc: 0.9836 - val_loss: 0.5081 - val_acc: 0.8385
Epoch 38/40
- 1s - loss: 0.3715 - acc: 0.9519 - val_loss: 0.3502 - val_acc: 0.9438
Epoch 39/40
- 1s - loss: 0.1664 - acc: 0.9939 - val_loss: 0.3342 - val_acc: 0.9438
Epoch 40/40
- 1s - loss: 0.1381 - acc: 0.9954 - val_loss: 0.3313 - val_acc: 0.9416
Train accuracy 0.9929984779299847 Test accuracy: 0.9416005767844268

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_2 (Conv1D)	(None, 122, 24)	2328
-----		
dropout_1 (Dropout)	(None, 122, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
-----		
flatten_1 (Flatten)	(None, 1464)	0
-----		
dense_1 (Dense)	(None, 16)	23440
-----		
dense_2 (Dense)	(None, 3)	51
=====		

Total params: 27,291

Trainable params: 27,291

Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 55.9596 - acc: 0.3674 - val\_loss: 14.4817 - val\_acc: 0.3576

Epoch 2/40

- 1s - loss: 5.9546 - acc: 0.3732 - val\_loss: 1.9221 - val\_acc: 0.4045

Epoch 3/40

- 1s - loss: 1.2886 - acc: 0.5504 - val\_loss: 1.0939 - val\_acc: 0.6013

Epoch 4/40

- 1s - loss: 0.9819 - acc: 0.6000 - val\_loss: 1.0079 - val\_acc: 0.6215

Epoch 5/40

- 1s - loss: 0.8812 - acc: 0.6347 - val\_loss: 0.9780 - val\_acc: 0.6157

Epoch 6/40

- 1s - loss: 0.8315 - acc: 0.6594 - val\_loss: 0.8693 - val\_acc: 0.6568

Epoch 7/40

- 1s - loss: 0.7689 - acc: 0.7848 - val\_loss: 0.7859 - val\_acc: 0.8681

Epoch 8/40

- 1s - loss: 0.6622 - acc: 0.8883 - val\_loss: 0.7829 - val\_acc: 0.8731

Epoch 9/40

- 1s - loss: 0.5112 - acc: 0.9172 - val\_loss: 0.5939 - val\_acc: 0.8926

Epoch 10/40

- 1s - loss: 0.4262 - acc: 0.9349 - val\_loss: 0.5416 - val\_acc: 0.9041

Epoch 11/40

- 1s - loss: 0.3531 - acc: 0.9507 - val\_loss: 0.5927 - val\_acc: 0.8356

Epoch 12/40

- 1s - loss: 0.3161 - acc: 0.9613 - val\_loss: 0.5052 - val\_acc: 0.8753

Epoch 13/40

- 1s - loss: 0.3013 - acc: 0.9537 - val\_loss: 0.4510 - val\_acc: 0.9329

Epoch 14/40

- 1s - loss: 0.2861 - acc: 0.9601 - val\_loss: 0.4758 - val\_acc: 0.8854

Epoch 15/40

- 1s - loss: 0.3090 - acc: 0.9510 - val\_loss: 0.4494 - val\_acc: 0.8933

Epoch 16/40

- 1s - loss: 0.2911 - acc: 0.9574 - val\_loss: 0.4040 - val\_acc: 0.9149

Epoch 17/40

- 1s - loss: 0.2925 - acc: 0.9549 - val\_loss: 0.4272 - val\_acc: 0.9286

Epoch 18/40

- 1s - loss: 0.2419 - acc: 0.9741 - val\_loss: 0.4279 - val\_acc: 0.9077

Epoch 19/40

- 1s - loss: 0.2173 - acc: 0.9760 - val\_loss: 0.4216 - val\_acc: 0.8904

Epoch 20/40

- 1s - loss: 0.2392 - acc: 0.9680 - val\_loss: 0.3915 - val\_acc: 0.9135

Epoch 21/40

- 1s - loss: 0.2317 - acc: 0.9763 - val\_loss: 0.4039 - val\_acc: 0.9185

Epoch 22/40

```

- 1s - loss: 0.2384 - acc: 0.9632 - val_loss: 0.5001 - val_acc: 0.8681
Epoch 23/40
- 1s - loss: 0.2692 - acc: 0.9589 - val_loss: 0.3776 - val_acc: 0.9250
Epoch 24/40
- 1s - loss: 0.2136 - acc: 0.9750 - val_loss: 0.4421 - val_acc: 0.8767
Epoch 25/40
- 1s - loss: 0.2154 - acc: 0.9680 - val_loss: 0.5168 - val_acc: 0.8767
Epoch 26/40
- 1s - loss: 0.2163 - acc: 0.9732 - val_loss: 0.4347 - val_acc: 0.9005
Epoch 27/40
- 1s - loss: 0.2277 - acc: 0.9635 - val_loss: 0.3555 - val_acc: 0.9344
Epoch 28/40
- 1s - loss: 0.2051 - acc: 0.9744 - val_loss: 0.4175 - val_acc: 0.8947
Epoch 29/40
- 1s - loss: 0.2417 - acc: 0.9656 - val_loss: 0.3813 - val_acc: 0.9070
Epoch 30/40
- 1s - loss: 0.1868 - acc: 0.9790 - val_loss: 0.3227 - val_acc: 0.9394
Epoch 31/40
- 1s - loss: 0.2549 - acc: 0.9601 - val_loss: 0.4935 - val_acc: 0.8803
Epoch 32/40
- 1s - loss: 0.2185 - acc: 0.9686 - val_loss: 0.3868 - val_acc: 0.9113
Epoch 33/40
- 1s - loss: 0.2033 - acc: 0.9772 - val_loss: 0.3807 - val_acc: 0.9005
Epoch 34/40
- 1s - loss: 0.1946 - acc: 0.9766 - val_loss: 0.5521 - val_acc: 0.8536
Epoch 35/40
- 1s - loss: 0.2080 - acc: 0.9656 - val_loss: 0.4317 - val_acc: 0.9056
Epoch 36/40
- 1s - loss: 0.2102 - acc: 0.9753 - val_loss: 0.4125 - val_acc: 0.8962
Epoch 37/40
- 1s - loss: 0.2366 - acc: 0.9592 - val_loss: 0.4850 - val_acc: 0.9005
Epoch 38/40
- 1s - loss: 0.2289 - acc: 0.9756 - val_loss: 0.3950 - val_acc: 0.9243
Epoch 39/40
- 1s - loss: 0.2300 - acc: 0.9683 - val_loss: 0.4255 - val_acc: 0.8983
Epoch 40/40
- 1s - loss: 0.1990 - acc: 0.9747 - val_loss: 0.3737 - val_acc: 0.9185
Train accuracy 0.9899543378995433 Test accuracy: 0.9185291997116077

```

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
<hr/>		
conv1d_2 (Conv1D)	(None, 118, 24)	5400
<hr/>		
dropout_1 (Dropout)	(None, 118, 24)	0
<hr/>		

```

max_pooling1d_1 (MaxPooling1 (None, 59, 24)          0
-----
flatten_1 (Flatten)          (None, 1416)          0
-----
dense_1 (Dense)              (None, 64)          90688
-----
dense_2 (Dense)              (None, 3)           195
=====
Total params: 97,755
Trainable params: 97,755
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
  - 2s - loss: 6.6326 - acc: 0.6776 - val_loss: 1.0498 - val_acc: 0.8320
Epoch 2/40
  - 2s - loss: 0.6944 - acc: 0.8928 - val_loss: 0.7633 - val_acc: 0.7693
Epoch 3/40
  - 2s - loss: 0.4890 - acc: 0.9139 - val_loss: 0.4900 - val_acc: 0.9459
Epoch 4/40
  - 2s - loss: 0.3483 - acc: 0.9470 - val_loss: 0.4432 - val_acc: 0.8904
Epoch 5/40
  - 2s - loss: 0.3421 - acc: 0.9467 - val_loss: 0.3884 - val_acc: 0.9265
Epoch 6/40
  - 2s - loss: 0.3027 - acc: 0.9495 - val_loss: 0.3657 - val_acc: 0.9380
Epoch 7/40
  - 2s - loss: 0.2648 - acc: 0.9626 - val_loss: 0.3525 - val_acc: 0.9351
Epoch 8/40
  - 2s - loss: 0.2563 - acc: 0.9586 - val_loss: 0.5729 - val_acc: 0.9128
Epoch 9/40
  - 2s - loss: 0.2537 - acc: 0.9574 - val_loss: 0.6147 - val_acc: 0.8702
Epoch 10/40
  - 2s - loss: 0.2265 - acc: 0.9702 - val_loss: 0.3758 - val_acc: 0.9250
Epoch 11/40
  - 2s - loss: 0.2303 - acc: 0.9677 - val_loss: 0.4734 - val_acc: 0.9142
Epoch 12/40
  - 2s - loss: 0.2143 - acc: 0.9699 - val_loss: 0.3164 - val_acc: 0.9430
Epoch 13/40
  - 2s - loss: 0.2131 - acc: 0.9665 - val_loss: 0.3232 - val_acc: 0.9193
Epoch 14/40
  - 2s - loss: 0.1970 - acc: 0.9735 - val_loss: 0.2773 - val_acc: 0.9459
Epoch 15/40
  - 2s - loss: 0.2062 - acc: 0.9714 - val_loss: 0.3049 - val_acc: 0.9265
Epoch 16/40
  - 2s - loss: 0.1949 - acc: 0.9729 - val_loss: 0.2761 - val_acc: 0.9351
Epoch 17/40
  - 2s - loss: 0.2233 - acc: 0.9699 - val_loss: 0.2988 - val_acc: 0.9243

```

```

Epoch 18/40
- 2s - loss: 0.1943 - acc: 0.9714 - val_loss: 0.3911 - val_acc: 0.9012
Epoch 19/40
- 2s - loss: 0.2372 - acc: 0.9723 - val_loss: 0.3490 - val_acc: 0.9200
Epoch 20/40
- 2s - loss: 0.1851 - acc: 0.9699 - val_loss: 0.3073 - val_acc: 0.9185
Epoch 21/40
- 2s - loss: 0.1914 - acc: 0.9760 - val_loss: 0.6075 - val_acc: 0.8407
Epoch 22/40
- 2s - loss: 0.1950 - acc: 0.9747 - val_loss: 0.2876 - val_acc: 0.9272
Epoch 23/40
- 2s - loss: 0.1920 - acc: 0.9787 - val_loss: 0.3236 - val_acc: 0.9445
Epoch 24/40
- 2s - loss: 0.1734 - acc: 0.9775 - val_loss: 0.3048 - val_acc: 0.9301
Epoch 25/40
- 2s - loss: 0.2054 - acc: 0.9741 - val_loss: 0.3498 - val_acc: 0.9250
Epoch 26/40
- 2s - loss: 0.2171 - acc: 0.9723 - val_loss: 0.2809 - val_acc: 0.9380
Epoch 27/40
- 2s - loss: 0.1726 - acc: 0.9805 - val_loss: 0.8492 - val_acc: 0.8082
Epoch 28/40
- 2s - loss: 0.2375 - acc: 0.9705 - val_loss: 0.3286 - val_acc: 0.9250
Epoch 29/40
- 2s - loss: 0.2058 - acc: 0.9775 - val_loss: 0.3316 - val_acc: 0.9293
Epoch 30/40
- 2s - loss: 0.1890 - acc: 0.9714 - val_loss: 0.3223 - val_acc: 0.9387
Epoch 31/40
- 2s - loss: 0.1837 - acc: 0.9796 - val_loss: 0.5722 - val_acc: 0.8616
Epoch 32/40
- 2s - loss: 0.1798 - acc: 0.9729 - val_loss: 0.3130 - val_acc: 0.9337
Epoch 33/40
- 2s - loss: 0.1671 - acc: 0.9763 - val_loss: 0.4361 - val_acc: 0.8926
Epoch 34/40
- 2s - loss: 0.1656 - acc: 0.9784 - val_loss: 0.3187 - val_acc: 0.9142
Epoch 35/40
- 2s - loss: 0.1664 - acc: 0.9741 - val_loss: 0.3011 - val_acc: 0.9423
Epoch 36/40
- 2s - loss: 0.1923 - acc: 0.9753 - val_loss: 0.4052 - val_acc: 0.8998
Epoch 37/40
- 2s - loss: 0.1590 - acc: 0.9808 - val_loss: 0.6466 - val_acc: 0.8428
Epoch 38/40
- 2s - loss: 0.1683 - acc: 0.9769 - val_loss: 0.4506 - val_acc: 0.9063
Epoch 39/40
- 2s - loss: 0.1813 - acc: 0.9772 - val_loss: 0.4706 - val_acc: 0.8695
Epoch 40/40
- 2s - loss: 0.1570 - acc: 0.9848 - val_loss: 0.3215 - val_acc: 0.9394
Train accuracy 0.997869101978691 Test accuracy: 0.93943763518385
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 24)	3048
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 16)	15376
dense_2 (Dense)	(None, 3)	51

Total params: 20,407

Trainable params: 20,407

Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 57.8075 - acc: 0.4581 - val\_loss: 30.3956 - val\_acc: 0.5552

Epoch 2/40

- 1s - loss: 18.3318 - acc: 0.7005 - val\_loss: 9.9586 - val\_acc: 0.5739

Epoch 3/40

- 1s - loss: 6.1367 - acc: 0.8143 - val\_loss: 3.7412 - val\_acc: 0.8089

Epoch 4/40

- 1s - loss: 2.3430 - acc: 0.9087 - val\_loss: 1.7612 - val\_acc: 0.8565

Epoch 5/40

- 1s - loss: 1.0621 - acc: 0.9452 - val\_loss: 1.0515 - val\_acc: 0.8782

Epoch 6/40

- 1s - loss: 0.6138 - acc: 0.9592 - val\_loss: 0.8012 - val\_acc: 0.8810

Epoch 7/40

- 1s - loss: 0.4603 - acc: 0.9598 - val\_loss: 0.6833 - val\_acc: 0.8926

Epoch 8/40

- 1s - loss: 0.3824 - acc: 0.9717 - val\_loss: 0.6263 - val\_acc: 0.8976

Epoch 9/40

- 1s - loss: 0.3546 - acc: 0.9693 - val\_loss: 0.5784 - val\_acc: 0.9265

Epoch 10/40

- 1s - loss: 0.3527 - acc: 0.9653 - val\_loss: 0.5689 - val\_acc: 0.8810

Epoch 11/40

- 1s - loss: 0.3277 - acc: 0.9668 - val\_loss: 0.5336 - val\_acc: 0.9272

Epoch 12/40

- 1s - loss: 0.2918 - acc: 0.9842 - val\_loss: 0.4984 - val\_acc: 0.9503

Epoch 13/40



- 1s - loss: 0.2754 - acc: 0.9823 - val\_loss: 0.5545 - val\_acc: 0.8565  
 Epoch 14/40  
 - 1s - loss: 0.2777 - acc: 0.9799 - val\_loss: 0.4690 - val\_acc: 0.9517  
 Epoch 15/40  
 - 1s - loss: 0.2788 - acc: 0.9744 - val\_loss: 0.4825 - val\_acc: 0.9099  
 Epoch 16/40  
 - 1s - loss: 0.2492 - acc: 0.9817 - val\_loss: 0.4511 - val\_acc: 0.9373  
 Epoch 17/40  
 - 1s - loss: 0.2644 - acc: 0.9793 - val\_loss: 0.4430 - val\_acc: 0.9423  
 Epoch 18/40  
 - 1s - loss: 0.2250 - acc: 0.9872 - val\_loss: 0.4816 - val\_acc: 0.8998  
 Epoch 19/40  
 - 1s - loss: 0.2360 - acc: 0.9808 - val\_loss: 0.4396 - val\_acc: 0.9221  
 Epoch 20/40  
 - 1s - loss: 0.2453 - acc: 0.9787 - val\_loss: 0.4382 - val\_acc: 0.9373  
 Epoch 21/40  
 - 1s - loss: 0.2095 - acc: 0.9878 - val\_loss: 0.3967 - val\_acc: 0.9567  
 Epoch 22/40  
 - 1s - loss: 0.2052 - acc: 0.9884 - val\_loss: 0.4457 - val\_acc: 0.8998  
 Epoch 23/40  
 - 1s - loss: 0.2117 - acc: 0.9848 - val\_loss: 0.3861 - val\_acc: 0.9575  
 Epoch 24/40  
 - 1s - loss: 0.2288 - acc: 0.9744 - val\_loss: 0.5430 - val\_acc: 0.8443  
 Epoch 25/40  
 - 1s - loss: 0.2485 - acc: 0.9738 - val\_loss: 0.3781 - val\_acc: 0.9553  
 Epoch 26/40  
 - 1s - loss: 0.1955 - acc: 0.9881 - val\_loss: 0.3674 - val\_acc: 0.9539  
 Epoch 27/40  
 - 1s - loss: 0.1849 - acc: 0.9903 - val\_loss: 0.3476 - val\_acc: 0.9553  
 Epoch 28/40  
 - 1s - loss: 0.1755 - acc: 0.9896 - val\_loss: 0.3498 - val\_acc: 0.9632  
 Epoch 29/40  
 - 1s - loss: 0.2445 - acc: 0.9702 - val\_loss: 0.3641 - val\_acc: 0.9452  
 Epoch 30/40  
 - 1s - loss: 0.1792 - acc: 0.9903 - val\_loss: 0.3500 - val\_acc: 0.9632  
 Epoch 31/40  
 - 1s - loss: 0.1877 - acc: 0.9893 - val\_loss: 0.3345 - val\_acc: 0.9668  
 Epoch 32/40  
 - 1s - loss: 0.1910 - acc: 0.9826 - val\_loss: 0.3348 - val\_acc: 0.9546  
 Epoch 33/40  
 - 1s - loss: 0.1661 - acc: 0.9912 - val\_loss: 0.3549 - val\_acc: 0.9344  
 Epoch 34/40  
 - 1s - loss: 0.1668 - acc: 0.9906 - val\_loss: 0.3733 - val\_acc: 0.9322  
 Epoch 35/40  
 - 1s - loss: 0.1607 - acc: 0.9921 - val\_loss: 0.3266 - val\_acc: 0.9625  
 Epoch 36/40  
 - 1s - loss: 0.1613 - acc: 0.9906 - val\_loss: 0.3389 - val\_acc: 0.9438  
 Epoch 37/40

```

- 1s - loss: 0.1645 - acc: 0.9872 - val_loss: 0.3712 - val_acc: 0.9113
Epoch 38/40
- 1s - loss: 0.2702 - acc: 0.9662 - val_loss: 0.3522 - val_acc: 0.9344
Epoch 39/40
- 1s - loss: 0.1600 - acc: 0.9887 - val_loss: 0.3527 - val_acc: 0.9481
Epoch 40/40
- 1s - loss: 0.1416 - acc: 0.9963 - val_loss: 0.3086 - val_acc: 0.9647
Train accuracy 1.0 Test accuracy: 0.9646719538572458
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 24)	2328
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 24)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 65,499
Trainable params: 65,499
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
- 2s - loss: 43.9603 - acc: 0.5702 - val_loss: 17.8761 - val_acc: 0.7541
Epoch 2/40
- 1s - loss: 8.9323 - acc: 0.8785 - val_loss: 3.8264 - val_acc: 0.7736
Epoch 3/40
- 1s - loss: 1.9260 - acc: 0.9306 - val_loss: 1.3479 - val_acc: 0.7707
Epoch 4/40
- 1s - loss: 0.6863 - acc: 0.9431 - val_loss: 0.7324 - val_acc: 0.9012
Epoch 5/40
- 1s - loss: 0.4043 - acc: 0.9613 - val_loss: 0.5895 - val_acc: 0.9250
Epoch 6/40
- 1s - loss: 0.3250 - acc: 0.9699 - val_loss: 0.5050 - val_acc: 0.9351
Epoch 7/40
- 1s - loss: 0.2935 - acc: 0.9699 - val_loss: 0.4889 - val_acc: 0.9185
Epoch 8/40
- 1s - loss: 0.2735 - acc: 0.9735 - val_loss: 0.4389 - val_acc: 0.9466

```

Epoch 9/40  
- 1s - loss: 0.2945 - acc: 0.9644 - val\_loss: 0.4953 - val\_acc: 0.9056  
Epoch 10/40  
- 1s - loss: 0.2696 - acc: 0.9699 - val\_loss: 0.4491 - val\_acc: 0.8962  
Epoch 11/40  
- 1s - loss: 0.2565 - acc: 0.9680 - val\_loss: 0.4417 - val\_acc: 0.9142  
Epoch 12/40  
- 1s - loss: 0.2215 - acc: 0.9848 - val\_loss: 0.3811 - val\_acc: 0.9618  
Epoch 13/40  
- 1s - loss: 0.2016 - acc: 0.9866 - val\_loss: 0.3529 - val\_acc: 0.9676  
Epoch 14/40  
- 1s - loss: 0.1997 - acc: 0.9845 - val\_loss: 0.3590 - val\_acc: 0.9603  
Epoch 15/40  
- 1s - loss: 0.1805 - acc: 0.9881 - val\_loss: 0.4034 - val\_acc: 0.9041  
Epoch 16/40  
- 1s - loss: 0.1792 - acc: 0.9887 - val\_loss: 0.3141 - val\_acc: 0.9712  
Epoch 17/40  
- 1s - loss: 0.1857 - acc: 0.9851 - val\_loss: 0.3371 - val\_acc: 0.9452  
Epoch 18/40  
- 1s - loss: 0.1903 - acc: 0.9811 - val\_loss: 0.3066 - val\_acc: 0.9683  
Epoch 19/40  
- 1s - loss: 0.1561 - acc: 0.9939 - val\_loss: 0.3127 - val\_acc: 0.9683  
Epoch 20/40  
- 1s - loss: 0.1535 - acc: 0.9896 - val\_loss: 0.2905 - val\_acc: 0.9640  
Epoch 21/40  
- 1s - loss: 0.1698 - acc: 0.9906 - val\_loss: 0.3075 - val\_acc: 0.9611  
Epoch 22/40  
- 1s - loss: 0.1772 - acc: 0.9808 - val\_loss: 0.3226 - val\_acc: 0.9618  
Epoch 23/40  
- 1s - loss: 0.1990 - acc: 0.9802 - val\_loss: 0.3202 - val\_acc: 0.9438  
Epoch 24/40  
- 1s - loss: 0.1733 - acc: 0.9839 - val\_loss: 0.3075 - val\_acc: 0.9603  
Epoch 25/40  
- 1s - loss: 0.1404 - acc: 0.9915 - val\_loss: 0.3008 - val\_acc: 0.9503  
Epoch 26/40  
- 1s - loss: 0.1343 - acc: 0.9942 - val\_loss: 0.3551 - val\_acc: 0.9106  
Epoch 27/40  
- 1s - loss: 0.1232 - acc: 0.9945 - val\_loss: 0.3003 - val\_acc: 0.9510  
Epoch 28/40  
- 1s - loss: 0.1297 - acc: 0.9915 - val\_loss: 0.2888 - val\_acc: 0.9640  
Epoch 29/40  
- 1s - loss: 0.1871 - acc: 0.9781 - val\_loss: 0.2573 - val\_acc: 0.9719  
Epoch 30/40  
- 1s - loss: 0.1867 - acc: 0.9717 - val\_loss: 0.3745 - val\_acc: 0.9084  
Epoch 31/40  
- 1s - loss: 0.1644 - acc: 0.9881 - val\_loss: 0.2575 - val\_acc: 0.9647  
Epoch 32/40  
- 1s - loss: 0.1216 - acc: 0.9954 - val\_loss: 0.3056 - val\_acc: 0.9466

Epoch 33/40  
 - 1s - loss: 0.1175 - acc: 0.9945 - val\_loss: 0.3707 - val\_acc: 0.8810  
 Epoch 34/40  
 - 1s - loss: 0.1803 - acc: 0.9750 - val\_loss: 0.4388 - val\_acc: 0.8796  
 Epoch 35/40  
 - 1s - loss: 0.1624 - acc: 0.9839 - val\_loss: 0.2533 - val\_acc: 0.9719  
 Epoch 36/40  
 - 1s - loss: 0.1083 - acc: 0.9960 - val\_loss: 0.2537 - val\_acc: 0.9676  
 Epoch 37/40  
 - 1s - loss: 0.1061 - acc: 0.9960 - val\_loss: 0.2308 - val\_acc: 0.9726  
 Epoch 38/40  
 - 1s - loss: 0.1058 - acc: 0.9957 - val\_loss: 0.2835 - val\_acc: 0.9488  
 Epoch 39/40  
 - 1s - loss: 0.1046 - acc: 0.9930 - val\_loss: 0.2833 - val\_acc: 0.9344  
 Epoch 40/40  
 - 1s - loss: 0.1469 - acc: 0.9826 - val\_loss: 0.4784 - val\_acc: 0.8580  
 Train accuracy 0.9449010654490106 Test accuracy: 0.8579668348954578

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 24)	3048
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 16)	23440
dense_2 (Dense)	(None, 3)	51

Total params: 28,471  
 Trainable params: 28,471  
 Non-trainable params: 0

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/40  
 - 1s - loss: 62.0416 - acc: 0.5473 - val\_loss: 42.8468 - val\_acc: 0.6359  
 Epoch 2/40  
 - 1s - loss: 30.8149 - acc: 0.7869 - val\_loss: 20.7443 - val\_acc: 0.7030  
 Epoch 3/40  
 - 1s - loss: 14.1636 - acc: 0.8791 - val\_loss: 9.6504 - val\_acc: 0.5335  
 Epoch 4/40

- 1s - loss: 6.2533 - acc: 0.8974 - val\_loss: 4.1405 - val\_acc: 0.8782  
 Epoch 5/40  
 - 1s - loss: 2.7522 - acc: 0.9032 - val\_loss: 1.9396 - val\_acc: 0.8940  
 Epoch 6/40  
 - 1s - loss: 1.2634 - acc: 0.9139 - val\_loss: 1.0698 - val\_acc: 0.8515  
 Epoch 7/40  
 - 1s - loss: 0.6999 - acc: 0.9221 - val\_loss: 0.8565 - val\_acc: 0.7844  
 Epoch 8/40  
 - 1s - loss: 0.5127 - acc: 0.9315 - val\_loss: 0.6892 - val\_acc: 0.8392  
 Epoch 9/40  
 - 1s - loss: 0.4466 - acc: 0.9379 - val\_loss: 0.7635 - val\_acc: 0.8234  
 Epoch 10/40  
 - 1s - loss: 0.4066 - acc: 0.9400 - val\_loss: 0.6013 - val\_acc: 0.8472  
 Epoch 11/40  
 - 1s - loss: 0.3764 - acc: 0.9437 - val\_loss: 0.5284 - val\_acc: 0.9063  
 Epoch 12/40  
 - 1s - loss: 0.3566 - acc: 0.9473 - val\_loss: 0.4842 - val\_acc: 0.9380  
 Epoch 13/40  
 - 1s - loss: 0.3372 - acc: 0.9519 - val\_loss: 0.8628 - val\_acc: 0.6597  
 Epoch 14/40  
 - 1s - loss: 0.3128 - acc: 0.9613 - val\_loss: 0.4750 - val\_acc: 0.8969  
 Epoch 15/40  
 - 1s - loss: 0.3185 - acc: 0.9513 - val\_loss: 0.4837 - val\_acc: 0.8745  
 Epoch 16/40  
 - 1s - loss: 0.2949 - acc: 0.9598 - val\_loss: 0.4367 - val\_acc: 0.9019  
 Epoch 17/40  
 - 1s - loss: 0.2884 - acc: 0.9629 - val\_loss: 0.4677 - val\_acc: 0.9185  
 Epoch 18/40  
 - 1s - loss: 0.2739 - acc: 0.9689 - val\_loss: 0.4236 - val\_acc: 0.9171  
 Epoch 19/40  
 - 1s - loss: 0.2761 - acc: 0.9632 - val\_loss: 0.4144 - val\_acc: 0.9250  
 Epoch 20/40  
 - 1s - loss: 0.2543 - acc: 0.9699 - val\_loss: 0.3885 - val\_acc: 0.9193  
 Epoch 21/40  
 - 1s - loss: 0.2567 - acc: 0.9656 - val\_loss: 0.4905 - val\_acc: 0.8515  
 Epoch 22/40  
 - 1s - loss: 0.2369 - acc: 0.9744 - val\_loss: 0.4731 - val\_acc: 0.8645  
 Epoch 23/40  
 - 1s - loss: 0.2318 - acc: 0.9726 - val\_loss: 0.4238 - val\_acc: 0.8955  
 Epoch 24/40  
 - 1s - loss: 0.2266 - acc: 0.9717 - val\_loss: 0.3659 - val\_acc: 0.9373  
 Epoch 25/40  
 - 1s - loss: 0.2281 - acc: 0.9702 - val\_loss: 0.3389 - val\_acc: 0.9517  
 Epoch 26/40  
 - 1s - loss: 0.2133 - acc: 0.9756 - val\_loss: 0.9000 - val\_acc: 0.7030  
 Epoch 27/40  
 - 1s - loss: 0.2133 - acc: 0.9732 - val\_loss: 0.7304 - val\_acc: 0.8097  
 Epoch 28/40

```

- 1s - loss: 0.2125 - acc: 0.9729 - val_loss: 0.3762 - val_acc: 0.9466
Epoch 29/40
- 1s - loss: 0.2051 - acc: 0.9766 - val_loss: 0.3298 - val_acc: 0.9596
Epoch 30/40
- 1s - loss: 0.2039 - acc: 0.9747 - val_loss: 0.3510 - val_acc: 0.9539
Epoch 31/40
- 1s - loss: 0.1924 - acc: 0.9784 - val_loss: 0.3083 - val_acc: 0.9517
Epoch 32/40
- 1s - loss: 0.2045 - acc: 0.9717 - val_loss: 0.7867 - val_acc: 0.7851
Epoch 33/40
- 1s - loss: 0.2124 - acc: 0.9668 - val_loss: 0.3087 - val_acc: 0.9466
Epoch 34/40
- 1s - loss: 0.1794 - acc: 0.9830 - val_loss: 0.2954 - val_acc: 0.9589
Epoch 35/40
- 1s - loss: 0.2013 - acc: 0.9702 - val_loss: 0.3438 - val_acc: 0.9185
Epoch 36/40
- 1s - loss: 0.1936 - acc: 0.9744 - val_loss: 0.3056 - val_acc: 0.9683
Epoch 37/40
- 1s - loss: 0.1862 - acc: 0.9744 - val_loss: 0.3313 - val_acc: 0.9272
Epoch 38/40
- 1s - loss: 0.1953 - acc: 0.9717 - val_loss: 0.3143 - val_acc: 0.9640
Epoch 39/40
- 1s - loss: 0.1799 - acc: 0.9790 - val_loss: 0.3067 - val_acc: 0.9438
Epoch 40/40
- 1s - loss: 0.1625 - acc: 0.9830 - val_loss: 0.3031 - val_acc: 0.9683
Train accuracy 0.9954337899543378 Test accuracy: 0.9682768565248738

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 124, 32)          1472
-----
conv1d_2 (Conv1D)            (None, 122, 24)          2328
-----
dropout_1 (Dropout)          (None, 122, 24)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 61, 24)          0
-----
flatten_1 (Flatten)          (None, 1464)              0
-----
dense_1 (Dense)              (None, 16)                23440
-----
dense_2 (Dense)              (None, 3)                  51
=====
Total params: 27,291
Trainable params: 27,291
Non-trainable params: 0
-----

```

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 100.2142 - acc: 0.3985 - val\_loss: 72.1857 - val\_acc: 0.5133

Epoch 2/40

- 1s - loss: 53.5881 - acc: 0.6371 - val\_loss: 37.0141 - val\_acc: 0.6330

Epoch 3/40

- 1s - loss: 25.9923 - acc: 0.7750 - val\_loss: 17.0753 - val\_acc: 0.4463

Epoch 4/40

- 1s - loss: 11.1382 - acc: 0.8231 - val\_loss: 6.8775 - val\_acc: 0.6720

Epoch 5/40

- 1s - loss: 4.2413 - acc: 0.8350 - val\_loss: 2.5696 - val\_acc: 0.7563

Epoch 6/40

- 1s - loss: 1.5146 - acc: 0.8588 - val\_loss: 1.1587 - val\_acc: 0.7851

Epoch 7/40

- 1s - loss: 0.7388 - acc: 0.8834 - val\_loss: 0.8759 - val\_acc: 0.7657

Epoch 8/40

- 1s - loss: 0.5890 - acc: 0.8965 - val\_loss: 0.7878 - val\_acc: 0.8169

Epoch 9/40

- 1s - loss: 0.5423 - acc: 0.9008 - val\_loss: 0.6869 - val\_acc: 0.8724

Epoch 10/40

- 1s - loss: 0.5015 - acc: 0.9139 - val\_loss: 0.8108 - val\_acc: 0.7231

Epoch 11/40

- 1s - loss: 0.4863 - acc: 0.9023 - val\_loss: 0.7972 - val\_acc: 0.7462

Epoch 12/40

- 1s - loss: 0.4608 - acc: 0.9196 - val\_loss: 0.5820 - val\_acc: 0.8998

Epoch 13/40

- 1s - loss: 0.4331 - acc: 0.9218 - val\_loss: 0.9686 - val\_acc: 0.6251

Epoch 14/40

- 1s - loss: 0.4180 - acc: 0.9233 - val\_loss: 0.7345 - val\_acc: 0.7534

Epoch 15/40

- 1s - loss: 0.4128 - acc: 0.9275 - val\_loss: 0.6106 - val\_acc: 0.8335

Epoch 16/40

- 1s - loss: 0.3901 - acc: 0.9300 - val\_loss: 0.6130 - val\_acc: 0.8306

Epoch 17/40

- 1s - loss: 0.3723 - acc: 0.9367 - val\_loss: 0.6063 - val\_acc: 0.8645

Epoch 18/40

- 1s - loss: 0.3710 - acc: 0.9324 - val\_loss: 0.8155 - val\_acc: 0.7159

Epoch 19/40

- 1s - loss: 0.3644 - acc: 0.9367 - val\_loss: 0.5030 - val\_acc: 0.9106

Epoch 20/40

- 1s - loss: 0.3282 - acc: 0.9504 - val\_loss: 0.6710 - val\_acc: 0.7960

Epoch 21/40

- 1s - loss: 0.3288 - acc: 0.9428 - val\_loss: 0.7998 - val\_acc: 0.6864

Epoch 22/40

- 1s - loss: 0.3149 - acc: 0.9495 - val\_loss: 0.7698 - val\_acc: 0.7361

Epoch 23/40

- 1s - loss: 0.3098 - acc: 0.9531 - val\_loss: 0.4478 - val\_acc: 0.9207

```

Epoch 24/40
- 1s - loss: 0.2983 - acc: 0.9553 - val_loss: 0.4443 - val_acc: 0.9164
Epoch 25/40
- 1s - loss: 0.2971 - acc: 0.9559 - val_loss: 0.4930 - val_acc: 0.8702
Epoch 26/40
- 1s - loss: 0.2878 - acc: 0.9556 - val_loss: 0.4956 - val_acc: 0.8882
Epoch 27/40
- 1s - loss: 0.2709 - acc: 0.9650 - val_loss: 0.6329 - val_acc: 0.8616
Epoch 28/40
- 1s - loss: 0.2920 - acc: 0.9504 - val_loss: 0.5043 - val_acc: 0.9034
Epoch 29/40
- 1s - loss: 0.2780 - acc: 0.9568 - val_loss: 0.4207 - val_acc: 0.9279
Epoch 30/40
- 1s - loss: 0.2793 - acc: 0.9525 - val_loss: 0.4326 - val_acc: 0.9257
Epoch 31/40
- 1s - loss: 0.2459 - acc: 0.9680 - val_loss: 0.4114 - val_acc: 0.9084
Epoch 32/40
- 1s - loss: 0.2686 - acc: 0.9595 - val_loss: 0.4717 - val_acc: 0.8955
Epoch 33/40
- 1s - loss: 0.2549 - acc: 0.9680 - val_loss: 0.7609 - val_acc: 0.7174
Epoch 34/40
- 1s - loss: 0.2527 - acc: 0.9604 - val_loss: 0.3776 - val_acc: 0.9286
Epoch 35/40
- 1s - loss: 0.2672 - acc: 0.9586 - val_loss: 0.4608 - val_acc: 0.9048
Epoch 36/40
- 1s - loss: 0.2444 - acc: 0.9641 - val_loss: 0.4535 - val_acc: 0.9106
Epoch 37/40
- 1s - loss: 0.2393 - acc: 0.9644 - val_loss: 0.4711 - val_acc: 0.9048
Epoch 38/40
- 1s - loss: 0.2512 - acc: 0.9629 - val_loss: 0.4923 - val_acc: 0.9084
Epoch 39/40
- 1s - loss: 0.2401 - acc: 0.9665 - val_loss: 0.4260 - val_acc: 0.9005
Epoch 40/40
- 1s - loss: 0.2326 - acc: 0.9635 - val_loss: 0.3904 - val_acc: 0.9279
Train accuracy 0.9914764079147641 Test accuracy: 0.9279019466474405

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 24)	2328
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0

---



```

-----
dense_1 (Dense)                (None, 64)                93760
-----
dense_2 (Dense)                (None, 3)                 195
=====
Total params: 97,755
Trainable params: 97,755
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
  - 2s - loss: 78.7403 - acc: 0.5266 - val_loss: 53.4401 - val_acc: 0.5595
Epoch 2/40
  - 1s - loss: 37.7553 - acc: 0.7574 - val_loss: 24.6322 - val_acc: 0.5703
Epoch 3/40
  - 1s - loss: 16.1910 - acc: 0.8298 - val_loss: 9.8387 - val_acc: 0.6518
Epoch 4/40
  - 1s - loss: 5.8844 - acc: 0.8688 - val_loss: 3.3221 - val_acc: 0.7671
Epoch 5/40
  - 1s - loss: 1.8497 - acc: 0.8828 - val_loss: 1.1520 - val_acc: 0.8356
Epoch 6/40
  - 1s - loss: 0.7387 - acc: 0.8907 - val_loss: 0.7810 - val_acc: 0.8515
Epoch 7/40
  - 1s - loss: 0.5296 - acc: 0.9078 - val_loss: 0.6851 - val_acc: 0.8298
Epoch 8/40
  - 1s - loss: 0.4524 - acc: 0.9227 - val_loss: 0.5487 - val_acc: 0.9012
Epoch 9/40
  - 1s - loss: 0.4015 - acc: 0.9318 - val_loss: 0.5317 - val_acc: 0.9063
Epoch 10/40
  - 1s - loss: 0.3588 - acc: 0.9455 - val_loss: 0.6625 - val_acc: 0.8111
Epoch 11/40
  - 1s - loss: 0.3513 - acc: 0.9422 - val_loss: 0.5353 - val_acc: 0.8731
Epoch 12/40
  - 1s - loss: 0.3240 - acc: 0.9476 - val_loss: 0.4208 - val_acc: 0.9423
Epoch 13/40
  - 1s - loss: 0.3059 - acc: 0.9519 - val_loss: 0.9699 - val_acc: 0.6734
Epoch 14/40
  - 1s - loss: 0.2818 - acc: 0.9592 - val_loss: 0.3844 - val_acc: 0.9279
Epoch 15/40
  - 1s - loss: 0.2890 - acc: 0.9492 - val_loss: 0.4856 - val_acc: 0.8782
Epoch 16/40
  - 1s - loss: 0.2640 - acc: 0.9589 - val_loss: 0.3873 - val_acc: 0.9019
Epoch 17/40
  - 1s - loss: 0.2550 - acc: 0.9589 - val_loss: 0.4247 - val_acc: 0.9128
Epoch 18/40
  - 1s - loss: 0.2609 - acc: 0.9583 - val_loss: 0.4597 - val_acc: 0.8774
Epoch 19/40

```

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- 1s - loss: 0.2450 - acc: 0.9598 - val_loss: 0.3492 - val_acc: 0.9517
Epoch 20/40
- 1s - loss: 0.2336 - acc: 0.9662 - val_loss: 0.2985 - val_acc: 0.9503
Epoch 21/40
- 1s - loss: 0.2391 - acc: 0.9647 - val_loss: 0.3626 - val_acc: 0.9250
Epoch 22/40
- 1s - loss: 0.2308 - acc: 0.9683 - val_loss: 0.3894 - val_acc: 0.9063
Epoch 23/40
- 1s - loss: 0.2199 - acc: 0.9705 - val_loss: 0.2990 - val_acc: 0.9539
Epoch 24/40
- 1s - loss: 0.2120 - acc: 0.9729 - val_loss: 0.2984 - val_acc: 0.9466
Epoch 25/40
- 1s - loss: 0.2324 - acc: 0.9610 - val_loss: 0.2758 - val_acc: 0.9611
Epoch 26/40
- 1s - loss: 0.2391 - acc: 0.9607 - val_loss: 0.3088 - val_acc: 0.9553
Epoch 27/40
- 1s - loss: 0.2028 - acc: 0.9729 - val_loss: 0.2921 - val_acc: 0.9640
Epoch 28/40
- 1s - loss: 0.1901 - acc: 0.9799 - val_loss: 0.2532 - val_acc: 0.9640
Epoch 29/40
- 1s - loss: 0.2394 - acc: 0.9623 - val_loss: 0.3216 - val_acc: 0.9402
Epoch 30/40
- 1s - loss: 0.1929 - acc: 0.9720 - val_loss: 0.3294 - val_acc: 0.9171
Epoch 31/40
- 1s - loss: 0.2254 - acc: 0.9647 - val_loss: 0.2655 - val_acc: 0.9647
Epoch 32/40
- 1s - loss: 0.1892 - acc: 0.9747 - val_loss: 0.2959 - val_acc: 0.9524
Epoch 33/40
- 1s - loss: 0.2175 - acc: 0.9650 - val_loss: 0.7249 - val_acc: 0.7505
Epoch 34/40
- 1s - loss: 0.1785 - acc: 0.9781 - val_loss: 0.3165 - val_acc: 0.9229
Epoch 35/40
- 1s - loss: 0.2052 - acc: 0.9686 - val_loss: 0.2530 - val_acc: 0.9466
Epoch 36/40
- 1s - loss: 0.2449 - acc: 0.9632 - val_loss: 0.2673 - val_acc: 0.9611
Epoch 37/40
- 1s - loss: 0.1509 - acc: 0.9851 - val_loss: 1.1246 - val_acc: 0.7231
Epoch 38/40
- 1s - loss: 0.2035 - acc: 0.9689 - val_loss: 0.2580 - val_acc: 0.9553
Epoch 39/40
- 1s - loss: 0.1959 - acc: 0.9705 - val_loss: 0.2407 - val_acc: 0.9640
Epoch 40/40
- 1s - loss: 0.2122 - acc: 0.9729 - val_loss: 0.2622 - val_acc: 0.9647
Train accuracy 0.9972602739726028 Test accuracy: 0.9646719538572458

```

```

-----
Layer (type)                Output Shape                Param #
=====

```

conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 24)	3048
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

Total params: 98,935  
 Trainable params: 98,935  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 41.7386 - acc: 0.6174 - val\_loss: 31.5608 - val\_acc: 0.7376

Epoch 2/40

- 1s - loss: 24.6770 - acc: 0.8575 - val\_loss: 18.9945 - val\_acc: 0.6828

Epoch 3/40

- 1s - loss: 14.3140 - acc: 0.9160 - val\_loss: 11.3941 - val\_acc: 0.5068

Epoch 4/40

- 1s - loss: 8.0415 - acc: 0.9300 - val\_loss: 5.8800 - val\_acc: 0.9553

Epoch 5/40

- 1s - loss: 4.2703 - acc: 0.9467 - val\_loss: 3.3998 - val\_acc: 0.7556

Epoch 6/40

- 1s - loss: 2.1918 - acc: 0.9546 - val\_loss: 1.6663 - val\_acc: 0.9409

Epoch 7/40

- 1s - loss: 1.1443 - acc: 0.9519 - val\_loss: 1.0074 - val\_acc: 0.9142

Epoch 8/40

- 1s - loss: 0.6416 - acc: 0.9659 - val\_loss: 0.6936 - val\_acc: 0.9128

Epoch 9/40

- 1s - loss: 0.4455 - acc: 0.9656 - val\_loss: 0.7062 - val\_acc: 0.8673

Epoch 10/40

- 1s - loss: 0.3538 - acc: 0.9726 - val\_loss: 0.4646 - val\_acc: 0.9373

Epoch 11/40

- 1s - loss: 0.2994 - acc: 0.9717 - val\_loss: 0.4204 - val\_acc: 0.9394

Epoch 12/40

- 1s - loss: 0.2599 - acc: 0.9763 - val\_loss: 0.3822 - val\_acc: 0.9611

Epoch 13/40

- 1s - loss: 0.2432 - acc: 0.9747 - val\_loss: 0.7292 - val\_acc: 0.7311

Epoch 14/40

- 1s - loss: 0.2204 - acc: 0.9763 - val\_loss: 0.3405 - val\_acc: 0.9430

Epoch 15/40  
- 1s - loss: 0.2107 - acc: 0.9793 - val\_loss: 0.3614 - val\_acc: 0.9286

Epoch 16/40  
- 1s - loss: 0.1987 - acc: 0.9775 - val\_loss: 0.3231 - val\_acc: 0.9466

Epoch 17/40  
- 1s - loss: 0.1876 - acc: 0.9820 - val\_loss: 0.3232 - val\_acc: 0.9495

Epoch 18/40  
- 1s - loss: 0.1714 - acc: 0.9830 - val\_loss: 0.3223 - val\_acc: 0.9445

Epoch 19/40  
- 1s - loss: 0.1588 - acc: 0.9863 - val\_loss: 0.2948 - val\_acc: 0.9488

Epoch 20/40  
- 1s - loss: 0.1626 - acc: 0.9793 - val\_loss: 0.2598 - val\_acc: 0.9647

Epoch 21/40  
- 1s - loss: 0.1527 - acc: 0.9842 - val\_loss: 0.3461 - val\_acc: 0.9113

Epoch 22/40  
- 1s - loss: 0.1344 - acc: 0.9884 - val\_loss: 0.3476 - val\_acc: 0.8955

Epoch 23/40  
- 1s - loss: 0.1392 - acc: 0.9845 - val\_loss: 0.2527 - val\_acc: 0.9668

Epoch 24/40  
- 1s - loss: 0.1335 - acc: 0.9830 - val\_loss: 0.2599 - val\_acc: 0.9567

Epoch 25/40  
- 1s - loss: 0.1257 - acc: 0.9890 - val\_loss: 0.2547 - val\_acc: 0.9618

Epoch 26/40  
- 1s - loss: 0.1362 - acc: 0.9814 - val\_loss: 0.2604 - val\_acc: 0.9531

Epoch 27/40  
- 1s - loss: 0.1205 - acc: 0.9875 - val\_loss: 0.5791 - val\_acc: 0.8609

Epoch 28/40  
- 1s - loss: 0.1330 - acc: 0.9830 - val\_loss: 0.3271 - val\_acc: 0.9416

Epoch 29/40  
- 1s - loss: 0.1089 - acc: 0.9903 - val\_loss: 0.2977 - val\_acc: 0.9185

Epoch 30/40  
- 1s - loss: 0.1217 - acc: 0.9839 - val\_loss: 0.2639 - val\_acc: 0.9380

Epoch 31/40  
- 1s - loss: 0.1143 - acc: 0.9866 - val\_loss: 0.2275 - val\_acc: 0.9603

Epoch 32/40  
- 1s - loss: 0.1159 - acc: 0.9866 - val\_loss: 0.2652 - val\_acc: 0.9560

Epoch 33/40  
- 1s - loss: 0.1310 - acc: 0.9802 - val\_loss: 0.2249 - val\_acc: 0.9661

Epoch 34/40  
- 1s - loss: 0.0968 - acc: 0.9896 - val\_loss: 0.2394 - val\_acc: 0.9524

Epoch 35/40  
- 1s - loss: 0.1178 - acc: 0.9826 - val\_loss: 0.2234 - val\_acc: 0.9575

Epoch 36/40  
- 1s - loss: 0.1055 - acc: 0.9884 - val\_loss: 0.2971 - val\_acc: 0.9265

Epoch 37/40  
- 1s - loss: 0.1099 - acc: 0.9836 - val\_loss: 0.2702 - val\_acc: 0.9402

Epoch 38/40  
- 1s - loss: 0.0973 - acc: 0.9896 - val\_loss: 0.2393 - val\_acc: 0.9618

Epoch 39/40

- 1s - loss: 0.1083 - acc: 0.9845 - val\_loss: 0.2615 - val\_acc: 0.9452

Epoch 40/40

- 1s - loss: 0.1134 - acc: 0.9826 - val\_loss: 0.2624 - val\_acc: 0.9459

Train accuracy 0.9993911719939117 Test accuracy: 0.9459264599855803

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_2 (Conv1D)	(None, 122, 24)	2328
-----		
dropout_1 (Dropout)	(None, 122, 24)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
-----		
flatten_1 (Flatten)	(None, 1464)	0
-----		
dense_1 (Dense)	(None, 16)	23440
-----		
dense_2 (Dense)	(None, 3)	51
=====		

Total params: 27,291

Trainable params: 27,291

Non-trainable params: 0

---

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 33.4108 - acc: 0.4170 - val\_loss: 13.3672 - val\_acc: 0.5032

Epoch 2/40

- 1s - loss: 6.0350 - acc: 0.7339 - val\_loss: 2.2628 - val\_acc: 0.5681

Epoch 3/40

- 1s - loss: 1.2194 - acc: 0.8405 - val\_loss: 1.9999 - val\_acc: 0.3655

Epoch 4/40

- 1s - loss: 0.7596 - acc: 0.8928 - val\_loss: 1.3635 - val\_acc: 0.6799

Epoch 5/40

- 1s - loss: 0.5828 - acc: 0.9212 - val\_loss: 0.6467 - val\_acc: 0.8767

Epoch 6/40

- 1s - loss: 0.5134 - acc: 0.9263 - val\_loss: 0.7113 - val\_acc: 0.8450

Epoch 7/40

- 1s - loss: 0.4366 - acc: 0.9412 - val\_loss: 0.4868 - val\_acc: 0.9329

Epoch 8/40

- 1s - loss: 0.4225 - acc: 0.9437 - val\_loss: 0.4775 - val\_acc: 0.9128

Epoch 9/40

- 1s - loss: 0.3760 - acc: 0.9412 - val\_loss: 0.5319 - val\_acc: 0.8897

Epoch 10/40

- 1s - loss: 0.3149 - acc: 0.9610 - val\_loss: 0.4175 - val\_acc: 0.9149  
 Epoch 11/40  
 - 1s - loss: 0.3192 - acc: 0.9528 - val\_loss: 0.3876 - val\_acc: 0.9243  
 Epoch 12/40  
 - 1s - loss: 0.3123 - acc: 0.9537 - val\_loss: 0.3665 - val\_acc: 0.9229  
 Epoch 13/40  
 - 1s - loss: 0.2741 - acc: 0.9644 - val\_loss: 1.4452 - val\_acc: 0.6503  
 Epoch 14/40  
 - 1s - loss: 0.2866 - acc: 0.9610 - val\_loss: 0.3844 - val\_acc: 0.9012  
 Epoch 15/40  
 - 1s - loss: 0.2638 - acc: 0.9583 - val\_loss: 0.3570 - val\_acc: 0.9236  
 Epoch 16/40  
 - 1s - loss: 0.2384 - acc: 0.9680 - val\_loss: 0.3070 - val\_acc: 0.9308  
 Epoch 17/40  
 - 1s - loss: 0.2528 - acc: 0.9632 - val\_loss: 0.2993 - val\_acc: 0.9423  
 Epoch 18/40  
 - 1s - loss: 0.2145 - acc: 0.9674 - val\_loss: 0.2936 - val\_acc: 0.9474  
 Epoch 19/40  
 - 1s - loss: 0.2111 - acc: 0.9699 - val\_loss: 0.3002 - val\_acc: 0.9402  
 Epoch 20/40  
 - 1s - loss: 0.2049 - acc: 0.9656 - val\_loss: 0.2870 - val\_acc: 0.9358  
 Epoch 21/40  
 - 1s - loss: 0.1922 - acc: 0.9756 - val\_loss: 0.2907 - val\_acc: 0.9329  
 Epoch 22/40  
 - 1s - loss: 0.1823 - acc: 0.9769 - val\_loss: 0.3019 - val\_acc: 0.9272  
 Epoch 23/40  
 - 1s - loss: 0.1799 - acc: 0.9756 - val\_loss: 0.2767 - val\_acc: 0.9344  
 Epoch 24/40  
 - 1s - loss: 0.1587 - acc: 0.9802 - val\_loss: 0.2483 - val\_acc: 0.9445  
 Epoch 25/40  
 - 1s - loss: 0.1747 - acc: 0.9756 - val\_loss: 0.2631 - val\_acc: 0.9438  
 Epoch 26/40  
 - 1s - loss: 0.1536 - acc: 0.9805 - val\_loss: 0.2614 - val\_acc: 0.9308  
 Epoch 27/40  
 - 1s - loss: 0.1655 - acc: 0.9756 - val\_loss: 0.3405 - val\_acc: 0.9171  
 Epoch 28/40  
 - 1s - loss: 0.1603 - acc: 0.9781 - val\_loss: 0.3508 - val\_acc: 0.9063  
 Epoch 29/40  
 - 1s - loss: 0.1545 - acc: 0.9760 - val\_loss: 0.2540 - val\_acc: 0.9416  
 Epoch 30/40  
 - 1s - loss: 0.1577 - acc: 0.9750 - val\_loss: 0.2669 - val\_acc: 0.9286  
 Epoch 31/40  
 - 1s - loss: 0.1524 - acc: 0.9778 - val\_loss: 0.2746 - val\_acc: 0.9394  
 Epoch 32/40  
 - 1s - loss: 0.1322 - acc: 0.9854 - val\_loss: 1.1133 - val\_acc: 0.7426  
 Epoch 33/40  
 - 1s - loss: 0.1462 - acc: 0.9823 - val\_loss: 0.2514 - val\_acc: 0.9315  
 Epoch 34/40

```

- 1s - loss: 0.1501 - acc: 0.9775 - val_loss: 0.2364 - val_acc: 0.9402
Epoch 35/40
- 1s - loss: 0.1596 - acc: 0.9769 - val_loss: 0.2295 - val_acc: 0.9394
Epoch 36/40
- 1s - loss: 0.1145 - acc: 0.9878 - val_loss: 0.2130 - val_acc: 0.9488
Epoch 37/40
- 1s - loss: 0.1625 - acc: 0.9723 - val_loss: 0.2533 - val_acc: 0.9171
Epoch 38/40
- 1s - loss: 0.1412 - acc: 0.9790 - val_loss: 0.2142 - val_acc: 0.9409
Epoch 39/40
- 1s - loss: 0.1767 - acc: 0.9726 - val_loss: 0.2288 - val_acc: 0.9409
Epoch 40/40
- 1s - loss: 0.1233 - acc: 0.9830 - val_loss: 0.2539 - val_acc: 0.9409
Train accuracy 0.9984779299847792 Test accuracy: 0.9408795962509012
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 24)	3048
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 98,935
Trainable params: 98,935
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
- 2s - loss: 106.9503 - acc: 0.5893 - val_loss: 80.3954 - val_acc: 0.7066
Epoch 2/40
- 1s - loss: 62.3671 - acc: 0.8247 - val_loss: 46.2742 - val_acc: 0.6604
Epoch 3/40
- 1s - loss: 34.6308 - acc: 0.8798 - val_loss: 24.9618 - val_acc: 0.6929
Epoch 4/40
- 1s - loss: 17.9532 - acc: 0.9044 - val_loss: 12.3662 - val_acc: 0.8443
Epoch 5/40
- 1s - loss: 8.5478 - acc: 0.9081 - val_loss: 5.6170 - val_acc: 0.8962

```

Epoch 6/40  
- 1s - loss: 3.6214 - acc: 0.9175 - val\_loss: 2.3321 - val\_acc: 0.8839  
Epoch 7/40  
- 1s - loss: 1.3837 - acc: 0.9245 - val\_loss: 1.1140 - val\_acc: 0.7902  
Epoch 8/40  
- 1s - loss: 0.6339 - acc: 0.9327 - val\_loss: 0.7311 - val\_acc: 0.8270  
Epoch 9/40  
- 1s - loss: 0.4678 - acc: 0.9297 - val\_loss: 0.7587 - val\_acc: 0.8291  
Epoch 10/40  
- 1s - loss: 0.4094 - acc: 0.9388 - val\_loss: 0.5997 - val\_acc: 0.8544  
Epoch 11/40  
- 1s - loss: 0.3745 - acc: 0.9376 - val\_loss: 0.5785 - val\_acc: 0.8558  
Epoch 12/40  
- 1s - loss: 0.3593 - acc: 0.9412 - val\_loss: 0.4892 - val\_acc: 0.9279  
Epoch 13/40  
- 1s - loss: 0.3312 - acc: 0.9486 - val\_loss: 0.7624 - val\_acc: 0.7311  
Epoch 14/40  
- 1s - loss: 0.3108 - acc: 0.9553 - val\_loss: 0.5138 - val\_acc: 0.8652  
Epoch 15/40  
- 1s - loss: 0.3084 - acc: 0.9519 - val\_loss: 0.5050 - val\_acc: 0.8731  
Epoch 16/40  
- 1s - loss: 0.2927 - acc: 0.9577 - val\_loss: 0.4250 - val\_acc: 0.9156  
Epoch 17/40  
- 1s - loss: 0.2830 - acc: 0.9589 - val\_loss: 0.4878 - val\_acc: 0.8947  
Epoch 18/40  
- 1s - loss: 0.2690 - acc: 0.9619 - val\_loss: 0.5722 - val\_acc: 0.8277  
Epoch 19/40  
- 1s - loss: 0.2564 - acc: 0.9644 - val\_loss: 0.4091 - val\_acc: 0.9322  
Epoch 20/40  
- 1s - loss: 0.2473 - acc: 0.9665 - val\_loss: 0.4115 - val\_acc: 0.9048  
Epoch 21/40  
- 1s - loss: 0.2431 - acc: 0.9665 - val\_loss: 0.5464 - val\_acc: 0.8053  
Epoch 22/40  
- 1s - loss: 0.2302 - acc: 0.9674 - val\_loss: 0.7014 - val\_acc: 0.7859  
Epoch 23/40  
- 1s - loss: 0.2221 - acc: 0.9717 - val\_loss: 0.4387 - val\_acc: 0.9128  
Epoch 24/40  
- 1s - loss: 0.2087 - acc: 0.9763 - val\_loss: 0.3580 - val\_acc: 0.9430  
Epoch 25/40  
- 1s - loss: 0.2307 - acc: 0.9656 - val\_loss: 0.3269 - val\_acc: 0.9495  
Epoch 26/40  
- 1s - loss: 0.2207 - acc: 0.9668 - val\_loss: 0.3476 - val\_acc: 0.9466  
Epoch 27/40  
- 1s - loss: 0.2100 - acc: 0.9693 - val\_loss: 0.3814 - val\_acc: 0.9351  
Epoch 28/40  
- 1s - loss: 0.2018 - acc: 0.9753 - val\_loss: 0.4059 - val\_acc: 0.9301  
Epoch 29/40  
- 1s - loss: 0.2017 - acc: 0.9747 - val\_loss: 0.4008 - val\_acc: 0.9106



Epoch 30/40  
 - 1s - loss: 0.2035 - acc: 0.9680 - val\_loss: 0.3961 - val\_acc: 0.9221  
 Epoch 31/40  
 - 1s - loss: 0.1959 - acc: 0.9717 - val\_loss: 0.3022 - val\_acc: 0.9517  
 Epoch 32/40  
 - 1s - loss: 0.1783 - acc: 0.9811 - val\_loss: 0.3222 - val\_acc: 0.9524  
 Epoch 33/40  
 - 1s - loss: 0.1994 - acc: 0.9674 - val\_loss: 0.2963 - val\_acc: 0.9510  
 Epoch 34/40  
 - 1s - loss: 0.1718 - acc: 0.9802 - val\_loss: 0.2851 - val\_acc: 0.9632  
 Epoch 35/40  
 - 1s - loss: 0.1879 - acc: 0.9708 - val\_loss: 0.2732 - val\_acc: 0.9596  
 Epoch 36/40  
 - 1s - loss: 0.1761 - acc: 0.9772 - val\_loss: 0.2938 - val\_acc: 0.9481  
 Epoch 37/40  
 - 1s - loss: 0.1770 - acc: 0.9763 - val\_loss: 0.4876 - val\_acc: 0.8717  
 Epoch 38/40  
 - 1s - loss: 0.1855 - acc: 0.9726 - val\_loss: 0.3014 - val\_acc: 0.9546  
 Epoch 39/40  
 - 1s - loss: 0.1573 - acc: 0.9830 - val\_loss: 0.2785 - val\_acc: 0.9488  
 Epoch 40/40  
 - 1s - loss: 0.1598 - acc: 0.9814 - val\_loss: 0.3084 - val\_acc: 0.9459  
 Train accuracy 0.9969558599695586 Test accuracy: 0.9459264599855803

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 64)	61504
dense_2 (Dense)	(None, 3)	195

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Total params: 65,299  
 Trainable params: 65,299  
 Non-trainable params: 0

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None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/40

- 2s - loss: 30.0979 - acc: 0.6000 - val\_loss: 14.2811 - val\_acc: 0.5350  
Epoch 2/40  
- 1s - loss: 7.4249 - acc: 0.8088 - val\_loss: 3.1186 - val\_acc: 0.8075  
Epoch 3/40  
- 1s - loss: 1.5964 - acc: 0.8788 - val\_loss: 0.9289 - val\_acc: 0.8882  
Epoch 4/40  
- 1s - loss: 0.6370 - acc: 0.9117 - val\_loss: 0.6152 - val\_acc: 0.9048  
Epoch 5/40  
- 1s - loss: 0.4560 - acc: 0.9312 - val\_loss: 0.7100 - val\_acc: 0.7758  
Epoch 6/40  
- 1s - loss: 0.3922 - acc: 0.9364 - val\_loss: 0.4500 - val\_acc: 0.9257  
Epoch 7/40  
- 1s - loss: 0.3310 - acc: 0.9507 - val\_loss: 0.4030 - val\_acc: 0.9366  
Epoch 8/40  
- 1s - loss: 0.2861 - acc: 0.9571 - val\_loss: 0.6610 - val\_acc: 0.8133  
Epoch 9/40  
- 1s - loss: 0.2614 - acc: 0.9635 - val\_loss: 0.3370 - val\_acc: 0.9387  
Epoch 10/40  
- 1s - loss: 0.2455 - acc: 0.9650 - val\_loss: 0.5695 - val\_acc: 0.8472  
Epoch 11/40  
- 1s - loss: 0.2774 - acc: 0.9553 - val\_loss: 0.3305 - val\_acc: 0.9517  
Epoch 12/40  
- 1s - loss: 0.2438 - acc: 0.9668 - val\_loss: 0.3020 - val\_acc: 0.9625  
Epoch 13/40  
- 1s - loss: 0.2460 - acc: 0.9613 - val\_loss: 0.8487 - val\_acc: 0.7224  
Epoch 14/40  
- 1s - loss: 0.2154 - acc: 0.9674 - val\_loss: 0.3148 - val\_acc: 0.9452  
Epoch 15/40  
- 1s - loss: 0.2283 - acc: 0.9626 - val\_loss: 0.2899 - val\_acc: 0.9373  
Epoch 16/40  
- 1s - loss: 0.2106 - acc: 0.9680 - val\_loss: 0.2599 - val\_acc: 0.9546  
Epoch 17/40  
- 1s - loss: 0.2395 - acc: 0.9638 - val\_loss: 0.2456 - val\_acc: 0.9690  
Epoch 18/40  
- 1s - loss: 0.1704 - acc: 0.9778 - val\_loss: 0.3783 - val\_acc: 0.9156  
Epoch 19/40  
- 1s - loss: 0.2020 - acc: 0.9689 - val\_loss: 0.2757 - val\_acc: 0.9531  
Epoch 20/40  
- 1s - loss: 0.1610 - acc: 0.9772 - val\_loss: 0.2634 - val\_acc: 0.9416  
Epoch 21/40  
- 1s - loss: 0.2251 - acc: 0.9668 - val\_loss: 0.6010 - val\_acc: 0.8118  
Epoch 22/40  
- 1s - loss: 0.2133 - acc: 0.9665 - val\_loss: 0.3398 - val\_acc: 0.9236  
Epoch 23/40  
- 1s - loss: 0.1597 - acc: 0.9839 - val\_loss: 0.2699 - val\_acc: 0.9293  
Epoch 24/40  
- 1s - loss: 0.2341 - acc: 0.9616 - val\_loss: 0.2574 - val\_acc: 0.9560  
Epoch 25/40

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- 1s - loss: 0.1625 - acc: 0.9796 - val_loss: 0.2328 - val_acc: 0.9539
Epoch 26/40
- 1s - loss: 0.2110 - acc: 0.9665 - val_loss: 0.3678 - val_acc: 0.9149
Epoch 27/40
- 1s - loss: 0.1599 - acc: 0.9796 - val_loss: 0.2429 - val_acc: 0.9603
Epoch 28/40
- 1s - loss: 0.1936 - acc: 0.9677 - val_loss: 0.2535 - val_acc: 0.9510
Epoch 29/40
- 1s - loss: 0.2344 - acc: 0.9638 - val_loss: 0.2681 - val_acc: 0.9589
Epoch 30/40
- 1s - loss: 0.1950 - acc: 0.9696 - val_loss: 0.2721 - val_acc: 0.9553
Epoch 31/40
- 1s - loss: 0.1644 - acc: 0.9805 - val_loss: 0.2012 - val_acc: 0.9676
Epoch 32/40
- 1s - loss: 0.1731 - acc: 0.9714 - val_loss: 0.2970 - val_acc: 0.9488
Epoch 33/40
- 1s - loss: 0.1586 - acc: 0.9766 - val_loss: 0.2328 - val_acc: 0.9596
Epoch 34/40
- 1s - loss: 0.2043 - acc: 0.9641 - val_loss: 0.2427 - val_acc: 0.9611
Epoch 35/40
- 1s - loss: 0.1393 - acc: 0.9802 - val_loss: 0.6245 - val_acc: 0.8688
Epoch 36/40
- 1s - loss: 0.1568 - acc: 0.9747 - val_loss: 0.2495 - val_acc: 0.9589
Epoch 37/40
- 1s - loss: 0.1342 - acc: 0.9857 - val_loss: 1.3945 - val_acc: 0.6857
Epoch 38/40
- 1s - loss: 0.1800 - acc: 0.9717 - val_loss: 0.2478 - val_acc: 0.9625
Epoch 39/40
- 1s - loss: 0.1553 - acc: 0.9778 - val_loss: 0.2457 - val_acc: 0.9409
Epoch 40/40
- 1s - loss: 0.1654 - acc: 0.9741 - val_loss: 0.2158 - val_acc: 0.9596
Train accuracy 0.9954337899724824 Test accuracy: 0.9596250901225667

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 32)	3104
dropout_1 (Dropout)	(None, 122, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 16)	12304

dense\_2 (Dense) (None, 3) 51

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Total params: 16,931

Trainable params: 16,931

Non-trainable params: 0

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None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 41.6498 - acc: 0.5486 - val\_loss: 29.3217 - val\_acc: 0.7094

Epoch 2/40

- 1s - loss: 21.1196 - acc: 0.8408 - val\_loss: 14.2424 - val\_acc: 0.7880

Epoch 3/40

- 1s - loss: 9.4430 - acc: 0.9361 - val\_loss: 6.2857 - val\_acc: 0.5833

Epoch 4/40

- 1s - loss: 3.6011 - acc: 0.9543 - val\_loss: 2.1980 - val\_acc: 0.9524

Epoch 5/40

- 1s - loss: 1.2979 - acc: 0.9592 - val\_loss: 1.0934 - val\_acc: 0.9106

Epoch 6/40

- 1s - loss: 0.7002 - acc: 0.9607 - val\_loss: 0.7710 - val\_acc: 0.9553

Epoch 7/40

- 1s - loss: 0.5478 - acc: 0.9559 - val\_loss: 0.6767 - val\_acc: 0.9200

Epoch 8/40

- 1s - loss: 0.4696 - acc: 0.9613 - val\_loss: 0.6072 - val\_acc: 0.9481

Epoch 9/40

- 1s - loss: 0.3822 - acc: 0.9756 - val\_loss: 0.5270 - val\_acc: 0.9647

Epoch 10/40

- 1s - loss: 0.3737 - acc: 0.9677 - val\_loss: 0.4799 - val\_acc: 0.9503

Epoch 11/40

- 1s - loss: 0.3369 - acc: 0.9644 - val\_loss: 0.4552 - val\_acc: 0.9575

Epoch 12/40

- 1s - loss: 0.2975 - acc: 0.9726 - val\_loss: 0.4247 - val\_acc: 0.9553

Epoch 13/40

- 1s - loss: 0.2857 - acc: 0.9702 - val\_loss: 1.0057 - val\_acc: 0.6914

Epoch 14/40

- 1s - loss: 0.2624 - acc: 0.9756 - val\_loss: 0.3727 - val\_acc: 0.9690

Epoch 15/40

- 1s - loss: 0.2463 - acc: 0.9744 - val\_loss: 0.4244 - val\_acc: 0.9056

Epoch 16/40

- 1s - loss: 0.2312 - acc: 0.9717 - val\_loss: 0.3487 - val\_acc: 0.9661

Epoch 17/40

- 1s - loss: 0.2140 - acc: 0.9769 - val\_loss: 0.3246 - val\_acc: 0.9712

Epoch 18/40

- 1s - loss: 0.1899 - acc: 0.9833 - val\_loss: 0.6432 - val\_acc: 0.7541

Epoch 19/40

- 1s - loss: 0.1910 - acc: 0.9778 - val\_loss: 0.3856 - val\_acc: 0.9236

Epoch 20/40

- 1s - loss: 0.1822 - acc: 0.9778 - val\_loss: 0.2965 - val\_acc: 0.9481

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Epoch 21/40
- 1s - loss: 0.1757 - acc: 0.9769 - val_loss: 0.2997 - val_acc: 0.9719
Epoch 22/40
- 1s - loss: 0.1581 - acc: 0.9814 - val_loss: 0.3025 - val_acc: 0.9430
Epoch 23/40
- 1s - loss: 0.1701 - acc: 0.9760 - val_loss: 0.3693 - val_acc: 0.9063
Epoch 24/40
- 1s - loss: 0.1585 - acc: 0.9836 - val_loss: 0.2759 - val_acc: 0.9596
Epoch 25/40
- 1s - loss: 0.1658 - acc: 0.9750 - val_loss: 0.2709 - val_acc: 0.9683
Epoch 26/40
- 1s - loss: 0.1253 - acc: 0.9881 - val_loss: 1.2106 - val_acc: 0.5739
Epoch 27/40
- 1s - loss: 0.1650 - acc: 0.9766 - val_loss: 0.2672 - val_acc: 0.9567
Epoch 28/40
- 1s - loss: 0.1644 - acc: 0.9778 - val_loss: 0.4073 - val_acc: 0.8904
Epoch 29/40
- 1s - loss: 0.1269 - acc: 0.9845 - val_loss: 0.2633 - val_acc: 0.9589
Epoch 30/40
- 1s - loss: 0.1534 - acc: 0.9738 - val_loss: 0.3406 - val_acc: 0.9034
Epoch 31/40
- 1s - loss: 0.1256 - acc: 0.9826 - val_loss: 0.2469 - val_acc: 0.9654
Epoch 32/40
- 1s - loss: 0.1462 - acc: 0.9808 - val_loss: 0.2465 - val_acc: 0.9668
Epoch 33/40
- 1s - loss: 0.1221 - acc: 0.9848 - val_loss: 0.2726 - val_acc: 0.9510
Epoch 34/40
- 1s - loss: 0.1372 - acc: 0.9823 - val_loss: 0.2388 - val_acc: 0.9690
Epoch 35/40
- 1s - loss: 0.1261 - acc: 0.9836 - val_loss: 0.2409 - val_acc: 0.9668
Epoch 36/40
- 1s - loss: 0.1329 - acc: 0.9830 - val_loss: 0.2778 - val_acc: 0.9481
Epoch 37/40
- 1s - loss: 0.1305 - acc: 0.9845 - val_loss: 0.2334 - val_acc: 0.9740
Epoch 38/40
- 1s - loss: 0.1232 - acc: 0.9830 - val_loss: 0.3433 - val_acc: 0.9063
Epoch 39/40
- 1s - loss: 0.1335 - acc: 0.9799 - val_loss: 0.2734 - val_acc: 0.9567
Epoch 40/40
- 1s - loss: 0.1001 - acc: 0.9918 - val_loss: 0.2633 - val_acc: 0.9488
Train accuracy 0.9981735159817352 Test accuracy: 0.9488103821196827

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 124, 42)	1932
<hr/>		
conv1d_2 (Conv1D)	(None, 122, 24)	3048

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dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

Total params: 98,935  
 Trainable params: 98,935  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 23.0664 - acc: 0.6085 - val\_loss: 11.9232 - val\_acc: 0.8565

Epoch 2/40

- 1s - loss: 7.1927 - acc: 0.8594 - val\_loss: 4.0556 - val\_acc: 0.7743

Epoch 3/40

- 1s - loss: 2.2803 - acc: 0.9166 - val\_loss: 1.4436 - val\_acc: 0.8911

Epoch 4/40

- 1s - loss: 0.8426 - acc: 0.9388 - val\_loss: 0.6843 - val\_acc: 0.9466

Epoch 5/40

- 1s - loss: 0.4616 - acc: 0.9540 - val\_loss: 0.5415 - val\_acc: 0.9135

Epoch 6/40

- 1s - loss: 0.3475 - acc: 0.9571 - val\_loss: 0.4943 - val\_acc: 0.8940

Epoch 7/40

- 1s - loss: 0.2922 - acc: 0.9616 - val\_loss: 0.6324 - val\_acc: 0.7960

Epoch 8/40

- 1s - loss: 0.2577 - acc: 0.9656 - val\_loss: 0.3816 - val\_acc: 0.9279

Epoch 9/40

- 1s - loss: 0.2365 - acc: 0.9689 - val\_loss: 0.4737 - val\_acc: 0.8947

Epoch 10/40

- 1s - loss: 0.2165 - acc: 0.9726 - val\_loss: 0.3093 - val\_acc: 0.9589

Epoch 11/40

- 1s - loss: 0.2185 - acc: 0.9668 - val\_loss: 0.3044 - val\_acc: 0.9546

Epoch 12/40

- 1s - loss: 0.1809 - acc: 0.9775 - val\_loss: 0.2782 - val\_acc: 0.9661

Epoch 13/40

- 1s - loss: 0.1874 - acc: 0.9741 - val\_loss: 0.3088 - val\_acc: 0.9337

Epoch 14/40

- 1s - loss: 0.1760 - acc: 0.9775 - val\_loss: 0.2694 - val\_acc: 0.9517

Epoch 15/40

- 1s - loss: 0.1887 - acc: 0.9738 - val\_loss: 0.3293 - val\_acc: 0.9164

Epoch 16/40

- 1s - loss: 0.1799 - acc: 0.9720 - val\_loss: 0.3102 - val\_acc: 0.9229  
 Epoch 17/40  
 - 1s - loss: 0.1808 - acc: 0.9726 - val\_loss: 0.2609 - val\_acc: 0.9647  
 Epoch 18/40  
 - 1s - loss: 0.1521 - acc: 0.9799 - val\_loss: 0.2731 - val\_acc: 0.9553  
 Epoch 19/40  
 - 1s - loss: 0.1647 - acc: 0.9741 - val\_loss: 0.2603 - val\_acc: 0.9495  
 Epoch 20/40  
 - 1s - loss: 0.1484 - acc: 0.9802 - val\_loss: 0.2566 - val\_acc: 0.9517  
 Epoch 21/40  
 - 1s - loss: 0.1272 - acc: 0.9826 - val\_loss: 0.9598 - val\_acc: 0.6842  
 Epoch 22/40  
 - 1s - loss: 0.1603 - acc: 0.9778 - val\_loss: 0.6501 - val\_acc: 0.7787  
 Epoch 23/40  
 - 1s - loss: 0.1665 - acc: 0.9787 - val\_loss: 0.2424 - val\_acc: 0.9640  
 Epoch 24/40  
 - 1s - loss: 0.1299 - acc: 0.9893 - val\_loss: 0.2394 - val\_acc: 0.9546  
 Epoch 25/40  
 - 1s - loss: 0.1578 - acc: 0.9747 - val\_loss: 0.2203 - val\_acc: 0.9618  
 Epoch 26/40  
 - 1s - loss: 0.1394 - acc: 0.9760 - val\_loss: 0.2428 - val\_acc: 0.9539  
 Epoch 27/40  
 - 1s - loss: 0.1213 - acc: 0.9833 - val\_loss: 0.2602 - val\_acc: 0.9445  
 Epoch 28/40  
 - 1s - loss: 0.1185 - acc: 0.9836 - val\_loss: 0.3513 - val\_acc: 0.9351  
 Epoch 29/40  
 - 1s - loss: 0.1313 - acc: 0.9811 - val\_loss: 0.2452 - val\_acc: 0.9560  
 Epoch 30/40  
 - 1s - loss: 0.1794 - acc: 0.9711 - val\_loss: 0.2382 - val\_acc: 0.9618  
 Epoch 31/40  
 - 1s - loss: 0.0886 - acc: 0.9915 - val\_loss: 0.2202 - val\_acc: 0.9589  
 Epoch 32/40  
 - 1s - loss: 0.1288 - acc: 0.9793 - val\_loss: 0.2371 - val\_acc: 0.9524  
 Epoch 33/40  
 - 1s - loss: 0.1360 - acc: 0.9784 - val\_loss: 0.2584 - val\_acc: 0.9293  
 Epoch 34/40  
 - 1s - loss: 0.0939 - acc: 0.9915 - val\_loss: 0.2193 - val\_acc: 0.9618  
 Epoch 35/40  
 - 1s - loss: 0.1236 - acc: 0.9811 - val\_loss: 0.1988 - val\_acc: 0.9632  
 Epoch 36/40  
 - 1s - loss: 0.1228 - acc: 0.9817 - val\_loss: 0.2361 - val\_acc: 0.9575  
 Epoch 37/40  
 - 1s - loss: 0.1116 - acc: 0.9872 - val\_loss: 0.1952 - val\_acc: 0.9575  
 Epoch 38/40  
 - 1s - loss: 0.1352 - acc: 0.9863 - val\_loss: 0.2147 - val\_acc: 0.9582  
 Epoch 39/40  
 - 1s - loss: 0.1087 - acc: 0.9872 - val\_loss: 0.5577 - val\_acc: 0.8572  
 Epoch 40/40

- 1s - loss: 0.0937 - acc: 0.9896 - val\_loss: 0.2266 - val\_acc: 0.9553  
 Train accuracy 0.9996955859969558 Test accuracy: 0.9552992069214131

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 120, 16)	2032
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1	(None, 60, 16)	0
flatten_1 (Flatten)	(None, 960)	0
dense_1 (Dense)	(None, 16)	15376
dense_2 (Dense)	(None, 3)	51

Total params: 20,147  
 Trainable params: 20,147  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 1s - loss: 41.3950 - acc: 0.5939 - val\_loss: 14.4605 - val\_acc: 0.6965

Epoch 2/40

- 1s - loss: 6.1990 - acc: 0.7778 - val\_loss: 1.8791 - val\_acc: 0.7534

Epoch 3/40

- 1s - loss: 0.9181 - acc: 0.8350 - val\_loss: 0.7546 - val\_acc: 0.8248

Epoch 4/40

- 1s - loss: 0.5609 - acc: 0.8798 - val\_loss: 0.6497 - val\_acc: 0.8702

Epoch 5/40

- 1s - loss: 0.4813 - acc: 0.9005 - val\_loss: 0.5687 - val\_acc: 0.9084

Epoch 6/40

- 1s - loss: 0.4343 - acc: 0.9227 - val\_loss: 0.8471 - val\_acc: 0.6914

Epoch 7/40

- 1s - loss: 0.4056 - acc: 0.9306 - val\_loss: 0.7489 - val\_acc: 0.7736

Epoch 8/40

- 1s - loss: 0.3726 - acc: 0.9358 - val\_loss: 0.5324 - val\_acc: 0.8897

Epoch 9/40

- 1s - loss: 0.3810 - acc: 0.9279 - val\_loss: 0.4716 - val\_acc: 0.9200

Epoch 10/40

- 1s - loss: 0.3340 - acc: 0.9537 - val\_loss: 0.4798 - val\_acc: 0.9034

Epoch 11/40

- 1s - loss: 0.3697 - acc: 0.9324 - val\_loss: 0.4493 - val\_acc: 0.9019



Epoch 12/40  
- 1s - loss: 0.3454 - acc: 0.9437 - val\_loss: 0.4169 - val\_acc: 0.9503  
Epoch 13/40  
- 1s - loss: 0.3255 - acc: 0.9449 - val\_loss: 0.4790 - val\_acc: 0.9286  
Epoch 14/40  
- 1s - loss: 0.3394 - acc: 0.9455 - val\_loss: 0.5453 - val\_acc: 0.8572  
Epoch 15/40  
- 1s - loss: 0.3332 - acc: 0.9428 - val\_loss: 0.4369 - val\_acc: 0.9185  
Epoch 16/40  
- 1s - loss: 0.2867 - acc: 0.9604 - val\_loss: 0.3648 - val\_acc: 0.9301  
Epoch 17/40  
- 1s - loss: 0.3403 - acc: 0.9367 - val\_loss: 0.3916 - val\_acc: 0.9416  
Epoch 18/40  
- 1s - loss: 0.2873 - acc: 0.9516 - val\_loss: 0.4755 - val\_acc: 0.9041  
Epoch 19/40  
- 1s - loss: 0.3050 - acc: 0.9537 - val\_loss: 0.3637 - val\_acc: 0.9546  
Epoch 20/40  
- 1s - loss: 0.2877 - acc: 0.9540 - val\_loss: 0.4203 - val\_acc: 0.9106  
Epoch 21/40  
- 1s - loss: 0.3167 - acc: 0.9446 - val\_loss: 0.4953 - val\_acc: 0.8695  
Epoch 22/40  
- 1s - loss: 0.2924 - acc: 0.9537 - val\_loss: 0.4502 - val\_acc: 0.9012  
Epoch 23/40  
- 1s - loss: 0.2857 - acc: 0.9525 - val\_loss: 0.4165 - val\_acc: 0.9005  
Epoch 24/40  
- 1s - loss: 0.2702 - acc: 0.9571 - val\_loss: 0.3634 - val\_acc: 0.9337  
Epoch 25/40  
- 1s - loss: 0.2834 - acc: 0.9595 - val\_loss: 0.3778 - val\_acc: 0.9322  
Epoch 26/40  
- 1s - loss: 0.3133 - acc: 0.9534 - val\_loss: 0.4192 - val\_acc: 0.9207  
Epoch 27/40  
- 1s - loss: 0.2615 - acc: 0.9580 - val\_loss: 1.5410 - val\_acc: 0.6301  
Epoch 28/40  
- 1s - loss: 0.2966 - acc: 0.9470 - val\_loss: 0.3474 - val\_acc: 0.9539  
Epoch 29/40  
- 1s - loss: 0.3027 - acc: 0.9464 - val\_loss: 0.3964 - val\_acc: 0.9402  
Epoch 30/40  
- 1s - loss: 0.2770 - acc: 0.9586 - val\_loss: 0.4206 - val\_acc: 0.9279  
Epoch 31/40  
- 1s - loss: 0.2583 - acc: 0.9577 - val\_loss: 0.3367 - val\_acc: 0.9531  
Epoch 32/40  
- 1s - loss: 0.2528 - acc: 0.9619 - val\_loss: 0.3651 - val\_acc: 0.9452  
Epoch 33/40  
- 1s - loss: 0.2604 - acc: 0.9619 - val\_loss: 0.3358 - val\_acc: 0.9366  
Epoch 34/40  
- 1s - loss: 0.3194 - acc: 0.9473 - val\_loss: 0.3490 - val\_acc: 0.9387  
Epoch 35/40  
- 1s - loss: 0.2703 - acc: 0.9568 - val\_loss: 0.3564 - val\_acc: 0.9243

Epoch 36/40  
 - 1s - loss: 0.2364 - acc: 0.9653 - val\_loss: 0.3478 - val\_acc: 0.9423  
 Epoch 37/40  
 - 1s - loss: 0.2630 - acc: 0.9632 - val\_loss: 0.8841 - val\_acc: 0.6611  
 Epoch 38/40  
 - 1s - loss: 0.2446 - acc: 0.9619 - val\_loss: 0.3985 - val\_acc: 0.9416  
 Epoch 39/40  
 - 1s - loss: 0.2800 - acc: 0.9519 - val\_loss: 0.6032 - val\_acc: 0.8421  
 Epoch 40/40  
 - 1s - loss: 0.2654 - acc: 0.9583 - val\_loss: 0.4747 - val\_acc: 0.9063  
 Train accuracy 0.9844748858447488 Test accuracy: 0.9062725306416727

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 122, 24)	2328
dropout_1 (Dropout)	(None, 122, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 24)	0
flatten_1 (Flatten)	(None, 1464)	0
dense_1 (Dense)	(None, 64)	93760
dense_2 (Dense)	(None, 3)	195

Total params: 97,755  
 Trainable params: 97,755  
 Non-trainable params: 0

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/40  
 - 2s - loss: 79.5933 - acc: 0.5291 - val\_loss: 60.6032 - val\_acc: 0.5717  
 Epoch 2/40  
 - 1s - loss: 47.3121 - acc: 0.7525 - val\_loss: 35.3753 - val\_acc: 0.6813  
 Epoch 3/40  
 - 1s - loss: 26.6650 - acc: 0.8457 - val\_loss: 19.6036 - val\_acc: 0.5220  
 Epoch 4/40  
 - 1s - loss: 14.0150 - acc: 0.8807 - val\_loss: 9.8197 - val\_acc: 0.7974  
 Epoch 5/40  
 - 1s - loss: 6.8483 - acc: 0.8871 - val\_loss: 4.7404 - val\_acc: 0.7743  
 Epoch 6/40  
 - 1s - loss: 3.1759 - acc: 0.8865 - val\_loss: 2.3041 - val\_acc: 0.8205  
 Epoch 7/40

- 1s - loss: 1.4629 - acc: 0.9139 - val\_loss: 1.2242 - val\_acc: 0.8046  
 Epoch 8/40  
 - 1s - loss: 0.7657 - acc: 0.9291 - val\_loss: 0.8114 - val\_acc: 0.8399  
 Epoch 9/40  
 - 1s - loss: 0.5437 - acc: 0.9294 - val\_loss: 0.7918 - val\_acc: 0.8039  
 Epoch 10/40  
 - 1s - loss: 0.4496 - acc: 0.9431 - val\_loss: 0.6725 - val\_acc: 0.8378  
 Epoch 11/40  
 - 1s - loss: 0.4069 - acc: 0.9370 - val\_loss: 0.5931 - val\_acc: 0.8767  
 Epoch 12/40  
 - 1s - loss: 0.3637 - acc: 0.9507 - val\_loss: 0.4976 - val\_acc: 0.9113  
 Epoch 13/40  
 - 1s - loss: 0.3331 - acc: 0.9531 - val\_loss: 0.9708 - val\_acc: 0.6330  
 Epoch 14/40  
 - 1s - loss: 0.3065 - acc: 0.9629 - val\_loss: 0.4816 - val\_acc: 0.8868  
 Epoch 15/40  
 - 1s - loss: 0.3042 - acc: 0.9592 - val\_loss: 0.5505 - val\_acc: 0.8558  
 Epoch 16/40  
 - 1s - loss: 0.2856 - acc: 0.9595 - val\_loss: 0.3686 - val\_acc: 0.9539  
 Epoch 17/40  
 - 1s - loss: 0.2732 - acc: 0.9623 - val\_loss: 0.3686 - val\_acc: 0.9481  
 Epoch 18/40  
 - 1s - loss: 0.2611 - acc: 0.9662 - val\_loss: 0.4133 - val\_acc: 0.9185  
 Epoch 19/40  
 - 1s - loss: 0.2518 - acc: 0.9638 - val\_loss: 0.3714 - val\_acc: 0.9438  
 Epoch 20/40  
 - 1s - loss: 0.2377 - acc: 0.9705 - val\_loss: 0.3654 - val\_acc: 0.9293  
 Epoch 21/40  
 - 1s - loss: 0.2311 - acc: 0.9711 - val\_loss: 0.3786 - val\_acc: 0.9250  
 Epoch 22/40  
 - 1s - loss: 0.2209 - acc: 0.9705 - val\_loss: 0.4102 - val\_acc: 0.9084  
 Epoch 23/40  
 - 1s - loss: 0.2155 - acc: 0.9741 - val\_loss: 0.3460 - val\_acc: 0.9387  
 Epoch 24/40  
 - 1s - loss: 0.1947 - acc: 0.9826 - val\_loss: 0.2961 - val\_acc: 0.9503  
 Epoch 25/40  
 - 1s - loss: 0.2065 - acc: 0.9769 - val\_loss: 0.2846 - val\_acc: 0.9459  
 Epoch 26/40  
 - 1s - loss: 0.2000 - acc: 0.9729 - val\_loss: 0.3090 - val\_acc: 0.9466  
 Epoch 27/40  
 - 1s - loss: 0.1936 - acc: 0.9747 - val\_loss: 0.2939 - val\_acc: 0.9582  
 Epoch 28/40  
 - 1s - loss: 0.1830 - acc: 0.9769 - val\_loss: 0.3100 - val\_acc: 0.9423  
 Epoch 29/40  
 - 1s - loss: 0.1865 - acc: 0.9760 - val\_loss: 0.2777 - val\_acc: 0.9582  
 Epoch 30/40  
 - 1s - loss: 0.1975 - acc: 0.9680 - val\_loss: 0.2679 - val\_acc: 0.9640  
 Epoch 31/40

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- 1s - loss: 0.1676 - acc: 0.9805 - val_loss: 0.2543 - val_acc: 0.9625
Epoch 32/40
- 1s - loss: 0.1792 - acc: 0.9763 - val_loss: 0.2749 - val_acc: 0.9560
Epoch 33/40
- 1s - loss: 0.1757 - acc: 0.9784 - val_loss: 0.3023 - val_acc: 0.9452
Epoch 34/40
- 1s - loss: 0.1516 - acc: 0.9848 - val_loss: 0.7825 - val_acc: 0.7051
Epoch 35/40
- 1s - loss: 0.1812 - acc: 0.9720 - val_loss: 0.2555 - val_acc: 0.9466
Epoch 36/40
- 1s - loss: 0.1571 - acc: 0.9814 - val_loss: 0.2410 - val_acc: 0.9647
Epoch 37/40
- 1s - loss: 0.1661 - acc: 0.9784 - val_loss: 0.2668 - val_acc: 0.9481
Epoch 38/40
- 1s - loss: 0.1716 - acc: 0.9735 - val_loss: 0.2774 - val_acc: 0.9517
Epoch 39/40
- 1s - loss: 0.1517 - acc: 0.9836 - val_loss: 0.2852 - val_acc: 0.9409
Epoch 40/40
- 1s - loss: 0.1796 - acc: 0.9723 - val_loss: 0.2657 - val_acc: 0.9524
Train accuracy 0.995738203957382 Test accuracy: 0.9524152847873107
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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 32)	4064
dropout_1 (Dropout)	(None, 122, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 32)	0
flatten_1 (Flatten)	(None, 1952)	0
dense_1 (Dense)	(None, 16)	31248
dense_2 (Dense)	(None, 3)	51

```

=====
Total params: 37,295
Trainable params: 37,295
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
- 2s - loss: 110.3895 - acc: 0.4533 - val_loss: 54.4061 - val_acc: 0.5177
Epoch 2/40
- 1s - loss: 29.6538 - acc: 0.6015 - val_loss: 12.1622 - val_acc: 0.4982

```

Epoch 3/40  
- 1s - loss: 5.5735 - acc: 0.7126 - val\_loss: 1.9893 - val\_acc: 0.5631  
Epoch 4/40  
- 1s - loss: 1.0265 - acc: 0.7854 - val\_loss: 1.0319 - val\_acc: 0.6806  
Epoch 5/40  
- 1s - loss: 0.7283 - acc: 0.8253 - val\_loss: 0.7852 - val\_acc: 0.8392  
Epoch 6/40  
- 1s - loss: 0.6558 - acc: 0.8478 - val\_loss: 0.7776 - val\_acc: 0.8479  
Epoch 7/40  
- 1s - loss: 0.5971 - acc: 0.8694 - val\_loss: 0.7920 - val\_acc: 0.7426  
Epoch 8/40  
- 1s - loss: 0.5576 - acc: 0.8788 - val\_loss: 0.7140 - val\_acc: 0.8089  
Epoch 9/40  
- 1s - loss: 0.5449 - acc: 0.8773 - val\_loss: 0.6392 - val\_acc: 0.8695  
Epoch 10/40  
- 1s - loss: 0.5051 - acc: 0.8922 - val\_loss: 0.7129 - val\_acc: 0.7859  
Epoch 11/40  
- 1s - loss: 0.5250 - acc: 0.8919 - val\_loss: 0.7318 - val\_acc: 0.8003  
Epoch 12/40  
- 1s - loss: 0.4865 - acc: 0.8956 - val\_loss: 0.6086 - val\_acc: 0.8666  
Epoch 13/40  
- 1s - loss: 0.4796 - acc: 0.8913 - val\_loss: 0.9209 - val\_acc: 0.6453  
Epoch 14/40  
- 1s - loss: 0.4736 - acc: 0.8980 - val\_loss: 0.6817 - val\_acc: 0.8068  
Epoch 15/40  
- 1s - loss: 0.4595 - acc: 0.9035 - val\_loss: 0.5972 - val\_acc: 0.8385  
Epoch 16/40  
- 1s - loss: 0.4372 - acc: 0.9087 - val\_loss: 0.7706 - val\_acc: 0.7578  
Epoch 17/40  
- 1s - loss: 0.4203 - acc: 0.9154 - val\_loss: 0.5990 - val\_acc: 0.8580  
Epoch 18/40  
- 1s - loss: 0.4158 - acc: 0.9123 - val\_loss: 0.7056 - val\_acc: 0.7924  
Epoch 19/40  
- 1s - loss: 0.4275 - acc: 0.9050 - val\_loss: 0.5900 - val\_acc: 0.8551  
Epoch 20/40  
- 1s - loss: 0.3851 - acc: 0.9239 - val\_loss: 0.5813 - val\_acc: 0.8565  
Epoch 21/40  
- 1s - loss: 0.3935 - acc: 0.9218 - val\_loss: 0.8509 - val\_acc: 0.6835  
Epoch 22/40  
- 1s - loss: 0.3777 - acc: 0.9266 - val\_loss: 0.6917 - val\_acc: 0.7880  
Epoch 23/40  
- 1s - loss: 0.3653 - acc: 0.9300 - val\_loss: 0.5205 - val\_acc: 0.8738  
Epoch 24/40  
- 1s - loss: 0.3581 - acc: 0.9315 - val\_loss: 0.5129 - val\_acc: 0.8839  
Epoch 25/40  
- 1s - loss: 0.3670 - acc: 0.9263 - val\_loss: 0.5521 - val\_acc: 0.8659  
Epoch 26/40  
- 1s - loss: 0.3647 - acc: 0.9306 - val\_loss: 0.5751 - val\_acc: 0.8356

Epoch 27/40  
 - 1s - loss: 0.3612 - acc: 0.9269 - val\_loss: 0.5441 - val\_acc: 0.8738  
 Epoch 28/40  
 - 1s - loss: 0.3673 - acc: 0.9303 - val\_loss: 0.5915 - val\_acc: 0.8717  
 Epoch 29/40  
 - 1s - loss: 0.3441 - acc: 0.9346 - val\_loss: 0.5335 - val\_acc: 0.8882  
 Epoch 30/40  
 - 1s - loss: 0.3666 - acc: 0.9257 - val\_loss: 0.5452 - val\_acc: 0.8609  
 Epoch 31/40  
 - 1s - loss: 0.3228 - acc: 0.9416 - val\_loss: 0.7520 - val\_acc: 0.7642  
 Epoch 32/40  
 - 1s - loss: 0.3474 - acc: 0.9327 - val\_loss: 0.5556 - val\_acc: 0.8587  
 Epoch 33/40  
 - 1s - loss: 0.3414 - acc: 0.9391 - val\_loss: 0.6686 - val\_acc: 0.8025  
 Epoch 34/40  
 - 1s - loss: 0.3279 - acc: 0.9403 - val\_loss: 0.4756 - val\_acc: 0.9005  
 Epoch 35/40  
 - 1s - loss: 0.3621 - acc: 0.9266 - val\_loss: 0.5093 - val\_acc: 0.8717  
 Epoch 36/40  
 - 1s - loss: 0.3269 - acc: 0.9388 - val\_loss: 0.4909 - val\_acc: 0.8933  
 Epoch 37/40  
 - 1s - loss: 0.3297 - acc: 0.9385 - val\_loss: 0.6089 - val\_acc: 0.8320  
 Epoch 38/40  
 - 1s - loss: 0.3363 - acc: 0.9382 - val\_loss: 0.5550 - val\_acc: 0.8782  
 Epoch 39/40  
 - 1s - loss: 0.3389 - acc: 0.9379 - val\_loss: 0.5478 - val\_acc: 0.8515  
 Epoch 40/40  
 - 1s - loss: 0.3204 - acc: 0.9376 - val\_loss: 0.5092 - val\_acc: 0.8789  
 Train accuracy 0.9753424657534246 Test accuracy: 0.878875270582569

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 28)	1288
conv1d_2 (Conv1D)	(None, 122, 16)	1360
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 64)	24640
dense_2 (Dense)	(None, 3)	195

---

Total params: 27,483

Trainable params: 27,483

Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 1s - loss: 45.1911 - acc: 0.6073 - val\_loss: 30.1249 - val\_acc: 0.8061

Epoch 2/40

- 1s - loss: 20.8037 - acc: 0.8362 - val\_loss: 13.3619 - val\_acc: 0.5624

Epoch 3/40

- 1s - loss: 8.3468 - acc: 0.8865 - val\_loss: 5.0720 - val\_acc: 0.6136

Epoch 4/40

- 1s - loss: 2.8116 - acc: 0.9126 - val\_loss: 1.8137 - val\_acc: 0.7866

Epoch 5/40

- 1s - loss: 1.0601 - acc: 0.9078 - val\_loss: 1.0277 - val\_acc: 0.8198

Epoch 6/40

- 1s - loss: 0.6417 - acc: 0.9227 - val\_loss: 0.9219 - val\_acc: 0.7686

Epoch 7/40

- 1s - loss: 0.5000 - acc: 0.9376 - val\_loss: 0.7535 - val\_acc: 0.8327

Epoch 8/40

- 1s - loss: 0.4259 - acc: 0.9476 - val\_loss: 0.6256 - val\_acc: 0.9005

Epoch 9/40

- 1s - loss: 0.3568 - acc: 0.9519 - val\_loss: 0.6102 - val\_acc: 0.8652

Epoch 10/40

- 1s - loss: 0.3061 - acc: 0.9665 - val\_loss: 0.5324 - val\_acc: 0.9048

Epoch 11/40

- 1s - loss: 0.3284 - acc: 0.9479 - val\_loss: 0.4444 - val\_acc: 0.9373

Epoch 12/40

- 1s - loss: 0.2833 - acc: 0.9607 - val\_loss: 0.4397 - val\_acc: 0.9438

Epoch 13/40

- 1s - loss: 0.2612 - acc: 0.9644 - val\_loss: 0.7859 - val\_acc: 0.6676

Epoch 14/40

- 1s - loss: 0.2518 - acc: 0.9623 - val\_loss: 0.4443 - val\_acc: 0.9243

Epoch 15/40

- 1s - loss: 0.2452 - acc: 0.9686 - val\_loss: 0.6488 - val\_acc: 0.7397

Epoch 16/40

- 1s - loss: 0.2392 - acc: 0.9632 - val\_loss: 0.3515 - val\_acc: 0.9495

Epoch 17/40

- 1s - loss: 0.2435 - acc: 0.9629 - val\_loss: 0.3507 - val\_acc: 0.9524

Epoch 18/40

- 1s - loss: 0.2235 - acc: 0.9696 - val\_loss: 0.3739 - val\_acc: 0.9358

Epoch 19/40

- 1s - loss: 0.2267 - acc: 0.9626 - val\_loss: 0.3735 - val\_acc: 0.9438

Epoch 20/40

- 1s - loss: 0.2040 - acc: 0.9753 - val\_loss: 0.3250 - val\_acc: 0.9416

Epoch 21/40

- 1s - loss: 0.2165 - acc: 0.9653 - val\_loss: 0.3345 - val\_acc: 0.9503

Epoch 22/40

```

- 1s - loss: 0.1955 - acc: 0.9741 - val_loss: 0.6912 - val_acc: 0.7527
Epoch 23/40
- 1s - loss: 0.1978 - acc: 0.9729 - val_loss: 0.3146 - val_acc: 0.9531
Epoch 24/40
- 1s - loss: 0.1914 - acc: 0.9726 - val_loss: 0.3457 - val_acc: 0.9402
Epoch 25/40
- 1s - loss: 0.1750 - acc: 0.9766 - val_loss: 0.3077 - val_acc: 0.9503
Epoch 26/40
- 1s - loss: 0.1946 - acc: 0.9699 - val_loss: 0.3061 - val_acc: 0.9474
Epoch 27/40
- 1s - loss: 0.1742 - acc: 0.9793 - val_loss: 0.2919 - val_acc: 0.9452
Epoch 28/40
- 1s - loss: 0.1786 - acc: 0.9726 - val_loss: 0.2980 - val_acc: 0.9517
Epoch 29/40
- 1s - loss: 0.1755 - acc: 0.9756 - val_loss: 0.2903 - val_acc: 0.9517
Epoch 30/40
- 1s - loss: 0.1890 - acc: 0.9702 - val_loss: 0.4403 - val_acc: 0.8435
Epoch 31/40
- 1s - loss: 0.1508 - acc: 0.9823 - val_loss: 0.2797 - val_acc: 0.9481
Epoch 32/40
- 1s - loss: 0.1678 - acc: 0.9756 - val_loss: 0.3001 - val_acc: 0.9438
Epoch 33/40
- 1s - loss: 0.1535 - acc: 0.9796 - val_loss: 0.6334 - val_acc: 0.7779
Epoch 34/40
- 1s - loss: 0.1561 - acc: 0.9787 - val_loss: 0.2916 - val_acc: 0.9402
Epoch 35/40
- 1s - loss: 0.1607 - acc: 0.9747 - val_loss: 0.2831 - val_acc: 0.9452
Epoch 36/40
- 1s - loss: 0.1690 - acc: 0.9729 - val_loss: 0.3348 - val_acc: 0.8969
Epoch 37/40
- 1s - loss: 0.1489 - acc: 0.9790 - val_loss: 0.4172 - val_acc: 0.8558
Epoch 38/40
- 1s - loss: 0.1318 - acc: 0.9854 - val_loss: 0.3365 - val_acc: 0.9135
Epoch 39/40
- 1s - loss: 0.1608 - acc: 0.9756 - val_loss: 0.7500 - val_acc: 0.6929
Epoch 40/40
- 1s - loss: 0.1589 - acc: 0.9747 - val_loss: 0.3143 - val_acc: 0.9301
Train accuracy 0.9960426179604261 Test accuracy: 0.9300648882480173
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 124, 24)	3048
dropout_1 (Dropout)	(None, 124, 24)	0



```

max_pooling1d_1 (MaxPooling1 (None, 62, 24)          0
-----
flatten_1 (Flatten)          (None, 1488)          0
-----
dense_1 (Dense)              (None, 16)          23824
-----
dense_2 (Dense)              (None, 3)           51
=====
Total params: 28,099
Trainable params: 28,099
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
  - 1s - loss: 47.2083 - acc: 0.4846 - val_loss: 32.2905 - val_acc: 0.5789
Epoch 2/40
  - 1s - loss: 23.4663 - acc: 0.7169 - val_loss: 16.2798 - val_acc: 0.6698
Epoch 3/40
  - 1s - loss: 11.5563 - acc: 0.8454 - val_loss: 8.5430 - val_acc: 0.4441
Epoch 4/40
  - 1s - loss: 5.4709 - acc: 0.8770 - val_loss: 3.8863 - val_acc: 0.7325
Epoch 5/40
  - 1s - loss: 2.4055 - acc: 0.8810 - val_loss: 1.7855 - val_acc: 0.7433
Epoch 6/40
  - 1s - loss: 1.0808 - acc: 0.9005 - val_loss: 1.0112 - val_acc: 0.8104
Epoch 7/40
  - 1s - loss: 0.6484 - acc: 0.9047 - val_loss: 0.8504 - val_acc: 0.7650
Epoch 8/40
  - 1s - loss: 0.5210 - acc: 0.9120 - val_loss: 0.7795 - val_acc: 0.7563
Epoch 9/40
  - 1s - loss: 0.4576 - acc: 0.9245 - val_loss: 0.6697 - val_acc: 0.8205
Epoch 10/40
  - 1s - loss: 0.4249 - acc: 0.9330 - val_loss: 0.6911 - val_acc: 0.7815
Epoch 11/40
  - 1s - loss: 0.4033 - acc: 0.9269 - val_loss: 0.6156 - val_acc: 0.8486
Epoch 12/40
  - 1s - loss: 0.3793 - acc: 0.9358 - val_loss: 0.5302 - val_acc: 0.8911
Epoch 13/40
  - 1s - loss: 0.3625 - acc: 0.9373 - val_loss: 0.8029 - val_acc: 0.7138
Epoch 14/40
  - 1s - loss: 0.3400 - acc: 0.9458 - val_loss: 0.6107 - val_acc: 0.8118
Epoch 15/40
  - 1s - loss: 0.3410 - acc: 0.9440 - val_loss: 0.4748 - val_acc: 0.9128
Epoch 16/40
  - 1s - loss: 0.3166 - acc: 0.9467 - val_loss: 0.5065 - val_acc: 0.8673
Epoch 17/40
  - 1s - loss: 0.3049 - acc: 0.9479 - val_loss: 0.5843 - val_acc: 0.8298

```

Epoch 18/40  
- 1s - loss: 0.2999 - acc: 0.9507 - val\_loss: 0.7523 - val\_acc: 0.7296  
Epoch 19/40  
- 1s - loss: 0.2987 - acc: 0.9482 - val\_loss: 0.4592 - val\_acc: 0.9070  
Epoch 20/40  
- 1s - loss: 0.2788 - acc: 0.9568 - val\_loss: 0.4397 - val\_acc: 0.8955  
Epoch 21/40  
- 1s - loss: 0.2703 - acc: 0.9586 - val\_loss: 0.5512 - val\_acc: 0.8385  
Epoch 22/40  
- 1s - loss: 0.2601 - acc: 0.9577 - val\_loss: 0.6105 - val\_acc: 0.7880  
Epoch 23/40  
- 1s - loss: 0.2542 - acc: 0.9607 - val\_loss: 0.5178 - val\_acc: 0.8724  
Epoch 24/40  
- 1s - loss: 0.2435 - acc: 0.9647 - val\_loss: 0.4315 - val\_acc: 0.8947  
Epoch 25/40  
- 1s - loss: 0.2637 - acc: 0.9583 - val\_loss: 0.4336 - val\_acc: 0.8882  
Epoch 26/40  
- 1s - loss: 0.2453 - acc: 0.9671 - val\_loss: 0.4929 - val\_acc: 0.8738  
Epoch 27/40  
- 1s - loss: 0.2342 - acc: 0.9635 - val\_loss: 0.9286 - val\_acc: 0.7426  
Epoch 28/40  
- 1s - loss: 0.2413 - acc: 0.9619 - val\_loss: 0.4210 - val\_acc: 0.9034  
Epoch 29/40  
- 1s - loss: 0.2344 - acc: 0.9629 - val\_loss: 0.3855 - val\_acc: 0.9344  
Epoch 30/40  
- 1s - loss: 0.2267 - acc: 0.9644 - val\_loss: 0.4255 - val\_acc: 0.9106  
Epoch 31/40  
- 1s - loss: 0.2044 - acc: 0.9717 - val\_loss: 1.3800 - val\_acc: 0.5415  
Epoch 32/40  
- 1s - loss: 0.2228 - acc: 0.9659 - val\_loss: 0.4959 - val\_acc: 0.8753  
Epoch 33/40  
- 1s - loss: 0.2148 - acc: 0.9671 - val\_loss: 0.4481 - val\_acc: 0.8861  
Epoch 34/40  
- 1s - loss: 0.1942 - acc: 0.9729 - val\_loss: 0.3732 - val\_acc: 0.9250  
Epoch 35/40  
- 1s - loss: 0.2122 - acc: 0.9702 - val\_loss: 0.4508 - val\_acc: 0.8818  
Epoch 36/40  
- 1s - loss: 0.2015 - acc: 0.9711 - val\_loss: 0.5115 - val\_acc: 0.8428  
Epoch 37/40  
- 1s - loss: 0.2043 - acc: 0.9671 - val\_loss: 0.3940 - val\_acc: 0.9193  
Epoch 38/40  
- 1s - loss: 0.1956 - acc: 0.9741 - val\_loss: 0.4137 - val\_acc: 0.8998  
Epoch 39/40  
- 1s - loss: 0.2001 - acc: 0.9683 - val\_loss: 0.3748 - val\_acc: 0.9279  
Epoch 40/40  
- 1s - loss: 0.1915 - acc: 0.9726 - val\_loss: 0.4346 - val\_acc: 0.9070  
Train accuracy 0.9863013698630136 Test accuracy: 0.9069935111751982

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 24)	3864
dropout_1 (Dropout)	(None, 118, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 24)	0
flatten_1 (Flatten)	(None, 1416)	0
dense_1 (Dense)	(None, 64)	90688
dense_2 (Dense)	(None, 3)	195

Total params: 96,795  
 Trainable params: 96,795  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 3s - loss: 21.5679 - acc: 0.7011 - val\_loss: 2.6269 - val\_acc: 0.7325

Epoch 2/40

- 2s - loss: 0.9842 - acc: 0.9367 - val\_loss: 0.6518 - val\_acc: 0.8933

Epoch 3/40

- 2s - loss: 0.3407 - acc: 0.9638 - val\_loss: 0.4970 - val\_acc: 0.8897

Epoch 4/40

- 2s - loss: 0.2316 - acc: 0.9756 - val\_loss: 0.4165 - val\_acc: 0.9063

Epoch 5/40

- 2s - loss: 0.1898 - acc: 0.9766 - val\_loss: 0.2826 - val\_acc: 0.9596

Epoch 6/40

- 2s - loss: 0.1644 - acc: 0.9811 - val\_loss: 0.3044 - val\_acc: 0.9250

Epoch 7/40

- 2s - loss: 0.1598 - acc: 0.9799 - val\_loss: 0.3950 - val\_acc: 0.8702

Epoch 8/40

- 2s - loss: 0.1381 - acc: 0.9814 - val\_loss: 0.9953 - val\_acc: 0.7022

Epoch 9/40

- 2s - loss: 0.1439 - acc: 0.9817 - val\_loss: 0.3038 - val\_acc: 0.9164

Epoch 10/40

- 2s - loss: 0.1337 - acc: 0.9811 - val\_loss: 0.2058 - val\_acc: 0.9611

Epoch 11/40

- 2s - loss: 0.1204 - acc: 0.9851 - val\_loss: 0.2451 - val\_acc: 0.9351

Epoch 12/40

- 2s - loss: 0.1281 - acc: 0.9814 - val\_loss: 0.1823 - val\_acc: 0.9618

Epoch 13/40

- 2s - loss: 0.1214 - acc: 0.9805 - val\_loss: 0.3392 - val\_acc: 0.9193  
 Epoch 14/40  
 - 2s - loss: 0.1246 - acc: 0.9817 - val\_loss: 0.1954 - val\_acc: 0.9575  
 Epoch 15/40  
 - 2s - loss: 0.1109 - acc: 0.9860 - val\_loss: 0.2721 - val\_acc: 0.9077  
 Epoch 16/40  
 - 2s - loss: 0.1264 - acc: 0.9784 - val\_loss: 0.1795 - val\_acc: 0.9611  
 Epoch 17/40  
 - 2s - loss: 0.1154 - acc: 0.9833 - val\_loss: 0.3008 - val\_acc: 0.9236  
 Epoch 18/40  
 - 2s - loss: 0.1070 - acc: 0.9826 - val\_loss: 0.2181 - val\_acc: 0.9409  
 Epoch 19/40  
 - 2s - loss: 0.1073 - acc: 0.9848 - val\_loss: 0.2587 - val\_acc: 0.9200  
 Epoch 20/40  
 - 2s - loss: 0.1035 - acc: 0.9845 - val\_loss: 0.1987 - val\_acc: 0.9452  
 Epoch 21/40  
 - 2s - loss: 0.0965 - acc: 0.9866 - val\_loss: 0.2149 - val\_acc: 0.9423  
 Epoch 22/40  
 - 2s - loss: 0.0971 - acc: 0.9851 - val\_loss: 0.4646 - val\_acc: 0.8955  
 Epoch 23/40  
 - 2s - loss: 0.0967 - acc: 0.9842 - val\_loss: 0.1513 - val\_acc: 0.9618  
 Epoch 24/40  
 - 2s - loss: 0.0964 - acc: 0.9863 - val\_loss: 0.7679 - val\_acc: 0.8371  
 Epoch 25/40  
 - 2s - loss: 0.0890 - acc: 0.9896 - val\_loss: 0.2906 - val\_acc: 0.9005  
 Epoch 26/40  
 - 2s - loss: 0.0963 - acc: 0.9845 - val\_loss: 0.1869 - val\_acc: 0.9632  
 Epoch 27/40  
 - 2s - loss: 0.0986 - acc: 0.9823 - val\_loss: 0.3813 - val\_acc: 0.8810  
 Epoch 28/40  
 - 2s - loss: 0.0934 - acc: 0.9860 - val\_loss: 0.2272 - val\_acc: 0.9438  
 Epoch 29/40  
 - 2s - loss: 0.1042 - acc: 0.9839 - val\_loss: 0.1967 - val\_acc: 0.9402  
 Epoch 30/40  
 - 2s - loss: 0.0889 - acc: 0.9875 - val\_loss: 0.2041 - val\_acc: 0.9582  
 Epoch 31/40  
 - 2s - loss: 0.0989 - acc: 0.9836 - val\_loss: 0.2014 - val\_acc: 0.9402  
 Epoch 32/40  
 - 2s - loss: 0.1046 - acc: 0.9842 - val\_loss: 0.2702 - val\_acc: 0.9452  
 Epoch 33/40  
 - 2s - loss: 0.0927 - acc: 0.9851 - val\_loss: 0.2805 - val\_acc: 0.9257  
 Epoch 34/40  
 - 2s - loss: 0.1095 - acc: 0.9811 - val\_loss: 0.1935 - val\_acc: 0.9582  
 Epoch 35/40  
 - 2s - loss: 0.0922 - acc: 0.9857 - val\_loss: 0.4072 - val\_acc: 0.8796  
 Epoch 36/40  
 - 2s - loss: 0.1009 - acc: 0.9839 - val\_loss: 0.2082 - val\_acc: 0.9438  
 Epoch 37/40

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- 2s - loss: 0.1028 - acc: 0.9842 - val_loss: 0.2032 - val_acc: 0.9539
Epoch 38/40
- 2s - loss: 0.0954 - acc: 0.9845 - val_loss: 0.1965 - val_acc: 0.9452
Epoch 39/40
- 2s - loss: 0.1039 - acc: 0.9851 - val_loss: 3.1968 - val_acc: 0.4888
Epoch 40/40
- 2s - loss: 0.1015 - acc: 0.9848 - val_loss: 0.2358 - val_acc: 0.9366
Train accuracy 0.9966514459665144 Test accuracy: 0.9365537130497477
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 42)	1932
conv1d_2 (Conv1D)	(None, 122, 32)	4064
dropout_1 (Dropout)	(None, 122, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 16)	12304
dense_2 (Dense)	(None, 3)	51

```

=====
Total params: 18,351
Trainable params: 18,351
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 122.6977 - acc: 0.4661 - val_loss: 65.5370 - val_acc: 0.5566
Epoch 2/35
- 1s - loss: 38.2275 - acc: 0.6545 - val_loss: 18.1775 - val_acc: 0.6042
Epoch 3/35
- 1s - loss: 9.7547 - acc: 0.7196 - val_loss: 4.3811 - val_acc: 0.5090
Epoch 4/35
- 1s - loss: 2.0449 - acc: 0.7896 - val_loss: 1.2230 - val_acc: 0.7030
Epoch 5/35
- 1s - loss: 0.7770 - acc: 0.8301 - val_loss: 0.8708 - val_acc: 0.7902
Epoch 6/35
- 1s - loss: 0.6486 - acc: 0.8636 - val_loss: 0.8704 - val_acc: 0.7448
Epoch 7/35
- 1s - loss: 0.5813 - acc: 0.8840 - val_loss: 0.8644 - val_acc: 0.7383
Epoch 8/35
- 1s - loss: 0.5302 - acc: 0.8974 - val_loss: 0.7026 - val_acc: 0.8839

```

Epoch 9/35  
 - 1s - loss: 0.5159 - acc: 0.8950 - val\_loss: 0.6687 - val\_acc: 0.8789

Epoch 10/35  
 - 1s - loss: 0.4784 - acc: 0.9111 - val\_loss: 0.7717 - val\_acc: 0.7397

Epoch 11/35  
 - 1s - loss: 0.4820 - acc: 0.9005 - val\_loss: 0.6930 - val\_acc: 0.8378

Epoch 12/35  
 - 1s - loss: 0.4566 - acc: 0.9111 - val\_loss: 0.6223 - val\_acc: 0.8947

Epoch 13/35  
 - 1s - loss: 0.4497 - acc: 0.9181 - val\_loss: 0.9459 - val\_acc: 0.6172

Epoch 14/35  
 - 1s - loss: 0.4320 - acc: 0.9157 - val\_loss: 0.6744 - val\_acc: 0.7888

Epoch 15/35  
 - 1s - loss: 0.4221 - acc: 0.9169 - val\_loss: 0.6065 - val\_acc: 0.8601

Epoch 16/35  
 - 1s - loss: 0.4027 - acc: 0.9257 - val\_loss: 0.8023 - val\_acc: 0.7109

Epoch 17/35  
 - 1s - loss: 0.3956 - acc: 0.9279 - val\_loss: 0.6446 - val\_acc: 0.8515

Epoch 18/35  
 - 1s - loss: 0.3833 - acc: 0.9263 - val\_loss: 1.0157 - val\_acc: 0.5458

Epoch 19/35  
 - 1s - loss: 0.3858 - acc: 0.9260 - val\_loss: 0.5656 - val\_acc: 0.8818

Epoch 20/35  
 - 1s - loss: 0.3513 - acc: 0.9391 - val\_loss: 0.5305 - val\_acc: 0.8868

Epoch 21/35  
 - 1s - loss: 0.3717 - acc: 0.9336 - val\_loss: 0.7151 - val\_acc: 0.7462

Epoch 22/35  
 - 1s - loss: 0.3579 - acc: 0.9336 - val\_loss: 0.7154 - val\_acc: 0.7397

Epoch 23/35  
 - 1s - loss: 0.3556 - acc: 0.9391 - val\_loss: 0.5406 - val\_acc: 0.8825

Epoch 24/35  
 - 1s - loss: 0.3312 - acc: 0.9434 - val\_loss: 0.6510 - val\_acc: 0.8161

Epoch 25/35  
 - 1s - loss: 0.3480 - acc: 0.9346 - val\_loss: 0.6723 - val\_acc: 0.7743

Epoch 26/35  
 - 1s - loss: 0.3428 - acc: 0.9364 - val\_loss: 0.4825 - val\_acc: 0.9084

Epoch 27/35  
 - 1s - loss: 0.3326 - acc: 0.9388 - val\_loss: 0.5982 - val\_acc: 0.8212

Epoch 28/35  
 - 1s - loss: 0.3300 - acc: 0.9464 - val\_loss: 0.4781 - val\_acc: 0.9156

Epoch 29/35  
 - 1s - loss: 0.3266 - acc: 0.9416 - val\_loss: 0.4719 - val\_acc: 0.9200

Epoch 30/35  
 - 1s - loss: 0.3406 - acc: 0.9324 - val\_loss: 0.4931 - val\_acc: 0.9070

Epoch 31/35  
 - 1s - loss: 0.2979 - acc: 0.9549 - val\_loss: 0.4340 - val\_acc: 0.9243

Epoch 32/35  
 - 1s - loss: 0.3308 - acc: 0.9394 - val\_loss: 0.5053 - val\_acc: 0.8890

Epoch 33/35  
 - 1s - loss: 0.3347 - acc: 0.9333 - val\_loss: 0.5325 - val\_acc: 0.8789  
 Epoch 34/35  
 - 1s - loss: 0.2941 - acc: 0.9531 - val\_loss: 0.4412 - val\_acc: 0.8933  
 Epoch 35/35  
 - 1s - loss: 0.3399 - acc: 0.9303 - val\_loss: 0.4787 - val\_acc: 0.8890  
 Train accuracy 0.9570776255707762 Test accuracy: 0.8889689978370584

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 42)	1176
conv1d_2 (Conv1D)	(None, 122, 16)	3376
dropout_1 (Dropout)	(None, 122, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 61, 16)	0
flatten_1 (Flatten)	(None, 976)	0
dense_1 (Dense)	(None, 64)	62528
dense_2 (Dense)	(None, 3)	195

Total params: 67,275  
 Trainable params: 67,275  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40  
 - 2s - loss: 59.8307 - acc: 0.6941 - val\_loss: 27.9730 - val\_acc: 0.7678  
 Epoch 2/40  
 - 1s - loss: 14.8227 - acc: 0.8947 - val\_loss: 6.1851 - val\_acc: 0.8327  
 Epoch 3/40  
 - 1s - loss: 2.5884 - acc: 0.9233 - val\_loss: 1.1393 - val\_acc: 0.8176  
 Epoch 4/40  
 - 1s - loss: 0.5882 - acc: 0.9239 - val\_loss: 0.7887 - val\_acc: 0.8198  
 Epoch 5/40  
 - 2s - loss: 0.4160 - acc: 0.9376 - val\_loss: 0.6296 - val\_acc: 0.8277  
 Epoch 6/40  
 - 2s - loss: 0.3433 - acc: 0.9537 - val\_loss: 0.6333 - val\_acc: 0.8212  
 Epoch 7/40  
 - 1s - loss: 0.3084 - acc: 0.9586 - val\_loss: 0.5737 - val\_acc: 0.8154  
 Epoch 8/40  
 - 1s - loss: 0.2777 - acc: 0.9616 - val\_loss: 0.5316 - val\_acc: 0.8392  
 Epoch 9/40

- 2s - loss: 0.2673 - acc: 0.9595 - val\_loss: 0.4719 - val\_acc: 0.8882  
 Epoch 10/40  
 - 2s - loss: 0.2563 - acc: 0.9635 - val\_loss: 0.4037 - val\_acc: 0.9128  
 Epoch 11/40  
 - 1s - loss: 0.2381 - acc: 0.9680 - val\_loss: 0.4937 - val\_acc: 0.8291  
 Epoch 12/40  
 - 2s - loss: 0.2182 - acc: 0.9723 - val\_loss: 0.3514 - val\_acc: 0.9315  
 Epoch 13/40  
 - 2s - loss: 0.2230 - acc: 0.9705 - val\_loss: 0.6220 - val\_acc: 0.8032  
 Epoch 14/40  
 - 1s - loss: 0.2117 - acc: 0.9720 - val\_loss: 0.4664 - val\_acc: 0.8479  
 Epoch 15/40  
 - 1s - loss: 0.1958 - acc: 0.9732 - val\_loss: 0.3613 - val\_acc: 0.9027  
 Epoch 16/40  
 - 1s - loss: 0.1945 - acc: 0.9717 - val\_loss: 1.0225 - val\_acc: 0.7123  
 Epoch 17/40  
 - 1s - loss: 0.1958 - acc: 0.9717 - val\_loss: 0.2897 - val\_acc: 0.9438  
 Epoch 18/40  
 - 2s - loss: 0.1802 - acc: 0.9775 - val\_loss: 0.3478 - val\_acc: 0.9185  
 Epoch 19/40  
 - 1s - loss: 0.1767 - acc: 0.9760 - val\_loss: 0.3098 - val\_acc: 0.9337  
 Epoch 20/40  
 - 2s - loss: 0.1714 - acc: 0.9753 - val\_loss: 0.6100 - val\_acc: 0.7815  
 Epoch 21/40  
 - 2s - loss: 0.1670 - acc: 0.9811 - val\_loss: 0.3828 - val\_acc: 0.8810  
 Epoch 22/40  
 - 1s - loss: 0.1729 - acc: 0.9729 - val\_loss: 0.4481 - val\_acc: 0.8572  
 Epoch 23/40  
 - 1s - loss: 0.1638 - acc: 0.9738 - val\_loss: 0.3390 - val\_acc: 0.9005  
 Epoch 24/40  
 - 1s - loss: 0.1723 - acc: 0.9766 - val\_loss: 0.3179 - val\_acc: 0.9142  
 Epoch 25/40  
 - 2s - loss: 0.1647 - acc: 0.9738 - val\_loss: 0.3051 - val\_acc: 0.9308  
 Epoch 26/40  
 - 1s - loss: 0.1621 - acc: 0.9793 - val\_loss: 0.3306 - val\_acc: 0.9005  
 Epoch 27/40  
 - 2s - loss: 0.1728 - acc: 0.9747 - val\_loss: 0.7663 - val\_acc: 0.8335  
 Epoch 28/40  
 - 1s - loss: 0.1656 - acc: 0.9763 - val\_loss: 0.3004 - val\_acc: 0.9243  
 Epoch 29/40  
 - 1s - loss: 0.1515 - acc: 0.9823 - val\_loss: 0.2808 - val\_acc: 0.9387  
 Epoch 30/40  
 - 1s - loss: 0.1537 - acc: 0.9793 - val\_loss: 0.3115 - val\_acc: 0.9128  
 Epoch 31/40  
 - 1s - loss: 0.1587 - acc: 0.9766 - val\_loss: 0.2581 - val\_acc: 0.9445  
 Epoch 32/40  
 - 2s - loss: 0.1702 - acc: 0.9753 - val\_loss: 0.2677 - val\_acc: 0.9358  
 Epoch 33/40



```

- 2s - loss: 0.1528 - acc: 0.9747 - val_loss: 0.5606 - val_acc: 0.8053
Epoch 34/40
- 1s - loss: 0.1541 - acc: 0.9775 - val_loss: 0.3035 - val_acc: 0.9366
Epoch 35/40
- 2s - loss: 0.1524 - acc: 0.9778 - val_loss: 0.2780 - val_acc: 0.9329
Epoch 36/40
- 1s - loss: 0.1443 - acc: 0.9790 - val_loss: 0.2963 - val_acc: 0.9409
Epoch 37/40
- 1s - loss: 0.1398 - acc: 0.9842 - val_loss: 0.3007 - val_acc: 0.9178
Epoch 38/40
- 2s - loss: 0.1562 - acc: 0.9760 - val_loss: 0.2397 - val_acc: 0.9430
Epoch 39/40
- 2s - loss: 0.1507 - acc: 0.9799 - val_loss: 0.3688 - val_acc: 0.8803
Epoch 40/40
- 2s - loss: 0.1564 - acc: 0.9756 - val_loss: 0.2803 - val_acc: 0.9315
Train accuracy 0.9917808219178083 Test accuracy: 0.9315068493150684
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 28)	1288
conv1d_2 (Conv1D)	(None, 118, 24)	4728
dropout_1 (Dropout)	(None, 118, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 59, 24)	0
flatten_1 (Flatten)	(None, 1416)	0
dense_1 (Dense)	(None, 16)	22672
dense_2 (Dense)	(None, 3)	51

```

=====
Total params: 28,739
Trainable params: 28,739
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
- 2s - loss: 25.4551 - acc: 0.6024 - val_loss: 12.1356 - val_acc: 0.7815
Epoch 2/40
- 1s - loss: 6.1224 - acc: 0.8837 - val_loss: 2.6324 - val_acc: 0.8082
Epoch 3/40
- 1s - loss: 1.1763 - acc: 0.9349 - val_loss: 0.8378 - val_acc: 0.8601
Epoch 4/40
- 1s - loss: 0.4566 - acc: 0.9455 - val_loss: 0.5234 - val_acc: 0.9279

```

Epoch 5/40  
- 1s - loss: 0.3117 - acc: 0.9619 - val\_loss: 0.6312 - val\_acc: 0.7751  
Epoch 6/40  
- 1s - loss: 0.2481 - acc: 0.9729 - val\_loss: 0.4204 - val\_acc: 0.9344  
Epoch 7/40  
- 1s - loss: 0.2187 - acc: 0.9756 - val\_loss: 0.4449 - val\_acc: 0.9120  
Epoch 8/40  
- 1s - loss: 0.1992 - acc: 0.9747 - val\_loss: 0.3481 - val\_acc: 0.9466  
Epoch 9/40  
- 1s - loss: 0.1726 - acc: 0.9808 - val\_loss: 0.3168 - val\_acc: 0.9351  
Epoch 10/40  
- 1s - loss: 0.1752 - acc: 0.9753 - val\_loss: 0.3300 - val\_acc: 0.9344  
Epoch 11/40  
- 1s - loss: 0.1534 - acc: 0.9799 - val\_loss: 0.2678 - val\_acc: 0.9589  
Epoch 12/40  
- 1s - loss: 0.1522 - acc: 0.9814 - val\_loss: 0.2743 - val\_acc: 0.9466  
Epoch 13/40  
- 1s - loss: 0.1638 - acc: 0.9763 - val\_loss: 0.2747 - val\_acc: 0.9539  
Epoch 14/40  
- 1s - loss: 0.1462 - acc: 0.9793 - val\_loss: 0.2298 - val\_acc: 0.9618  
Epoch 15/40  
- 1s - loss: 0.1502 - acc: 0.9781 - val\_loss: 0.2497 - val\_acc: 0.9582  
Epoch 16/40  
- 1s - loss: 0.1424 - acc: 0.9799 - val\_loss: 0.2856 - val\_acc: 0.9474  
Epoch 17/40  
- 1s - loss: 0.1477 - acc: 0.9781 - val\_loss: 0.2942 - val\_acc: 0.9466  
Epoch 18/40  
- 1s - loss: 0.1385 - acc: 0.9817 - val\_loss: 0.3071 - val\_acc: 0.9459  
Epoch 19/40  
- 1s - loss: 0.1344 - acc: 0.9778 - val\_loss: 0.3089 - val\_acc: 0.9474  
Epoch 20/40  
- 1s - loss: 0.1414 - acc: 0.9778 - val\_loss: 0.2510 - val\_acc: 0.9618  
Epoch 21/40  
- 1s - loss: 0.1333 - acc: 0.9820 - val\_loss: 0.2960 - val\_acc: 0.9560  
Epoch 22/40  
- 1s - loss: 0.1286 - acc: 0.9836 - val\_loss: 0.2687 - val\_acc: 0.9474  
Epoch 23/40  
- 1s - loss: 0.1237 - acc: 0.9839 - val\_loss: 0.2106 - val\_acc: 0.9647  
Epoch 24/40  
- 1s - loss: 0.1295 - acc: 0.9784 - val\_loss: 0.1891 - val\_acc: 0.9712  
Epoch 25/40  
- 1s - loss: 0.1224 - acc: 0.9863 - val\_loss: 0.3650 - val\_acc: 0.8810  
Epoch 26/40  
- 1s - loss: 0.1398 - acc: 0.9778 - val\_loss: 0.2510 - val\_acc: 0.9575  
Epoch 27/40  
- 1s - loss: 0.1178 - acc: 0.9839 - val\_loss: 0.3120 - val\_acc: 0.9358  
Epoch 28/40  
- 1s - loss: 0.1329 - acc: 0.9781 - val\_loss: 0.2252 - val\_acc: 0.9423

```

Epoch 29/40
  - 1s - loss: 0.1330 - acc: 0.9814 - val_loss: 0.3192 - val_acc: 0.9416
Epoch 30/40
  - 1s - loss: 0.1217 - acc: 0.9808 - val_loss: 0.5419 - val_acc: 0.8277
Epoch 31/40
  - 1s - loss: 0.1395 - acc: 0.9820 - val_loss: 0.2172 - val_acc: 0.9611
Epoch 32/40
  - 1s - loss: 0.1300 - acc: 0.9784 - val_loss: 0.2615 - val_acc: 0.9488
Epoch 33/40
  - 1s - loss: 0.1414 - acc: 0.9778 - val_loss: 0.2676 - val_acc: 0.9243
Epoch 34/40
  - 1s - loss: 0.1236 - acc: 0.9842 - val_loss: 0.2377 - val_acc: 0.9596
Epoch 35/40
  - 1s - loss: 0.1308 - acc: 0.9805 - val_loss: 0.2649 - val_acc: 0.9524
Epoch 36/40
  - 1s - loss: 0.1185 - acc: 0.9836 - val_loss: 0.2038 - val_acc: 0.9618
Epoch 37/40
  - 1s - loss: 0.1145 - acc: 0.9863 - val_loss: 0.4353 - val_acc: 0.8904
Epoch 38/40
  - 1s - loss: 0.1288 - acc: 0.9851 - val_loss: 0.2359 - val_acc: 0.9539
Epoch 39/40
  - 1s - loss: 0.1355 - acc: 0.9784 - val_loss: 0.3108 - val_acc: 0.9293
Epoch 40/40
  - 1s - loss: 0.1360 - acc: 0.9811 - val_loss: 0.3337 - val_acc: 0.9416
Train accuracy 0.9899543378995433 Test accuracy: 0.9416005767844268

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 122, 32)          2048
-----
conv1d_2 (Conv1D)            (None, 120, 24)          2328
-----
dropout_1 (Dropout)          (None, 120, 24)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 24, 24)          0
-----
flatten_1 (Flatten)          (None, 576)              0
-----
dense_1 (Dense)              (None, 32)               18464
-----
dense_2 (Dense)              (None, 3)                99
=====
Total params: 22,939
Trainable params: 22,939
Non-trainable params: 0

```

```

-----
None

```

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 1s - loss: 24.2100 - acc: 0.6524 - val\_loss: 10.7816 - val\_acc: 0.8882

Epoch 2/35

- 1s - loss: 5.3945 - acc: 0.9023 - val\_loss: 2.1393 - val\_acc: 0.9481

Epoch 3/35

- 1s - loss: 1.1129 - acc: 0.9394 - val\_loss: 1.1996 - val\_acc: 0.6619

Epoch 4/35

- 1s - loss: 0.5493 - acc: 0.9525 - val\_loss: 0.5286 - val\_acc: 0.9654

Epoch 5/35

- 1s - loss: 0.4038 - acc: 0.9610 - val\_loss: 0.5076 - val\_acc: 0.9034

Epoch 6/35

- 1s - loss: 0.4597 - acc: 0.9455 - val\_loss: 0.4007 - val\_acc: 0.9647

Epoch 7/35

- 1s - loss: 0.2919 - acc: 0.9705 - val\_loss: 0.4166 - val\_acc: 0.9740

Epoch 8/35

- 1s - loss: 0.2704 - acc: 0.9729 - val\_loss: 0.3041 - val\_acc: 0.9776

Epoch 9/35

- 1s - loss: 0.3007 - acc: 0.9635 - val\_loss: 1.2824 - val\_acc: 0.4593

Epoch 10/35

- 1s - loss: 0.2540 - acc: 0.9644 - val\_loss: 0.2783 - val\_acc: 0.9733

Epoch 11/35

- 1s - loss: 0.2432 - acc: 0.9726 - val\_loss: 0.2698 - val\_acc: 0.9740

Epoch 12/35

- 1s - loss: 0.2322 - acc: 0.9720 - val\_loss: 0.2489 - val\_acc: 0.9791

Epoch 13/35

- 1s - loss: 0.1864 - acc: 0.9820 - val\_loss: 0.3197 - val\_acc: 0.9690

Epoch 14/35

- 1s - loss: 0.1974 - acc: 0.9793 - val\_loss: 0.2389 - val\_acc: 0.9589

Epoch 15/35

- 1s - loss: 0.2220 - acc: 0.9674 - val\_loss: 0.2166 - val\_acc: 0.9755

Epoch 16/35

- 1s - loss: 0.1649 - acc: 0.9787 - val\_loss: 0.2530 - val\_acc: 0.9668

Epoch 17/35

- 1s - loss: 0.1424 - acc: 0.9851 - val\_loss: 0.2289 - val\_acc: 0.9719

Epoch 18/35

- 1s - loss: 0.1607 - acc: 0.9738 - val\_loss: 0.2378 - val\_acc: 0.9531

Epoch 19/35

- 1s - loss: 0.1546 - acc: 0.9830 - val\_loss: 0.1995 - val\_acc: 0.9776

Epoch 20/35

- 1s - loss: 0.1153 - acc: 0.9863 - val\_loss: 0.2158 - val\_acc: 0.9647

Epoch 21/35

- 1s - loss: 0.1259 - acc: 0.9896 - val\_loss: 0.4733 - val\_acc: 0.8320

Epoch 22/35

- 1s - loss: 0.1093 - acc: 0.9872 - val\_loss: 0.4914 - val\_acc: 0.8284

Epoch 23/35

- 1s - loss: 0.1318 - acc: 0.9769 - val\_loss: 0.2549 - val\_acc: 0.9495

Epoch 24/35

```

- 1s - loss: 0.1439 - acc: 0.9857 - val_loss: 0.1813 - val_acc: 0.9704
Epoch 25/35
- 1s - loss: 0.0739 - acc: 0.9939 - val_loss: 0.1778 - val_acc: 0.9603
Epoch 26/35
- 1s - loss: 0.1163 - acc: 0.9836 - val_loss: 0.2006 - val_acc: 0.9560
Epoch 27/35
- 1s - loss: 0.1000 - acc: 0.9869 - val_loss: 0.1582 - val_acc: 0.9762
Epoch 28/35
- 1s - loss: 0.0883 - acc: 0.9884 - val_loss: 0.1869 - val_acc: 0.9567
Epoch 29/35
- 1s - loss: 0.0974 - acc: 0.9851 - val_loss: 0.1800 - val_acc: 0.9697
Epoch 30/35
- 1s - loss: 0.0653 - acc: 0.9933 - val_loss: 0.2416 - val_acc: 0.9402
Epoch 31/35
- 1s - loss: 0.0945 - acc: 0.9854 - val_loss: 0.2697 - val_acc: 0.9092
Epoch 32/35
- 1s - loss: 0.0901 - acc: 0.9896 - val_loss: 0.1562 - val_acc: 0.9740
Epoch 33/35
- 1s - loss: 0.0824 - acc: 0.9851 - val_loss: 0.1699 - val_acc: 0.9726
Epoch 34/35
- 1s - loss: 0.0889 - acc: 0.9878 - val_loss: 0.1561 - val_acc: 0.9769
Epoch 35/35
- 1s - loss: 0.0561 - acc: 0.9948 - val_loss: 0.1351 - val_acc: 0.9719
Train accuracy 1.0 Test accuracy: 0.9718817591925017

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 24)	2328
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 24)	0
flatten_1 (Flatten)	(None, 576)	0
dense_1 (Dense)	(None, 32)	18464
dense_2 (Dense)	(None, 3)	99

```

Total params: 22,939
Trainable params: 22,939
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples

```

Epoch 1/35  
- 1s - loss: 93.3506 - acc: 0.5732 - val\_loss: 34.1302 - val\_acc: 0.5479  
Epoch 2/35  
- 1s - loss: 13.9552 - acc: 0.7355 - val\_loss: 2.8761 - val\_acc: 0.6590  
Epoch 3/35  
- 1s - loss: 1.1558 - acc: 0.8055 - val\_loss: 1.0204 - val\_acc: 0.6381  
Epoch 4/35  
- 1s - loss: 0.6533 - acc: 0.8496 - val\_loss: 0.8411 - val\_acc: 0.7376  
Epoch 5/35  
- 1s - loss: 0.5915 - acc: 0.8636 - val\_loss: 0.7062 - val\_acc: 0.7714  
Epoch 6/35  
- 1s - loss: 0.5415 - acc: 0.8697 - val\_loss: 0.6687 - val\_acc: 0.8767  
Epoch 7/35  
- 1s - loss: 0.4996 - acc: 0.8925 - val\_loss: 0.7296 - val\_acc: 0.7873  
Epoch 8/35  
- 1s - loss: 0.4756 - acc: 0.9002 - val\_loss: 0.6007 - val\_acc: 0.8998  
Epoch 9/35  
- 1s - loss: 0.4487 - acc: 0.9053 - val\_loss: 0.5356 - val\_acc: 0.9236  
Epoch 10/35  
- 1s - loss: 0.4344 - acc: 0.9157 - val\_loss: 0.5610 - val\_acc: 0.8991  
Epoch 11/35  
- 1s - loss: 0.4196 - acc: 0.9151 - val\_loss: 0.6788 - val\_acc: 0.8212  
Epoch 12/35  
- 1s - loss: 0.4230 - acc: 0.9175 - val\_loss: 0.7549 - val\_acc: 0.8147  
Epoch 13/35  
- 1s - loss: 0.4118 - acc: 0.9154 - val\_loss: 0.8687 - val\_acc: 0.7066  
Epoch 14/35  
- 1s - loss: 0.3982 - acc: 0.9248 - val\_loss: 0.6648 - val\_acc: 0.8414  
Epoch 15/35  
- 1s - loss: 0.3899 - acc: 0.9239 - val\_loss: 0.5691 - val\_acc: 0.8385  
Epoch 16/35  
- 1s - loss: 0.3839 - acc: 0.9272 - val\_loss: 0.4467 - val\_acc: 0.9265  
Epoch 17/35  
- 1s - loss: 0.3984 - acc: 0.9184 - val\_loss: 0.8278 - val\_acc: 0.7751  
Epoch 18/35  
- 1s - loss: 0.3849 - acc: 0.9239 - val\_loss: 0.9858 - val\_acc: 0.6056  
Epoch 19/35  
- 1s - loss: 0.3944 - acc: 0.9269 - val\_loss: 0.5431 - val\_acc: 0.9099  
Epoch 20/35  
- 1s - loss: 0.3698 - acc: 0.9312 - val\_loss: 0.4867 - val\_acc: 0.8998  
Epoch 21/35  
- 1s - loss: 0.3712 - acc: 0.9309 - val\_loss: 1.1906 - val\_acc: 0.5963  
Epoch 22/35  
- 1s - loss: 0.3621 - acc: 0.9297 - val\_loss: 0.5022 - val\_acc: 0.9135  
Epoch 23/35  
- 1s - loss: 0.3553 - acc: 0.9412 - val\_loss: 0.4268 - val\_acc: 0.9380  
Epoch 24/35  
- 1s - loss: 0.3639 - acc: 0.9275 - val\_loss: 0.4387 - val\_acc: 0.9495

```

Epoch 25/35
- 1s - loss: 0.3648 - acc: 0.9285 - val_loss: 0.5211 - val_acc: 0.8789
Epoch 26/35
- 1s - loss: 0.3472 - acc: 0.9382 - val_loss: 0.4858 - val_acc: 0.9120
Epoch 27/35
- 1s - loss: 0.3588 - acc: 0.9376 - val_loss: 0.5075 - val_acc: 0.8947
Epoch 28/35
- 1s - loss: 0.3536 - acc: 0.9370 - val_loss: 0.4300 - val_acc: 0.9200
Epoch 29/35
- 1s - loss: 0.3572 - acc: 0.9318 - val_loss: 0.4750 - val_acc: 0.9092
Epoch 30/35
- 1s - loss: 0.3533 - acc: 0.9324 - val_loss: 0.4842 - val_acc: 0.8991
Epoch 31/35
- 1s - loss: 0.3658 - acc: 0.9382 - val_loss: 0.4339 - val_acc: 0.9243
Epoch 32/35
- 1s - loss: 0.3564 - acc: 0.9352 - val_loss: 0.6305 - val_acc: 0.8594
Epoch 33/35
- 1s - loss: 0.3417 - acc: 0.9358 - val_loss: 0.4779 - val_acc: 0.8890
Epoch 34/35
- 1s - loss: 0.3476 - acc: 0.9367 - val_loss: 0.4008 - val_acc: 0.9366
Epoch 35/35
- 1s - loss: 0.3652 - acc: 0.9285 - val_loss: 0.4601 - val_acc: 0.9106
Train accuracy 0.9613394216133943 Test accuracy: 0.9105984138428262

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 32)	5152
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

---

```

Total params: 30,883
Trainable params: 30,883
Non-trainable params: 0

```

---

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35

```

- 3s - loss: 22.6391 - acc: 0.6728 - val\_loss: 0.9765 - val\_acc: 0.7578  
Epoch 2/35  
- 3s - loss: 0.5255 - acc: 0.8913 - val\_loss: 0.6317 - val\_acc: 0.8760  
Epoch 3/35  
- 3s - loss: 0.4265 - acc: 0.9148 - val\_loss: 0.6099 - val\_acc: 0.8623  
Epoch 4/35  
- 3s - loss: 0.3788 - acc: 0.9303 - val\_loss: 0.6150 - val\_acc: 0.8955  
Epoch 5/35  
- 3s - loss: 0.3487 - acc: 0.9300 - val\_loss: 0.5012 - val\_acc: 0.9142  
Epoch 6/35  
- 3s - loss: 0.3351 - acc: 0.9361 - val\_loss: 0.5803 - val\_acc: 0.8782  
Epoch 7/35  
- 3s - loss: 0.3046 - acc: 0.9479 - val\_loss: 0.4639 - val\_acc: 0.9027  
Epoch 8/35  
- 3s - loss: 0.3055 - acc: 0.9422 - val\_loss: 0.8789 - val\_acc: 0.7116  
Epoch 9/35  
- 3s - loss: 0.3085 - acc: 0.9452 - val\_loss: 0.4255 - val\_acc: 0.9120  
Epoch 10/35  
- 3s - loss: 0.3041 - acc: 0.9440 - val\_loss: 0.5680 - val\_acc: 0.8486  
Epoch 11/35  
- 3s - loss: 0.3039 - acc: 0.9443 - val\_loss: 0.3933 - val\_acc: 0.9178  
Epoch 12/35  
- 3s - loss: 0.2968 - acc: 0.9504 - val\_loss: 0.4769 - val\_acc: 0.9048  
Epoch 13/35  
- 3s - loss: 0.3041 - acc: 0.9425 - val\_loss: 1.1143 - val\_acc: 0.6633  
Epoch 14/35  
- 3s - loss: 0.2994 - acc: 0.9461 - val\_loss: 0.3833 - val\_acc: 0.9301  
Epoch 15/35  
- 3s - loss: 0.3034 - acc: 0.9476 - val\_loss: 0.6340 - val\_acc: 0.7743  
Epoch 16/35  
- 3s - loss: 0.2947 - acc: 0.9486 - val\_loss: 0.6873 - val\_acc: 0.7585  
Epoch 17/35  
- 3s - loss: 0.2957 - acc: 0.9443 - val\_loss: 0.9937 - val\_acc: 0.7664  
Epoch 18/35  
- 3s - loss: 0.2747 - acc: 0.9543 - val\_loss: 0.6555 - val\_acc: 0.8075  
Epoch 19/35  
- 3s - loss: 0.2898 - acc: 0.9498 - val\_loss: 0.4888 - val\_acc: 0.9207  
Epoch 20/35  
- 3s - loss: 0.2835 - acc: 0.9528 - val\_loss: 0.9146 - val\_acc: 0.6662  
Epoch 21/35  
- 3s - loss: 0.2828 - acc: 0.9522 - val\_loss: 0.5297 - val\_acc: 0.8594  
Epoch 22/35  
- 3s - loss: 0.2793 - acc: 0.9537 - val\_loss: 0.4597 - val\_acc: 0.8962  
Epoch 23/35  
- 3s - loss: 0.2931 - acc: 0.9486 - val\_loss: 0.4084 - val\_acc: 0.9344  
Epoch 24/35  
- 3s - loss: 0.2820 - acc: 0.9501 - val\_loss: 0.4658 - val\_acc: 0.8709  
Epoch 25/35



```

- 3s - loss: 0.2739 - acc: 0.9577 - val_loss: 0.5145 - val_acc: 0.8753
Epoch 26/35
- 3s - loss: 0.2836 - acc: 0.9510 - val_loss: 0.4002 - val_acc: 0.9048
Epoch 27/35
- 3s - loss: 0.3067 - acc: 0.9489 - val_loss: 0.5540 - val_acc: 0.8544
Epoch 28/35
- 3s - loss: 0.2745 - acc: 0.9498 - val_loss: 0.3898 - val_acc: 0.9257
Epoch 29/35
- 3s - loss: 0.2763 - acc: 0.9574 - val_loss: 0.4550 - val_acc: 0.9135
Epoch 30/35
- 3s - loss: 0.2772 - acc: 0.9504 - val_loss: 1.1746 - val_acc: 0.5775
Epoch 31/35
- 3s - loss: 0.2891 - acc: 0.9498 - val_loss: 0.3660 - val_acc: 0.9272
Epoch 32/35
- 3s - loss: 0.2775 - acc: 0.9531 - val_loss: 0.3976 - val_acc: 0.9265
Epoch 33/35
- 3s - loss: 0.2794 - acc: 0.9519 - val_loss: 0.4643 - val_acc: 0.8897
Epoch 34/35
- 3s - loss: 0.2898 - acc: 0.9498 - val_loss: 0.4518 - val_acc: 0.8882
Epoch 35/35
- 3s - loss: 0.2759 - acc: 0.9498 - val_loss: 0.4738 - val_acc: 0.8897
Train accuracy 0.971689497716895 Test accuracy: 0.889689978370584
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 16)	1552
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 16)	0
flatten_1 (Flatten)	(None, 384)	0
dense_1 (Dense)	(None, 32)	12320
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 16,019
Trainable params: 16,019
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 17.0358 - acc: 0.6143 - val_loss: 1.0074 - val_acc: 0.7808

```

Epoch 2/35  
- 1s - loss: 0.6429 - acc: 0.8429 - val\_loss: 0.8237 - val\_acc: 0.6792

Epoch 3/35  
- 2s - loss: 0.4812 - acc: 0.8935 - val\_loss: 0.6990 - val\_acc: 0.8313

Epoch 4/35  
- 2s - loss: 0.4457 - acc: 0.9062 - val\_loss: 0.5225 - val\_acc: 0.9265

Epoch 5/35  
- 1s - loss: 0.3863 - acc: 0.9297 - val\_loss: 0.7553 - val\_acc: 0.7520

Epoch 6/35  
- 1s - loss: 0.3582 - acc: 0.9336 - val\_loss: 0.5513 - val\_acc: 0.8565

Epoch 7/35  
- 1s - loss: 0.3496 - acc: 0.9358 - val\_loss: 0.6841 - val\_acc: 0.7787

Epoch 8/35  
- 2s - loss: 0.3543 - acc: 0.9419 - val\_loss: 0.4510 - val\_acc: 0.9279

Epoch 9/35  
- 1s - loss: 0.3251 - acc: 0.9452 - val\_loss: 0.4339 - val\_acc: 0.9402

Epoch 10/35  
- 1s - loss: 0.3263 - acc: 0.9492 - val\_loss: 0.6124 - val\_acc: 0.8219

Epoch 11/35  
- 2s - loss: 0.3149 - acc: 0.9495 - val\_loss: 0.8736 - val\_acc: 0.7462

Epoch 12/35  
- 2s - loss: 0.3125 - acc: 0.9516 - val\_loss: 0.3905 - val\_acc: 0.9344

Epoch 13/35  
- 2s - loss: 0.3042 - acc: 0.9489 - val\_loss: 0.4725 - val\_acc: 0.9063

Epoch 14/35  
- 1s - loss: 0.3487 - acc: 0.9412 - val\_loss: 0.4637 - val\_acc: 0.9229

Epoch 15/35  
- 2s - loss: 0.2976 - acc: 0.9534 - val\_loss: 0.3872 - val\_acc: 0.9329

Epoch 16/35  
- 1s - loss: 0.3066 - acc: 0.9473 - val\_loss: 0.5742 - val\_acc: 0.8154

Epoch 17/35  
- 2s - loss: 0.3027 - acc: 0.9510 - val\_loss: 1.0994 - val\_acc: 0.7181

Epoch 18/35  
- 2s - loss: 0.2943 - acc: 0.9540 - val\_loss: 0.4034 - val\_acc: 0.9351

Epoch 19/35  
- 2s - loss: 0.2950 - acc: 0.9531 - val\_loss: 0.4047 - val\_acc: 0.9207

Epoch 20/35  
- 2s - loss: 0.3040 - acc: 0.9482 - val\_loss: 0.5361 - val\_acc: 0.8724

Epoch 21/35  
- 2s - loss: 0.2861 - acc: 0.9553 - val\_loss: 0.4115 - val\_acc: 0.9135

Epoch 22/35  
- 2s - loss: 0.3048 - acc: 0.9461 - val\_loss: 0.4156 - val\_acc: 0.9322

Epoch 23/35  
- 2s - loss: 0.2743 - acc: 0.9583 - val\_loss: 0.3379 - val\_acc: 0.9373

Epoch 24/35  
- 2s - loss: 0.3199 - acc: 0.9482 - val\_loss: 0.4091 - val\_acc: 0.9308

Epoch 25/35  
- 1s - loss: 0.2870 - acc: 0.9559 - val\_loss: 0.8238 - val\_acc: 0.7022

Epoch 26/35  
 - 1s - loss: 0.3209 - acc: 0.9479 - val\_loss: 0.3878 - val\_acc: 0.9193  
 Epoch 27/35  
 - 2s - loss: 0.2954 - acc: 0.9528 - val\_loss: 0.4181 - val\_acc: 0.9120  
 Epoch 28/35  
 - 2s - loss: 0.3082 - acc: 0.9455 - val\_loss: 0.4289 - val\_acc: 0.9056  
 Epoch 29/35  
 - 1s - loss: 0.2933 - acc: 0.9464 - val\_loss: 0.4350 - val\_acc: 0.9012  
 Epoch 30/35  
 - 1s - loss: 0.2855 - acc: 0.9531 - val\_loss: 0.3625 - val\_acc: 0.9337  
 Epoch 31/35  
 - 1s - loss: 0.2661 - acc: 0.9546 - val\_loss: 0.6025 - val\_acc: 0.8306  
 Epoch 32/35  
 - 2s - loss: 0.2958 - acc: 0.9492 - val\_loss: 0.4122 - val\_acc: 0.9056  
 Epoch 33/35  
 - 1s - loss: 0.2778 - acc: 0.9516 - val\_loss: 0.5165 - val\_acc: 0.8745  
 Epoch 34/35  
 - 2s - loss: 0.2820 - acc: 0.9537 - val\_loss: 0.5314 - val\_acc: 0.8630  
 Epoch 35/35  
 - 1s - loss: 0.2854 - acc: 0.9583 - val\_loss: 0.4735 - val\_acc: 0.8789  
 Train accuracy 0.9382039573820395 Test accuracy: 0.8788752703677001

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 24)	5400
dropout_1 (Dropout)	(None, 116, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 24)	0
flatten_1 (Flatten)	(None, 552)	0
dense_1 (Dense)	(None, 32)	17696
dense_2 (Dense)	(None, 3)	99

---

Total params: 25,243  
 Trainable params: 25,243  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/35  
 - 3s - loss: 4.7432 - acc: 0.7653 - val\_loss: 0.9027 - val\_acc: 0.9120  
 Epoch 2/35

- 2s - loss: 0.5345 - acc: 0.9559 - val\_loss: 0.4788 - val\_acc: 0.9279  
 Epoch 3/35  
 - 3s - loss: 0.2873 - acc: 0.9705 - val\_loss: 0.3264 - val\_acc: 0.9632  
 Epoch 4/35  
 - 2s - loss: 0.2053 - acc: 0.9775 - val\_loss: 0.2739 - val\_acc: 0.9668  
 Epoch 5/35  
 - 2s - loss: 0.1575 - acc: 0.9769 - val\_loss: 0.3076 - val\_acc: 0.9459  
 Epoch 6/35  
 - 2s - loss: 0.1363 - acc: 0.9836 - val\_loss: 0.2101 - val\_acc: 0.9791  
 Epoch 7/35  
 - 3s - loss: 0.1327 - acc: 0.9808 - val\_loss: 0.2254 - val\_acc: 0.9632  
 Epoch 8/35  
 - 3s - loss: 0.1210 - acc: 0.9823 - val\_loss: 0.2171 - val\_acc: 0.9654  
 Epoch 9/35  
 - 2s - loss: 0.1162 - acc: 0.9811 - val\_loss: 0.2129 - val\_acc: 0.9459  
 Epoch 10/35  
 - 2s - loss: 0.0969 - acc: 0.9863 - val\_loss: 0.2158 - val\_acc: 0.9438  
 Epoch 11/35  
 - 2s - loss: 0.0930 - acc: 0.9863 - val\_loss: 0.4556 - val\_acc: 0.8082  
 Epoch 12/35  
 - 3s - loss: 0.0874 - acc: 0.9860 - val\_loss: 0.1971 - val\_acc: 0.9582  
 Epoch 13/35  
 - 2s - loss: 0.0886 - acc: 0.9869 - val\_loss: 0.3235 - val\_acc: 0.9257  
 Epoch 14/35  
 - 2s - loss: 0.0883 - acc: 0.9857 - val\_loss: 0.1850 - val\_acc: 0.9560  
 Epoch 15/35  
 - 2s - loss: 0.0817 - acc: 0.9869 - val\_loss: 0.2285 - val\_acc: 0.9524  
 Epoch 16/35  
 - 2s - loss: 0.0949 - acc: 0.9848 - val\_loss: 0.2265 - val\_acc: 0.9459  
 Epoch 17/35  
 - 3s - loss: 0.0802 - acc: 0.9866 - val\_loss: 0.2274 - val\_acc: 0.9402  
 Epoch 18/35  
 - 2s - loss: 0.0871 - acc: 0.9878 - val\_loss: 0.2145 - val\_acc: 0.9618  
 Epoch 19/35  
 - 2s - loss: 0.0853 - acc: 0.9866 - val\_loss: 0.2000 - val\_acc: 0.9625  
 Epoch 20/35  
 - 2s - loss: 0.0842 - acc: 0.9869 - val\_loss: 0.2620 - val\_acc: 0.9366  
 Epoch 21/35  
 - 3s - loss: 0.0817 - acc: 0.9866 - val\_loss: 0.1975 - val\_acc: 0.9632  
 Epoch 22/35  
 - 2s - loss: 0.0830 - acc: 0.9875 - val\_loss: 0.9242 - val\_acc: 0.8399  
 Epoch 23/35  
 - 3s - loss: 0.0836 - acc: 0.9878 - val\_loss: 0.2880 - val\_acc: 0.8897  
 Epoch 24/35  
 - 2s - loss: 0.0859 - acc: 0.9863 - val\_loss: 0.2936 - val\_acc: 0.9019  
 Epoch 25/35  
 - 2s - loss: 0.0898 - acc: 0.9857 - val\_loss: 0.2472 - val\_acc: 0.9229  
 Epoch 26/35

```

- 2s - loss: 0.0812 - acc: 0.9872 - val_loss: 0.2237 - val_acc: 0.9553
Epoch 27/35
- 3s - loss: 0.0987 - acc: 0.9854 - val_loss: 0.2209 - val_acc: 0.9452
Epoch 28/35
- 3s - loss: 0.1038 - acc: 0.9878 - val_loss: 0.4144 - val_acc: 0.8897
Epoch 29/35
- 2s - loss: 0.0779 - acc: 0.9887 - val_loss: 0.2010 - val_acc: 0.9466
Epoch 30/35
- 2s - loss: 0.0920 - acc: 0.9863 - val_loss: 0.2401 - val_acc: 0.9373
Epoch 31/35
- 2s - loss: 0.0941 - acc: 0.9848 - val_loss: 0.2835 - val_acc: 0.9221
Epoch 32/35
- 2s - loss: 0.0764 - acc: 0.9884 - val_loss: 0.2661 - val_acc: 0.9373
Epoch 33/35
- 3s - loss: 0.1010 - acc: 0.9839 - val_loss: 0.3560 - val_acc: 0.8882
Epoch 34/35
- 3s - loss: 0.0815 - acc: 0.9887 - val_loss: 0.2258 - val_acc: 0.9625
Epoch 35/35
- 2s - loss: 0.0952 - acc: 0.9863 - val_loss: 0.2946 - val_acc: 0.9156
Train accuracy 0.9969558599695586 Test accuracy: 0.9156452775775054

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 118, 24)	5064
dropout_1 (Dropout)	(None, 118, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 24)	0
flatten_1 (Flatten)	(None, 552)	0
dense_1 (Dense)	(None, 32)	17696
dense_2 (Dense)	(None, 3)	99

---

```

Total params: 25,547
Trainable params: 25,547
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 1s - loss: 39.2019 - acc: 0.5799 - val_loss: 12.7552 - val_acc: 0.3850
Epoch 2/35
- 1s - loss: 5.6189 - acc: 0.7781 - val_loss: 2.4514 - val_acc: 0.6539

```

Epoch 3/35  
- 1s - loss: 1.2382 - acc: 0.8630 - val\_loss: 0.9263 - val\_acc: 0.8601  
Epoch 4/35  
- 1s - loss: 0.5834 - acc: 0.9023 - val\_loss: 0.6787 - val\_acc: 0.9214  
Epoch 5/35  
- 1s - loss: 0.4584 - acc: 0.9242 - val\_loss: 0.6536 - val\_acc: 0.8609  
Epoch 6/35  
- 1s - loss: 0.3885 - acc: 0.9376 - val\_loss: 0.5903 - val\_acc: 0.8926  
Epoch 7/35  
- 1s - loss: 0.3551 - acc: 0.9434 - val\_loss: 0.6376 - val\_acc: 0.8169  
Epoch 8/35  
- 1s - loss: 0.3068 - acc: 0.9565 - val\_loss: 0.4971 - val\_acc: 0.9193  
Epoch 9/35  
- 1s - loss: 0.2834 - acc: 0.9626 - val\_loss: 0.6978 - val\_acc: 0.7347  
Epoch 10/35  
- 1s - loss: 0.2700 - acc: 0.9619 - val\_loss: 0.6538 - val\_acc: 0.7332  
Epoch 11/35  
- 1s - loss: 0.2714 - acc: 0.9583 - val\_loss: 0.4139 - val\_acc: 0.9524  
Epoch 12/35  
- 1s - loss: 0.2600 - acc: 0.9586 - val\_loss: 0.4053 - val\_acc: 0.9589  
Epoch 13/35  
- 1s - loss: 0.2445 - acc: 0.9610 - val\_loss: 0.8558 - val\_acc: 0.6438  
Epoch 14/35  
- 1s - loss: 0.2236 - acc: 0.9732 - val\_loss: 0.3690 - val\_acc: 0.9632  
Epoch 15/35  
- 1s - loss: 0.2489 - acc: 0.9586 - val\_loss: 0.3849 - val\_acc: 0.9430  
Epoch 16/35  
- 1s - loss: 0.1980 - acc: 0.9772 - val\_loss: 0.3483 - val\_acc: 0.9416  
Epoch 17/35  
- 1s - loss: 0.2352 - acc: 0.9610 - val\_loss: 0.3313 - val\_acc: 0.9560  
Epoch 18/35  
- 1s - loss: 0.1979 - acc: 0.9714 - val\_loss: 0.3402 - val\_acc: 0.9683  
Epoch 19/35  
- 1s - loss: 0.2309 - acc: 0.9659 - val\_loss: 0.3487 - val\_acc: 0.9582  
Epoch 20/35  
- 1s - loss: 0.1898 - acc: 0.9741 - val\_loss: 0.3810 - val\_acc: 0.9185  
Epoch 21/35  
- 1s - loss: 0.2103 - acc: 0.9674 - val\_loss: 0.3658 - val\_acc: 0.9301  
Epoch 22/35  
- 1s - loss: 0.1889 - acc: 0.9750 - val\_loss: 0.5130 - val\_acc: 0.8190  
Epoch 23/35  
- 1s - loss: 0.1894 - acc: 0.9772 - val\_loss: 0.3019 - val\_acc: 0.9661  
Epoch 24/35  
- 1s - loss: 0.1794 - acc: 0.9741 - val\_loss: 0.4933 - val\_acc: 0.9063  
Epoch 25/35  
- 1s - loss: 0.2074 - acc: 0.9689 - val\_loss: 0.3295 - val\_acc: 0.9466  
Epoch 26/35  
- 1s - loss: 0.1839 - acc: 0.9735 - val\_loss: 0.3949 - val\_acc: 0.8969

```

Epoch 27/35
- 1s - loss: 0.2152 - acc: 0.9702 - val_loss: 0.2828 - val_acc: 0.9668
Epoch 28/35
- 1s - loss: 0.1765 - acc: 0.9738 - val_loss: 0.4237 - val_acc: 0.8666
Epoch 29/35
- 1s - loss: 0.1511 - acc: 0.9833 - val_loss: 0.3615 - val_acc: 0.9229
Epoch 30/35
- 1s - loss: 0.1955 - acc: 0.9635 - val_loss: 0.2946 - val_acc: 0.9531
Epoch 31/35
- 1s - loss: 0.1538 - acc: 0.9808 - val_loss: 0.3729 - val_acc: 0.9019
Epoch 32/35
- 1s - loss: 0.1719 - acc: 0.9753 - val_loss: 0.2935 - val_acc: 0.9603
Epoch 33/35
- 1s - loss: 0.1505 - acc: 0.9805 - val_loss: 0.2718 - val_acc: 0.9625
Epoch 34/35
- 1s - loss: 0.1748 - acc: 0.9705 - val_loss: 0.2647 - val_acc: 0.9668
Epoch 35/35
- 1s - loss: 0.1768 - acc: 0.9750 - val_loss: 0.2828 - val_acc: 0.9582
Train accuracy 0.9942161339421614 Test accuracy: 0.9581831290555155

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 32)	3104
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 32)	24608
dense_2 (Dense)	(None, 3)	99

```

Total params: 29,859
Trainable params: 29,859
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 3s - loss: 27.3881 - acc: 0.6295 - val_loss: 9.9919 - val_acc: 0.8479
Epoch 2/35
- 1s - loss: 4.4903 - acc: 0.9409 - val_loss: 1.8179 - val_acc: 0.9272
Epoch 3/35

```

- 1s - loss: 0.8064 - acc: 0.9811 - val\_loss: 0.7335 - val\_acc: 0.8940  
 Epoch 4/35  
 - 1s - loss: 0.3321 - acc: 0.9887 - val\_loss: 0.5376 - val\_acc: 0.9236  
 Epoch 5/35  
 - 1s - loss: 0.2562 - acc: 0.9875 - val\_loss: 0.4679 - val\_acc: 0.9625  
 Epoch 6/35  
 - 1s - loss: 0.2181 - acc: 0.9890 - val\_loss: 0.4439 - val\_acc: 0.9308  
 Epoch 7/35  
 - 1s - loss: 0.1874 - acc: 0.9936 - val\_loss: 0.4252 - val\_acc: 0.9279  
 Epoch 8/35  
 - 1s - loss: 0.1946 - acc: 0.9878 - val\_loss: 0.3679 - val\_acc: 0.9553  
 Epoch 9/35  
 - 1s - loss: 0.1670 - acc: 0.9933 - val\_loss: 0.3540 - val\_acc: 0.9517  
 Epoch 10/35  
 - 1s - loss: 0.1828 - acc: 0.9854 - val\_loss: 0.3626 - val\_acc: 0.9337  
 Epoch 11/35  
 - 1s - loss: 0.1558 - acc: 0.9915 - val\_loss: 0.3298 - val\_acc: 0.9618  
 Epoch 12/35  
 - 1s - loss: 0.1506 - acc: 0.9918 - val\_loss: 0.3803 - val\_acc: 0.9358  
 Epoch 13/35  
 - 1s - loss: 0.1551 - acc: 0.9918 - val\_loss: 0.3169 - val\_acc: 0.9625  
 Epoch 14/35  
 - 1s - loss: 0.1208 - acc: 0.9967 - val\_loss: 0.2937 - val\_acc: 0.9560  
 Epoch 15/35  
 - 1s - loss: 0.1577 - acc: 0.9845 - val\_loss: 0.2826 - val\_acc: 0.9596  
 Epoch 16/35  
 - 1s - loss: 0.1437 - acc: 0.9912 - val\_loss: 0.2539 - val\_acc: 0.9748  
 Epoch 17/35  
 - 1s - loss: 0.1378 - acc: 0.9900 - val\_loss: 0.2871 - val\_acc: 0.9539  
 Epoch 18/35  
 - 1s - loss: 0.1154 - acc: 0.9960 - val\_loss: 0.2800 - val\_acc: 0.9531  
 Epoch 19/35  
 - 1s - loss: 0.1385 - acc: 0.9866 - val\_loss: 0.2502 - val\_acc: 0.9733  
 Epoch 20/35  
 - 1s - loss: 0.1319 - acc: 0.9912 - val\_loss: 0.3112 - val\_acc: 0.9438  
 Epoch 21/35  
 - 1s - loss: 0.1021 - acc: 0.9957 - val\_loss: 0.2609 - val\_acc: 0.9683  
 Epoch 22/35  
 - 1s - loss: 0.1090 - acc: 0.9921 - val\_loss: 0.2268 - val\_acc: 0.9748  
 Epoch 23/35  
 - 1s - loss: 0.1325 - acc: 0.9872 - val\_loss: 0.3965 - val\_acc: 0.9373  
 Epoch 24/35  
 - 1s - loss: 0.1320 - acc: 0.9921 - val\_loss: 0.2634 - val\_acc: 0.9546  
 Epoch 25/35  
 - 1s - loss: 0.1250 - acc: 0.9884 - val\_loss: 0.3518 - val\_acc: 0.9243  
 Epoch 26/35  
 - 1s - loss: 0.1770 - acc: 0.9842 - val\_loss: 0.3506 - val\_acc: 0.9012  
 Epoch 27/35



```

- 1s - loss: 0.1345 - acc: 0.9921 - val_loss: 0.2509 - val_acc: 0.9596
Epoch 28/35
- 1s - loss: 0.1099 - acc: 0.9933 - val_loss: 0.2309 - val_acc: 0.9697
Epoch 29/35
- 1s - loss: 0.1186 - acc: 0.9881 - val_loss: 0.2837 - val_acc: 0.9704
Epoch 30/35
- 1s - loss: 0.1277 - acc: 0.9896 - val_loss: 0.2753 - val_acc: 0.9510
Epoch 31/35
- 1s - loss: 0.0841 - acc: 0.9982 - val_loss: 0.2199 - val_acc: 0.9748
Epoch 32/35
- 1s - loss: 0.1064 - acc: 0.9896 - val_loss: 0.2785 - val_acc: 0.9676
Epoch 33/35
- 1s - loss: 0.1141 - acc: 0.9933 - val_loss: 0.2267 - val_acc: 0.9531
Epoch 34/35
- 1s - loss: 0.0768 - acc: 0.9985 - val_loss: 0.3006 - val_acc: 0.9099
Epoch 35/35
- 1s - loss: 0.1017 - acc: 0.9903 - val_loss: 0.2049 - val_acc: 0.9726
Train accuracy 0.9939117199391172 Test accuracy: 0.9726027397260274

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 32)	3104
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 32)	24608
dense_2 (Dense)	(None, 3)	99

```

Total params: 29,859
Trainable params: 29,859
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 26.9980 - acc: 0.6356 - val_loss: 9.3638 - val_acc: 0.8565
Epoch 2/35
- 1s - loss: 4.1172 - acc: 0.9330 - val_loss: 1.6664 - val_acc: 0.9171
Epoch 3/35
- 1s - loss: 0.7333 - acc: 0.9784 - val_loss: 0.7055 - val_acc: 0.9005

```

Epoch 4/35  
- 1s - loss: 0.3305 - acc: 0.9851 - val\_loss: 0.5455 - val\_acc: 0.9236  
Epoch 5/35  
- 1s - loss: 0.2649 - acc: 0.9857 - val\_loss: 0.4915 - val\_acc: 0.9445  
Epoch 6/35  
- 1s - loss: 0.2244 - acc: 0.9893 - val\_loss: 0.4500 - val\_acc: 0.9265  
Epoch 7/35  
- 1s - loss: 0.1938 - acc: 0.9918 - val\_loss: 0.4114 - val\_acc: 0.9387  
Epoch 8/35  
- 1s - loss: 0.2048 - acc: 0.9857 - val\_loss: 0.3997 - val\_acc: 0.9387  
Epoch 9/35  
- 1s - loss: 0.1672 - acc: 0.9945 - val\_loss: 0.4089 - val\_acc: 0.9171  
Epoch 10/35  
- 1s - loss: 0.2155 - acc: 0.9753 - val\_loss: 0.5617 - val\_acc: 0.8226  
Epoch 11/35  
- 1s - loss: 0.1889 - acc: 0.9884 - val\_loss: 0.3511 - val\_acc: 0.9495  
Epoch 12/35  
- 1s - loss: 0.1630 - acc: 0.9900 - val\_loss: 0.3568 - val\_acc: 0.9510  
Epoch 13/35  
- 1s - loss: 0.1549 - acc: 0.9903 - val\_loss: 0.3479 - val\_acc: 0.9488  
Epoch 14/35  
- 1s - loss: 0.1271 - acc: 0.9960 - val\_loss: 0.3080 - val\_acc: 0.9582  
Epoch 15/35  
- 1s - loss: 0.1976 - acc: 0.9766 - val\_loss: 0.3502 - val\_acc: 0.9445  
Epoch 16/35  
- 1s - loss: 0.1934 - acc: 0.9836 - val\_loss: 0.3096 - val\_acc: 0.9546  
Epoch 17/35  
- 1s - loss: 0.1458 - acc: 0.9903 - val\_loss: 0.2750 - val\_acc: 0.9748  
Epoch 18/35  
- 1s - loss: 0.1243 - acc: 0.9924 - val\_loss: 0.2979 - val\_acc: 0.9488  
Epoch 19/35  
- 1s - loss: 0.1268 - acc: 0.9921 - val\_loss: 0.2595 - val\_acc: 0.9668  
Epoch 20/35  
- 1s - loss: 0.1205 - acc: 0.9924 - val\_loss: 0.2801 - val\_acc: 0.9481  
Epoch 21/35  
- 1s - loss: 0.1085 - acc: 0.9954 - val\_loss: 0.3436 - val\_acc: 0.9250  
Epoch 22/35  
- 1s - loss: 0.1347 - acc: 0.9857 - val\_loss: 0.3846 - val\_acc: 0.9056  
Epoch 23/35  
- 1s - loss: 0.1621 - acc: 0.9833 - val\_loss: 0.2656 - val\_acc: 0.9546  
Epoch 24/35  
- 1s - loss: 0.1952 - acc: 0.9741 - val\_loss: 0.3170 - val\_acc: 0.9337  
Epoch 25/35  
- 1s - loss: 0.1166 - acc: 0.9957 - val\_loss: 0.2663 - val\_acc: 0.9618  
Epoch 26/35  
- 1s - loss: 0.1003 - acc: 0.9973 - val\_loss: 0.2460 - val\_acc: 0.9582  
Epoch 27/35  
- 1s - loss: 0.1443 - acc: 0.9787 - val\_loss: 0.3404 - val\_acc: 0.9539

```

Epoch 28/35
- 1s - loss: 0.1427 - acc: 0.9918 - val_loss: 0.2628 - val_acc: 0.9517
Epoch 29/35
- 1s - loss: 0.0973 - acc: 0.9954 - val_loss: 0.3175 - val_acc: 0.9185
Epoch 30/35
- 1s - loss: 0.1410 - acc: 0.9851 - val_loss: 0.2311 - val_acc: 0.9603
Epoch 31/35
- 1s - loss: 0.0940 - acc: 0.9976 - val_loss: 0.2119 - val_acc: 0.9748
Epoch 32/35
- 1s - loss: 0.0934 - acc: 0.9939 - val_loss: 0.2554 - val_acc: 0.9704
Epoch 33/35
- 1s - loss: 0.1458 - acc: 0.9799 - val_loss: 0.2549 - val_acc: 0.9466
Epoch 34/35
- 1s - loss: 0.1295 - acc: 0.9872 - val_loss: 0.3132 - val_acc: 0.9495
Epoch 35/35
- 1s - loss: 0.0942 - acc: 0.9967 - val_loss: 0.2192 - val_acc: 0.9640
Train accuracy 0.9981735159817352 Test accuracy: 0.9639509733237203

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 5.3731 - acc: 0.6849 - val_loss: 3.2950 - val_acc: 0.8558
Epoch 2/35
- 2s - loss: 1.9720 - acc: 0.9735 - val_loss: 1.4488 - val_acc: 0.9438
Epoch 3/35
- 2s - loss: 0.8412 - acc: 0.9939 - val_loss: 0.8638 - val_acc: 0.9034
Epoch 4/35

```

- 2s - loss: 0.4769 - acc: 0.9936 - val\_loss: 0.5343 - val\_acc: 0.9740  
 Epoch 5/35  
 - 2s - loss: 0.3366 - acc: 0.9903 - val\_loss: 0.5894 - val\_acc: 0.9063  
 Epoch 6/35  
 - 2s - loss: 0.2931 - acc: 0.9924 - val\_loss: 0.3798 - val\_acc: 0.9769  
 Epoch 7/35  
 - 2s - loss: 0.2272 - acc: 0.9970 - val\_loss: 0.3377 - val\_acc: 0.9784  
 Epoch 8/35  
 - 2s - loss: 0.1928 - acc: 0.9994 - val\_loss: 0.3265 - val\_acc: 0.9762  
 Epoch 9/35  
 - 2s - loss: 0.1964 - acc: 0.9924 - val\_loss: 0.3172 - val\_acc: 0.9748  
 Epoch 10/35  
 - 2s - loss: 0.1537 - acc: 0.9994 - val\_loss: 0.2857 - val\_acc: 0.9640  
 Epoch 11/35  
 - 2s - loss: 0.1269 - acc: 1.0000 - val\_loss: 0.2797 - val\_acc: 0.9661  
 Epoch 12/35  
 - 2s - loss: 0.1253 - acc: 0.9957 - val\_loss: 0.2250 - val\_acc: 0.9813  
 Epoch 13/35  
 - 2s - loss: 0.1120 - acc: 0.9973 - val\_loss: 0.2441 - val\_acc: 0.9748  
 Epoch 14/35  
 - 2s - loss: 0.0932 - acc: 0.9988 - val\_loss: 0.2017 - val\_acc: 0.9697  
 Epoch 15/35  
 - 2s - loss: 0.0993 - acc: 0.9954 - val\_loss: 0.1939 - val\_acc: 0.9820  
 Epoch 16/35  
 - 2s - loss: 0.0837 - acc: 0.9982 - val\_loss: 0.2045 - val\_acc: 0.9712  
 Epoch 17/35  
 - 2s - loss: 0.0663 - acc: 0.9997 - val\_loss: 0.2127 - val\_acc: 0.9582  
 Epoch 18/35  
 - 2s - loss: 0.0683 - acc: 0.9982 - val\_loss: 0.1605 - val\_acc: 0.9733  
 Epoch 19/35  
 - 2s - loss: 0.0562 - acc: 0.9991 - val\_loss: 0.2615 - val\_acc: 0.9510  
 Epoch 20/35  
 - 2s - loss: 0.0676 - acc: 0.9960 - val\_loss: 0.1788 - val\_acc: 0.9784  
 Epoch 21/35  
 - 2s - loss: 0.0557 - acc: 0.9997 - val\_loss: 0.1802 - val\_acc: 0.9769  
 Epoch 22/35  
 - 2s - loss: 0.0556 - acc: 0.9954 - val\_loss: 0.1663 - val\_acc: 0.9661  
 Epoch 23/35  
 - 2s - loss: 0.0604 - acc: 0.9945 - val\_loss: 0.4041 - val\_acc: 0.8926  
 Epoch 24/35  
 - 2s - loss: 0.0657 - acc: 0.9970 - val\_loss: 0.1509 - val\_acc: 0.9625  
 Epoch 25/35  
 - 2s - loss: 0.0416 - acc: 0.9997 - val\_loss: 0.1427 - val\_acc: 0.9762  
 Epoch 26/35  
 - 2s - loss: 0.0352 - acc: 0.9997 - val\_loss: 0.1416 - val\_acc: 0.9740  
 Epoch 27/35  
 - 2s - loss: 0.0332 - acc: 0.9991 - val\_loss: 0.1580 - val\_acc: 0.9740  
 Epoch 28/35

```

- 2s - loss: 0.0303 - acc: 1.0000 - val_loss: 0.1436 - val_acc: 0.9748
Epoch 29/35
- 2s - loss: 0.0296 - acc: 1.0000 - val_loss: 0.1641 - val_acc: 0.9567
Epoch 30/35
- 2s - loss: 0.0589 - acc: 0.9915 - val_loss: 0.2665 - val_acc: 0.9351
Epoch 31/35
- 2s - loss: 0.0431 - acc: 0.9997 - val_loss: 0.1085 - val_acc: 0.9813
Epoch 32/35
- 2s - loss: 0.0312 - acc: 0.9994 - val_loss: 0.1131 - val_acc: 0.9798
Epoch 33/35
- 2s - loss: 0.0246 - acc: 1.0000 - val_loss: 0.1332 - val_acc: 0.9726
Epoch 34/35
- 2s - loss: 0.0237 - acc: 1.0000 - val_loss: 0.1511 - val_acc: 0.9755
Epoch 35/35
- 2s - loss: 0.0225 - acc: 1.0000 - val_loss: 0.1268 - val_acc: 0.9776
Train accuracy 1.0 Test accuracy: 0.9776496034607065

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 3s - loss: 85.4575 - acc: 0.6320 - val_loss: 46.1363 - val_acc: 0.8017
Epoch 2/35
- 2s - loss: 26.9283 - acc: 0.9510 - val_loss: 13.8221 - val_acc: 0.8955
Epoch 3/35
- 2s - loss: 7.6114 - acc: 0.9836 - val_loss: 3.9835 - val_acc: 0.8435
Epoch 4/35
- 2s - loss: 2.0453 - acc: 0.9836 - val_loss: 1.2971 - val_acc: 0.9329

```

Epoch 5/35  
- 2s - loss: 0.6617 - acc: 0.9872 - val\_loss: 0.7106 - val\_acc: 0.9193

Epoch 6/35  
- 2s - loss: 0.3492 - acc: 0.9826 - val\_loss: 0.5492 - val\_acc: 0.9164

Epoch 7/35  
- 2s - loss: 0.2386 - acc: 0.9924 - val\_loss: 0.4919 - val\_acc: 0.9120

Epoch 8/35  
- 2s - loss: 0.2221 - acc: 0.9890 - val\_loss: 0.4676 - val\_acc: 0.9070

Epoch 9/35  
- 2s - loss: 0.1851 - acc: 0.9912 - val\_loss: 0.3643 - val\_acc: 0.9430

Epoch 10/35  
- 2s - loss: 0.1821 - acc: 0.9890 - val\_loss: 0.4813 - val\_acc: 0.8659

Epoch 11/35  
- 2s - loss: 0.1754 - acc: 0.9875 - val\_loss: 0.3574 - val\_acc: 0.9488

Epoch 12/35  
- 2s - loss: 0.1744 - acc: 0.9851 - val\_loss: 0.3037 - val\_acc: 0.9618

Epoch 13/35  
- 2s - loss: 0.1517 - acc: 0.9878 - val\_loss: 0.3451 - val\_acc: 0.9531

Epoch 14/35  
- 2s - loss: 0.1404 - acc: 0.9924 - val\_loss: 0.3429 - val\_acc: 0.9344

Epoch 15/35  
- 2s - loss: 0.1392 - acc: 0.9887 - val\_loss: 0.3014 - val\_acc: 0.9567

Epoch 16/35  
- 2s - loss: 0.1380 - acc: 0.9896 - val\_loss: 0.2779 - val\_acc: 0.9676

Epoch 17/35  
- 2s - loss: 0.1209 - acc: 0.9939 - val\_loss: 0.2762 - val\_acc: 0.9474

Epoch 18/35  
- 2s - loss: 0.1247 - acc: 0.9942 - val\_loss: 0.2498 - val\_acc: 0.9762

Epoch 19/35  
- 2s - loss: 0.2006 - acc: 0.9732 - val\_loss: 0.3211 - val\_acc: 0.9611

Epoch 20/35  
- 2s - loss: 0.1352 - acc: 0.9933 - val\_loss: 0.2542 - val\_acc: 0.9820

Epoch 21/35  
- 2s - loss: 0.0976 - acc: 0.9976 - val\_loss: 0.2657 - val\_acc: 0.9676

Epoch 22/35  
- 2s - loss: 0.1060 - acc: 0.9933 - val\_loss: 0.2597 - val\_acc: 0.9625

Epoch 23/35  
- 2s - loss: 0.1031 - acc: 0.9967 - val\_loss: 0.2508 - val\_acc: 0.9740

Epoch 24/35  
- 2s - loss: 0.1392 - acc: 0.9848 - val\_loss: 0.2772 - val\_acc: 0.9661

Epoch 25/35  
- 2s - loss: 0.1289 - acc: 0.9918 - val\_loss: 0.2522 - val\_acc: 0.9654

Epoch 26/35  
- 2s - loss: 0.0913 - acc: 0.9963 - val\_loss: 0.2534 - val\_acc: 0.9539

Epoch 27/35  
- 2s - loss: 0.1134 - acc: 0.9881 - val\_loss: 0.2253 - val\_acc: 0.9647

Epoch 28/35  
- 2s - loss: 0.1087 - acc: 0.9927 - val\_loss: 0.2253 - val\_acc: 0.9748

```

Epoch 29/35
- 2s - loss: 0.1167 - acc: 0.9854 - val_loss: 0.3669 - val_acc: 0.8774
Epoch 30/35
- 2s - loss: 0.1727 - acc: 0.9820 - val_loss: 0.2581 - val_acc: 0.9459
Epoch 31/35
- 2s - loss: 0.0800 - acc: 1.0000 - val_loss: 0.2200 - val_acc: 0.9726
Epoch 32/35
- 2s - loss: 0.0816 - acc: 0.9948 - val_loss: 0.2120 - val_acc: 0.9798
Epoch 33/35
- 2s - loss: 0.1219 - acc: 0.9866 - val_loss: 0.2879 - val_acc: 0.9423
Epoch 34/35
- 2s - loss: 0.1153 - acc: 0.9933 - val_loss: 0.2207 - val_acc: 0.9546
Epoch 35/35
- 2s - loss: 0.0852 - acc: 0.9957 - val_loss: 0.2346 - val_acc: 0.9596
Train accuracy 0.9872146118721461 Test accuracy: 0.9596250901225667
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 116, 32)	6304
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 31,779
Trainable params: 31,779
Non-trainable params: 0
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```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 97.9907 - acc: 0.6764 - val_loss: 58.6598 - val_acc: 0.8147
Epoch 2/35
- 1s - loss: 37.1686 - acc: 0.9412 - val_loss: 21.5103 - val_acc: 0.9315
Epoch 3/35
- 1s - loss: 13.1090 - acc: 0.9729 - val_loss: 7.4712 - val_acc: 0.9214
Epoch 4/35
- 1s - loss: 4.3327 - acc: 0.9799 - val_loss: 2.6286 - val_acc: 0.9286
Epoch 5/35

```

- 1s - loss: 1.4381 - acc: 0.9823 - val\_loss: 1.1314 - val\_acc: 0.9128  
 Epoch 6/35  
 - 1s - loss: 0.5915 - acc: 0.9799 - val\_loss: 0.6916 - val\_acc: 0.9409  
 Epoch 7/35  
 - 1s - loss: 0.3416 - acc: 0.9854 - val\_loss: 0.5601 - val\_acc: 0.9185  
 Epoch 8/35  
 - 1s - loss: 0.2929 - acc: 0.9796 - val\_loss: 0.5309 - val\_acc: 0.9207  
 Epoch 9/35  
 - 1s - loss: 0.2459 - acc: 0.9866 - val\_loss: 0.4629 - val\_acc: 0.9265  
 Epoch 10/35  
 - 1s - loss: 0.2521 - acc: 0.9769 - val\_loss: 0.4875 - val\_acc: 0.9135  
 Epoch 11/35  
 - 1s - loss: 0.2060 - acc: 0.9912 - val\_loss: 0.4533 - val\_acc: 0.9243  
 Epoch 12/35  
 - 1s - loss: 0.2173 - acc: 0.9802 - val\_loss: 0.4253 - val\_acc: 0.9380  
 Epoch 13/35  
 - 1s - loss: 0.1830 - acc: 0.9915 - val\_loss: 0.4391 - val\_acc: 0.9243  
 Epoch 14/35  
 - 1s - loss: 0.1769 - acc: 0.9893 - val\_loss: 0.4240 - val\_acc: 0.9308  
 Epoch 15/35  
 - 1s - loss: 0.1699 - acc: 0.9887 - val\_loss: 0.3923 - val\_acc: 0.9265  
 Epoch 16/35  
 - 1s - loss: 0.1712 - acc: 0.9887 - val\_loss: 0.3813 - val\_acc: 0.9510  
 Epoch 17/35  
 - 1s - loss: 0.1680 - acc: 0.9875 - val\_loss: 0.3583 - val\_acc: 0.9517  
 Epoch 18/35  
 - 1s - loss: 0.1381 - acc: 0.9967 - val\_loss: 0.3887 - val\_acc: 0.9185  
 Epoch 19/35  
 - 1s - loss: 0.2130 - acc: 0.9747 - val\_loss: 0.4393 - val\_acc: 0.9236  
 Epoch 20/35  
 - 1s - loss: 0.1568 - acc: 0.9918 - val\_loss: 0.3781 - val\_acc: 0.9257  
 Epoch 21/35  
 - 1s - loss: 0.1368 - acc: 0.9924 - val\_loss: 0.3714 - val\_acc: 0.9315  
 Epoch 22/35  
 - 1s - loss: 0.1312 - acc: 0.9927 - val\_loss: 0.3527 - val\_acc: 0.9322  
 Epoch 23/35  
 - 1s - loss: 0.1272 - acc: 0.9927 - val\_loss: 0.3251 - val\_acc: 0.9387  
 Epoch 24/35  
 - 1s - loss: 0.1499 - acc: 0.9854 - val\_loss: 0.4469 - val\_acc: 0.8854  
 Epoch 25/35  
 - 1s - loss: 0.1501 - acc: 0.9903 - val\_loss: 0.3178 - val\_acc: 0.9438  
 Epoch 26/35  
 - 1s - loss: 0.1287 - acc: 0.9912 - val\_loss: 0.3378 - val\_acc: 0.9459  
 Epoch 27/35  
 - 1s - loss: 0.1163 - acc: 0.9936 - val\_loss: 0.3807 - val\_acc: 0.9041  
 Epoch 28/35  
 - 1s - loss: 0.1551 - acc: 0.9857 - val\_loss: 0.3388 - val\_acc: 0.9337  
 Epoch 29/35



```

- 1s - loss: 0.1197 - acc: 0.9930 - val_loss: 0.2921 - val_acc: 0.9676
Epoch 30/35
- 1s - loss: 0.1227 - acc: 0.9912 - val_loss: 0.3020 - val_acc: 0.9596
Epoch 31/35
- 1s - loss: 0.1073 - acc: 0.9945 - val_loss: 0.3227 - val_acc: 0.9329
Epoch 32/35
- 1s - loss: 0.1328 - acc: 0.9863 - val_loss: 0.3564 - val_acc: 0.9301
Epoch 33/35
- 1s - loss: 0.1018 - acc: 0.9963 - val_loss: 0.3154 - val_acc: 0.9315
Epoch 34/35
- 1s - loss: 0.1571 - acc: 0.9817 - val_loss: 0.3576 - val_acc: 0.9430
Epoch 35/35
- 1s - loss: 0.1271 - acc: 0.9912 - val_loss: 0.3063 - val_acc: 0.9423
Train accuracy 0.9917808219178083 Test accuracy: 0.9423215573179524
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 46.4403 - acc: 0.6377 - val_loss: 22.0815 - val_acc: 0.8637
Epoch 2/35
- 1s - loss: 11.6855 - acc: 0.9534 - val_loss: 5.3694 - val_acc: 0.9048
Epoch 3/35
- 1s - loss: 2.6445 - acc: 0.9836 - val_loss: 1.4798 - val_acc: 0.8796
Epoch 4/35
- 1s - loss: 0.6847 - acc: 0.9860 - val_loss: 0.6603 - val_acc: 0.9308
Epoch 5/35
- 1s - loss: 0.3220 - acc: 0.9857 - val_loss: 0.5053 - val_acc: 0.9358

```

Epoch 6/35  
- 1s - loss: 0.2333 - acc: 0.9875 - val\_loss: 0.4204 - val\_acc: 0.9481  
Epoch 7/35  
- 1s - loss: 0.1835 - acc: 0.9921 - val\_loss: 0.4017 - val\_acc: 0.9337  
Epoch 8/35  
- 1s - loss: 0.1867 - acc: 0.9881 - val\_loss: 0.4119 - val\_acc: 0.9243  
Epoch 9/35  
- 1s - loss: 0.1581 - acc: 0.9933 - val\_loss: 0.3246 - val\_acc: 0.9596  
Epoch 10/35  
- 1s - loss: 0.1982 - acc: 0.9756 - val\_loss: 0.3918 - val\_acc: 0.9351  
Epoch 11/35  
- 1s - loss: 0.1543 - acc: 0.9936 - val\_loss: 0.3503 - val\_acc: 0.9344  
Epoch 12/35  
- 1s - loss: 0.1395 - acc: 0.9909 - val\_loss: 0.3074 - val\_acc: 0.9402  
Epoch 13/35  
- 1s - loss: 0.1368 - acc: 0.9890 - val\_loss: 0.3423 - val\_acc: 0.9452  
Epoch 14/35  
- 1s - loss: 0.1273 - acc: 0.9930 - val\_loss: 0.2923 - val\_acc: 0.9524  
Epoch 15/35  
- 1s - loss: 0.1284 - acc: 0.9890 - val\_loss: 0.3160 - val\_acc: 0.9308  
Epoch 16/35  
- 1s - loss: 0.1078 - acc: 0.9954 - val\_loss: 0.2734 - val\_acc: 0.9690  
Epoch 17/35  
- 1s - loss: 0.1333 - acc: 0.9860 - val\_loss: 0.2396 - val\_acc: 0.9704  
Epoch 18/35  
- 1s - loss: 0.1020 - acc: 0.9973 - val\_loss: 0.2609 - val\_acc: 0.9611  
Epoch 19/35  
- 1s - loss: 0.1403 - acc: 0.9851 - val\_loss: 0.2301 - val\_acc: 0.9697  
Epoch 20/35  
- 1s - loss: 0.0893 - acc: 0.9985 - val\_loss: 0.2532 - val\_acc: 0.9632  
Epoch 21/35  
- 1s - loss: 0.1056 - acc: 0.9906 - val\_loss: 0.2487 - val\_acc: 0.9618  
Epoch 22/35  
- 1s - loss: 0.0970 - acc: 0.9933 - val\_loss: 0.2644 - val\_acc: 0.9553  
Epoch 23/35  
- 1s - loss: 0.1006 - acc: 0.9927 - val\_loss: 0.2364 - val\_acc: 0.9632  
Epoch 24/35  
- 1s - loss: 0.1385 - acc: 0.9802 - val\_loss: 0.2831 - val\_acc: 0.9510  
Epoch 25/35  
- 1s - loss: 0.1122 - acc: 0.9957 - val\_loss: 0.2170 - val\_acc: 0.9668  
Epoch 26/35  
- 1s - loss: 0.1101 - acc: 0.9872 - val\_loss: 0.3014 - val\_acc: 0.9373  
Epoch 27/35  
- 1s - loss: 0.2375 - acc: 0.9711 - val\_loss: 0.2418 - val\_acc: 0.9668  
Epoch 28/35  
- 1s - loss: 0.0938 - acc: 0.9979 - val\_loss: 0.2356 - val\_acc: 0.9611  
Epoch 29/35  
- 1s - loss: 0.0933 - acc: 0.9927 - val\_loss: 0.2942 - val\_acc: 0.9438

Epoch 30/35  
 - 1s - loss: 0.1212 - acc: 0.9872 - val\_loss: 0.2685 - val\_acc: 0.9510  
 Epoch 31/35  
 - 1s - loss: 0.0780 - acc: 0.9985 - val\_loss: 0.2305 - val\_acc: 0.9661  
 Epoch 32/35  
 - 1s - loss: 0.0739 - acc: 0.9957 - val\_loss: 0.2600 - val\_acc: 0.9546  
 Epoch 33/35  
 - 1s - loss: 0.0698 - acc: 0.9985 - val\_loss: 0.2241 - val\_acc: 0.9553  
 Epoch 34/35  
 - 1s - loss: 0.1447 - acc: 0.9775 - val\_loss: 0.4226 - val\_acc: 0.9120  
 Epoch 35/35  
 - 1s - loss: 0.1761 - acc: 0.9845 - val\_loss: 0.2105 - val\_acc: 0.9697  
 Train accuracy 0.9993911720120562 Test accuracy: 0.969718817591925

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

---

Total params: 32,931  
 Trainable params: 32,931  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/55  
 - 2s - loss: 134.1296 - acc: 0.5565 - val\_loss: 72.0967 - val\_acc: 0.7585  
 Epoch 2/55  
 - 1s - loss: 42.9383 - acc: 0.8846 - val\_loss: 22.7547 - val\_acc: 0.8753  
 Epoch 3/55  
 - 1s - loss: 13.0977 - acc: 0.9458 - val\_loss: 6.9697 - val\_acc: 0.8349  
 Epoch 4/55  
 - 1s - loss: 3.8167 - acc: 0.9562 - val\_loss: 2.2678 - val\_acc: 0.9099  
 Epoch 5/55  
 - 1s - loss: 1.2083 - acc: 0.9601 - val\_loss: 1.0682 - val\_acc: 0.9070  
 Epoch 6/55

- 1s - loss: 0.5562 - acc: 0.9647 - val\_loss: 0.7619 - val\_acc: 0.9344  
 Epoch 7/55  
 - 1s - loss: 0.3752 - acc: 0.9784 - val\_loss: 0.6574 - val\_acc: 0.9265  
 Epoch 8/55  
 - 1s - loss: 0.3293 - acc: 0.9811 - val\_loss: 0.6133 - val\_acc: 0.9366  
 Epoch 9/55  
 - 1s - loss: 0.2897 - acc: 0.9890 - val\_loss: 0.5855 - val\_acc: 0.9344  
 Epoch 10/55  
 - 1s - loss: 0.2897 - acc: 0.9781 - val\_loss: 0.5877 - val\_acc: 0.9113  
 Epoch 11/55  
 - 1s - loss: 0.2674 - acc: 0.9836 - val\_loss: 0.5681 - val\_acc: 0.9265  
 Epoch 12/55  
 - 1s - loss: 0.2568 - acc: 0.9830 - val\_loss: 0.5115 - val\_acc: 0.9704  
 Epoch 13/55  
 - 1s - loss: 0.2329 - acc: 0.9878 - val\_loss: 0.5245 - val\_acc: 0.9279  
 Epoch 14/55  
 - 1s - loss: 0.2167 - acc: 0.9881 - val\_loss: 0.4896 - val\_acc: 0.9575  
 Epoch 15/55  
 - 1s - loss: 0.2088 - acc: 0.9887 - val\_loss: 0.4902 - val\_acc: 0.9257  
 Epoch 16/55  
 - 1s - loss: 0.2176 - acc: 0.9857 - val\_loss: 0.4495 - val\_acc: 0.9517  
 Epoch 17/55  
 - 1s - loss: 0.2311 - acc: 0.9784 - val\_loss: 0.4221 - val\_acc: 0.9755  
 Epoch 18/55  
 - 1s - loss: 0.1882 - acc: 0.9896 - val\_loss: 0.4489 - val\_acc: 0.9445  
 Epoch 19/55  
 - 1s - loss: 0.2512 - acc: 0.9702 - val\_loss: 0.4964 - val\_acc: 0.9229  
 Epoch 20/55  
 - 1s - loss: 0.2122 - acc: 0.9875 - val\_loss: 0.4471 - val\_acc: 0.9286  
 Epoch 21/55  
 - 1s - loss: 0.1810 - acc: 0.9878 - val\_loss: 0.4199 - val\_acc: 0.9488  
 Epoch 22/55  
 - 1s - loss: 0.1843 - acc: 0.9820 - val\_loss: 0.5054 - val\_acc: 0.9012  
 Epoch 23/55  
 - 1s - loss: 0.2122 - acc: 0.9784 - val\_loss: 0.4095 - val\_acc: 0.9488  
 Epoch 24/55  
 - 1s - loss: 0.1780 - acc: 0.9869 - val\_loss: 0.4052 - val\_acc: 0.9380  
 Epoch 25/55  
 - 1s - loss: 0.1885 - acc: 0.9830 - val\_loss: 0.3812 - val\_acc: 0.9553  
 Epoch 26/55  
 - 1s - loss: 0.1829 - acc: 0.9836 - val\_loss: 0.3933 - val\_acc: 0.9416  
 Epoch 27/55  
 - 1s - loss: 0.1556 - acc: 0.9890 - val\_loss: 0.3492 - val\_acc: 0.9503  
 Epoch 28/55  
 - 1s - loss: 0.1713 - acc: 0.9863 - val\_loss: 0.3846 - val\_acc: 0.9322  
 Epoch 29/55  
 - 1s - loss: 0.1570 - acc: 0.9887 - val\_loss: 0.3516 - val\_acc: 0.9582  
 Epoch 30/55

- 1s - loss: 0.1476 - acc: 0.9900 - val\_loss: 0.3565 - val\_acc: 0.9560  
 Epoch 31/55  
 - 1s - loss: 0.1318 - acc: 0.9948 - val\_loss: 0.3471 - val\_acc: 0.9445  
 Epoch 32/55  
 - 1s - loss: 0.1863 - acc: 0.9766 - val\_loss: 0.3691 - val\_acc: 0.9524  
 Epoch 33/55  
 - 1s - loss: 0.1494 - acc: 0.9881 - val\_loss: 0.3860 - val\_acc: 0.9221  
 Epoch 34/55  
 - 1s - loss: 0.1575 - acc: 0.9839 - val\_loss: 0.3871 - val\_acc: 0.9293  
 Epoch 35/55  
 - 1s - loss: 0.1381 - acc: 0.9924 - val\_loss: 0.3384 - val\_acc: 0.9474  
 Epoch 36/55  
 - 1s - loss: 0.1944 - acc: 0.9778 - val\_loss: 0.3306 - val\_acc: 0.9466  
 Epoch 37/55  
 - 1s - loss: 0.1345 - acc: 0.9921 - val\_loss: 0.3807 - val\_acc: 0.9236  
 Epoch 38/55  
 - 1s - loss: 0.1586 - acc: 0.9833 - val\_loss: 0.3259 - val\_acc: 0.9567  
 Epoch 39/55  
 - 1s - loss: 0.1471 - acc: 0.9854 - val\_loss: 0.4042 - val\_acc: 0.9034  
 Epoch 40/55  
 - 1s - loss: 0.1360 - acc: 0.9915 - val\_loss: 0.3764 - val\_acc: 0.9164  
 Epoch 41/55  
 - 1s - loss: 0.1631 - acc: 0.9778 - val\_loss: 0.4861 - val\_acc: 0.9185  
 Epoch 42/55  
 - 1s - loss: 0.2410 - acc: 0.9683 - val\_loss: 0.3421 - val\_acc: 0.9495  
 Epoch 43/55  
 - 1s - loss: 0.1256 - acc: 0.9957 - val\_loss: 0.3434 - val\_acc: 0.9236  
 Epoch 44/55  
 - 1s - loss: 0.1146 - acc: 0.9945 - val\_loss: 0.3112 - val\_acc: 0.9589  
 Epoch 45/55  
 - 1s - loss: 0.1250 - acc: 0.9887 - val\_loss: 0.3400 - val\_acc: 0.9214  
 Epoch 46/55  
 - 1s - loss: 0.1427 - acc: 0.9860 - val\_loss: 0.3617 - val\_acc: 0.9048  
 Epoch 47/55  
 - 1s - loss: 0.1425 - acc: 0.9839 - val\_loss: 0.3447 - val\_acc: 0.9416  
 Epoch 48/55  
 - 1s - loss: 0.1258 - acc: 0.9912 - val\_loss: 0.3318 - val\_acc: 0.9481  
 Epoch 49/55  
 - 1s - loss: 0.1771 - acc: 0.9732 - val\_loss: 0.3177 - val\_acc: 0.9366  
 Epoch 50/55  
 - 1s - loss: 0.1338 - acc: 0.9903 - val\_loss: 0.3064 - val\_acc: 0.9387  
 Epoch 51/55  
 - 1s - loss: 0.1113 - acc: 0.9948 - val\_loss: 0.3050 - val\_acc: 0.9373  
 Epoch 52/55  
 - 1s - loss: 0.1137 - acc: 0.9930 - val\_loss: 0.2843 - val\_acc: 0.9575  
 Epoch 53/55  
 - 1s - loss: 0.1096 - acc: 0.9909 - val\_loss: 0.3224 - val\_acc: 0.9128  
 Epoch 54/55

- 1s - loss: 0.1334 - acc: 0.9851 - val\_loss: 0.3508 - val\_acc: 0.9402  
Epoch 55/55  
- 1s - loss: 0.2171 - acc: 0.9738 - val\_loss: 0.2816 - val\_acc: 0.9517  
Train accuracy 0.9972602739907472 Test accuracy: 0.9516943042537851

---

Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
<hr/>		
conv1d_2 (Conv1D)	(None, 116, 32)	6304
<hr/>		
dropout_1 (Dropout)	(None, 116, 32)	0
<hr/>		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
<hr/>		
flatten_1 (Flatten)	(None, 736)	0
<hr/>		
dense_1 (Dense)	(None, 32)	23584
<hr/>		
dense_2 (Dense)	(None, 3)	99
<hr/>		

Total params: 31,779  
Trainable params: 31,779  
Non-trainable params: 0

---

None  
Train on 3285 samples, validate on 1387 samples  
Epoch 1/35  
- 2s - loss: 74.3602 - acc: 0.6396 - val\_loss: 48.5813 - val\_acc: 0.7844  
Epoch 2/35  
- 1s - loss: 33.2669 - acc: 0.9157 - val\_loss: 21.6680 - val\_acc: 0.9063  
Epoch 3/35  
- 1s - loss: 14.6154 - acc: 0.9671 - val\_loss: 9.5982 - val\_acc: 0.9084  
Epoch 4/35  
- 1s - loss: 6.3211 - acc: 0.9738 - val\_loss: 4.2859 - val\_acc: 0.9301  
Epoch 5/35  
- 1s - loss: 2.7123 - acc: 0.9830 - val\_loss: 2.0179 - val\_acc: 0.9178  
Epoch 6/35  
- 1s - loss: 1.2117 - acc: 0.9854 - val\_loss: 1.0816 - val\_acc: 0.9438  
Epoch 7/35  
- 1s - loss: 0.6072 - acc: 0.9903 - val\_loss: 0.7150 - val\_acc: 0.9366  
Epoch 8/35  
- 1s - loss: 0.3851 - acc: 0.9857 - val\_loss: 0.5743 - val\_acc: 0.9416  
Epoch 9/35  
- 1s - loss: 0.2950 - acc: 0.9887 - val\_loss: 0.5061 - val\_acc: 0.9200  
Epoch 10/35  
- 1s - loss: 0.2546 - acc: 0.9887 - val\_loss: 0.5021 - val\_acc: 0.9099

Epoch 11/35  
- 1s - loss: 0.2318 - acc: 0.9906 - val\_loss: 0.4677 - val\_acc: 0.9229  
Epoch 12/35  
- 1s - loss: 0.2276 - acc: 0.9875 - val\_loss: 0.4232 - val\_acc: 0.9438  
Epoch 13/35  
- 1s - loss: 0.2006 - acc: 0.9942 - val\_loss: 0.4390 - val\_acc: 0.9387  
Epoch 14/35  
- 1s - loss: 0.1907 - acc: 0.9918 - val\_loss: 0.4263 - val\_acc: 0.9402  
Epoch 15/35  
- 1s - loss: 0.1863 - acc: 0.9903 - val\_loss: 0.3839 - val\_acc: 0.9539  
Epoch 16/35  
- 1s - loss: 0.1793 - acc: 0.9927 - val\_loss: 0.3652 - val\_acc: 0.9625  
Epoch 17/35  
- 1s - loss: 0.1835 - acc: 0.9878 - val\_loss: 0.3605 - val\_acc: 0.9430  
Epoch 18/35  
- 1s - loss: 0.1554 - acc: 0.9963 - val\_loss: 0.3787 - val\_acc: 0.9301  
Epoch 19/35  
- 1s - loss: 0.1988 - acc: 0.9814 - val\_loss: 0.3221 - val\_acc: 0.9640  
Epoch 20/35  
- 1s - loss: 0.1506 - acc: 0.9973 - val\_loss: 0.3565 - val\_acc: 0.9301  
Epoch 21/35  
- 1s - loss: 0.1430 - acc: 0.9957 - val\_loss: 0.3639 - val\_acc: 0.9488  
Epoch 22/35  
- 1s - loss: 0.1414 - acc: 0.9948 - val\_loss: 0.3575 - val\_acc: 0.9394  
Epoch 23/35  
- 1s - loss: 0.1422 - acc: 0.9927 - val\_loss: 0.3075 - val\_acc: 0.9640  
Epoch 24/35  
- 1s - loss: 0.1523 - acc: 0.9881 - val\_loss: 0.3284 - val\_acc: 0.9445  
Epoch 25/35  
- 1s - loss: 0.1379 - acc: 0.9939 - val\_loss: 0.3184 - val\_acc: 0.9409  
Epoch 26/35  
- 1s - loss: 0.1387 - acc: 0.9915 - val\_loss: 0.3187 - val\_acc: 0.9524  
Epoch 27/35  
- 1s - loss: 0.1244 - acc: 0.9957 - val\_loss: 0.3231 - val\_acc: 0.9603  
Epoch 28/35  
- 1s - loss: 0.1457 - acc: 0.9927 - val\_loss: 0.3073 - val\_acc: 0.9553  
Epoch 29/35  
- 1s - loss: 0.1216 - acc: 0.9951 - val\_loss: 0.2909 - val\_acc: 0.9596  
Epoch 30/35  
- 1s - loss: 0.1246 - acc: 0.9945 - val\_loss: 0.2983 - val\_acc: 0.9603  
Epoch 31/35  
- 1s - loss: 0.1120 - acc: 0.9970 - val\_loss: 0.2772 - val\_acc: 0.9603  
Epoch 32/35  
- 1s - loss: 0.1699 - acc: 0.9756 - val\_loss: 0.3146 - val\_acc: 0.9438  
Epoch 33/35  
- 1s - loss: 0.1193 - acc: 0.9954 - val\_loss: 0.2886 - val\_acc: 0.9567  
Epoch 34/35  
- 1s - loss: 0.1091 - acc: 0.9957 - val\_loss: 0.2871 - val\_acc: 0.9589

Epoch 35/35

- 1s - loss: 0.1152 - acc: 0.9921 - val\_loss: 0.2983 - val\_acc: 0.9481

Train accuracy 0.9917808219178083 Test accuracy: 0.9480894015861572

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 126, 32)	896
<hr/>		
conv1d_2 (Conv1D)	(None, 120, 32)	7200
<hr/>		
dropout_1 (Dropout)	(None, 120, 32)	0
<hr/>		
max_pooling1d_1 (MaxPooling1D)	(None, 40, 32)	0
<hr/>		
flatten_1 (Flatten)	(None, 1280)	0
<hr/>		
dense_1 (Dense)	(None, 32)	40992
<hr/>		
dense_2 (Dense)	(None, 3)	99
<hr/>		

Total params: 49,187

Trainable params: 49,187

Non-trainable params: 0

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None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 13.9091 - acc: 0.7342 - val\_loss: 8.5132 - val\_acc: 0.8724

Epoch 2/35

- 2s - loss: 5.3743 - acc: 0.9833 - val\_loss: 3.4994 - val\_acc: 0.9193

Epoch 3/35

- 2s - loss: 2.0890 - acc: 0.9936 - val\_loss: 1.5080 - val\_acc: 0.9142

Epoch 4/35

- 2s - loss: 0.8608 - acc: 0.9945 - val\_loss: 0.7636 - val\_acc: 0.9423

Epoch 5/35

- 2s - loss: 0.4148 - acc: 0.9951 - val\_loss: 0.4959 - val\_acc: 0.9488

Epoch 6/35

- 2s - loss: 0.2585 - acc: 0.9960 - val\_loss: 0.3673 - val\_acc: 0.9603

Epoch 7/35

- 2s - loss: 0.2018 - acc: 0.9936 - val\_loss: 0.4383 - val\_acc: 0.9063

Epoch 8/35

- 2s - loss: 0.2077 - acc: 0.9884 - val\_loss: 0.3149 - val\_acc: 0.9546

Epoch 9/35

- 2s - loss: 0.1410 - acc: 0.9970 - val\_loss: 0.3399 - val\_acc: 0.9164

Epoch 10/35

- 2s - loss: 0.1371 - acc: 0.9939 - val\_loss: 0.2681 - val\_acc: 0.9596

Epoch 11/35



- 2s - loss: 0.1107 - acc: 0.9982 - val\_loss: 0.3367 - val\_acc: 0.9056  
 Epoch 12/35  
 - 2s - loss: 0.1036 - acc: 0.9960 - val\_loss: 0.2671 - val\_acc: 0.9430  
 Epoch 13/35  
 - 2s - loss: 0.0987 - acc: 0.9970 - val\_loss: 0.2398 - val\_acc: 0.9531  
 Epoch 14/35  
 - 2s - loss: 0.0697 - acc: 1.0000 - val\_loss: 0.1904 - val\_acc: 0.9726  
 Epoch 15/35  
 - 2s - loss: 0.0687 - acc: 0.9988 - val\_loss: 0.1943 - val\_acc: 0.9654  
 Epoch 16/35  
 - 2s - loss: 0.0758 - acc: 0.9963 - val\_loss: 0.2089 - val\_acc: 0.9524  
 Epoch 17/35  
 - 2s - loss: 0.0697 - acc: 0.9945 - val\_loss: 0.1990 - val\_acc: 0.9582  
 Epoch 18/35  
 - 2s - loss: 0.0792 - acc: 0.9982 - val\_loss: 0.1904 - val\_acc: 0.9603  
 Epoch 19/35  
 - 2s - loss: 0.0528 - acc: 0.9994 - val\_loss: 0.2094 - val\_acc: 0.9452  
 Epoch 20/35  
 - 2s - loss: 0.1249 - acc: 0.9836 - val\_loss: 0.1641 - val\_acc: 0.9683  
 Epoch 21/35  
 - 2s - loss: 0.0594 - acc: 0.9994 - val\_loss: 0.1897 - val\_acc: 0.9517  
 Epoch 22/35  
 - 2s - loss: 0.0605 - acc: 0.9973 - val\_loss: 0.1603 - val\_acc: 0.9632  
 Epoch 23/35  
 - 2s - loss: 0.0492 - acc: 0.9988 - val\_loss: 0.3031 - val\_acc: 0.8983  
 Epoch 24/35  
 - 2s - loss: 0.0495 - acc: 0.9973 - val\_loss: 0.1761 - val\_acc: 0.9452  
 Epoch 25/35  
 - 2s - loss: 0.0521 - acc: 0.9985 - val\_loss: 0.1439 - val\_acc: 0.9719  
 Epoch 26/35  
 - 2s - loss: 0.0798 - acc: 0.9906 - val\_loss: 0.1967 - val\_acc: 0.9553  
 Epoch 27/35  
 - 2s - loss: 0.0514 - acc: 0.9991 - val\_loss: 0.1429 - val\_acc: 0.9625  
 Epoch 28/35  
 - 2s - loss: 0.0361 - acc: 0.9997 - val\_loss: 0.1443 - val\_acc: 0.9690  
 Epoch 29/35  
 - 2s - loss: 0.0697 - acc: 0.9939 - val\_loss: 0.1589 - val\_acc: 0.9596  
 Epoch 30/35  
 - 2s - loss: 0.0556 - acc: 0.9979 - val\_loss: 0.1505 - val\_acc: 0.9618  
 Epoch 31/35  
 - 2s - loss: 0.0354 - acc: 1.0000 - val\_loss: 0.1499 - val\_acc: 0.9640  
 Epoch 32/35  
 - 2s - loss: 0.0558 - acc: 0.9939 - val\_loss: 0.2457 - val\_acc: 0.9423  
 Epoch 33/35  
 - 2s - loss: 0.0580 - acc: 0.9979 - val\_loss: 0.1406 - val\_acc: 0.9596  
 Epoch 34/35  
 - 2s - loss: 0.0330 - acc: 1.0000 - val\_loss: 0.1574 - val\_acc: 0.9596  
 Epoch 35/35

- 2s - loss: 0.0529 - acc: 0.9948 - val\_loss: 0.3147 - val\_acc: 0.9466  
 Train accuracy 0.9887366818873669 Test accuracy: 0.946647440519106

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

Total params: 32,931  
 Trainable params: 32,931  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 3s - loss: 30.8432 - acc: 0.5963 - val\_loss: 14.3953 - val\_acc: 0.7808

Epoch 2/55

- 2s - loss: 7.8182 - acc: 0.9212 - val\_loss: 4.0796 - val\_acc: 0.8947

Epoch 3/55

- 2s - loss: 2.3093 - acc: 0.9860 - val\_loss: 1.6618 - val\_acc: 0.8645

Epoch 4/55

- 2s - loss: 0.9384 - acc: 0.9884 - val\_loss: 0.8734 - val\_acc: 0.9452

Epoch 5/55

- 2s - loss: 0.4883 - acc: 0.9933 - val\_loss: 0.6100 - val\_acc: 0.9459

Epoch 6/55

- 2s - loss: 0.3021 - acc: 0.9948 - val\_loss: 0.4636 - val\_acc: 0.9582

Epoch 7/55

- 2s - loss: 0.2200 - acc: 0.9954 - val\_loss: 0.4049 - val\_acc: 0.9582

Epoch 8/55

- 2s - loss: 0.1840 - acc: 0.9942 - val\_loss: 0.4251 - val\_acc: 0.9070

Epoch 9/55

- 2s - loss: 0.1601 - acc: 0.9967 - val\_loss: 0.3381 - val\_acc: 0.9517

Epoch 10/55

- 2s - loss: 0.1462 - acc: 0.9970 - val\_loss: 0.4127 - val\_acc: 0.8846

Epoch 11/55

- 2s - loss: 0.1401 - acc: 0.9948 - val\_loss: 0.3049 - val\_acc: 0.9611

Epoch 12/55  
- 2s - loss: 0.1285 - acc: 0.9967 - val\_loss: 0.3424 - val\_acc: 0.9185  
Epoch 13/55  
- 2s - loss: 0.1147 - acc: 0.9985 - val\_loss: 0.2678 - val\_acc: 0.9733  
Epoch 14/55  
- 2s - loss: 0.1013 - acc: 0.9997 - val\_loss: 0.2622 - val\_acc: 0.9726  
Epoch 15/55  
- 2s - loss: 0.1051 - acc: 0.9963 - val\_loss: 0.2625 - val\_acc: 0.9668  
Epoch 16/55  
- 2s - loss: 0.0941 - acc: 0.9991 - val\_loss: 0.2484 - val\_acc: 0.9769  
Epoch 17/55  
- 2s - loss: 0.1031 - acc: 0.9954 - val\_loss: 0.2558 - val\_acc: 0.9466  
Epoch 18/55  
- 2s - loss: 0.0975 - acc: 0.9970 - val\_loss: 0.2546 - val\_acc: 0.9560  
Epoch 19/55  
- 2s - loss: 0.1477 - acc: 0.9796 - val\_loss: 0.2295 - val\_acc: 0.9921  
Epoch 20/55  
- 2s - loss: 0.1077 - acc: 0.9979 - val\_loss: 0.2145 - val\_acc: 0.9791  
Epoch 21/55  
- 2s - loss: 0.0804 - acc: 0.9991 - val\_loss: 0.2181 - val\_acc: 0.9784  
Epoch 22/55  
- 2s - loss: 0.0749 - acc: 0.9994 - val\_loss: 0.2241 - val\_acc: 0.9697  
Epoch 23/55  
- 2s - loss: 0.0774 - acc: 0.9985 - val\_loss: 0.2100 - val\_acc: 0.9755  
Epoch 24/55  
- 2s - loss: 0.0851 - acc: 0.9954 - val\_loss: 0.2582 - val\_acc: 0.9409  
Epoch 25/55  
- 2s - loss: 0.0828 - acc: 0.9970 - val\_loss: 0.2166 - val\_acc: 0.9719  
Epoch 26/55  
- 2s - loss: 0.0685 - acc: 0.9997 - val\_loss: 0.2100 - val\_acc: 0.9697  
Epoch 27/55  
- 2s - loss: 0.0659 - acc: 0.9994 - val\_loss: 0.2143 - val\_acc: 0.9704  
Epoch 28/55  
- 2s - loss: 0.0694 - acc: 0.9991 - val\_loss: 0.2011 - val\_acc: 0.9733  
Epoch 29/55  
- 2s - loss: 0.0644 - acc: 0.9985 - val\_loss: 0.2136 - val\_acc: 0.9575  
Epoch 30/55  
- 2s - loss: 0.0764 - acc: 0.9960 - val\_loss: 0.2263 - val\_acc: 0.9409  
Epoch 31/55  
- 2s - loss: 0.0772 - acc: 0.9963 - val\_loss: 0.1797 - val\_acc: 0.9798  
Epoch 32/55  
- 2s - loss: 0.0625 - acc: 0.9985 - val\_loss: 0.2306 - val\_acc: 0.9394  
Epoch 33/55  
- 2s - loss: 0.0634 - acc: 0.9988 - val\_loss: 0.1897 - val\_acc: 0.9690  
Epoch 34/55  
- 2s - loss: 0.0773 - acc: 0.9939 - val\_loss: 0.2155 - val\_acc: 0.9553  
Epoch 35/55  
- 2s - loss: 0.0762 - acc: 0.9951 - val\_loss: 0.1989 - val\_acc: 0.9676

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Epoch 36/55
  - 2s - loss: 0.0559 - acc: 0.9997 - val_loss: 0.1754 - val_acc: 0.9791
Epoch 37/55
  - 2s - loss: 0.0568 - acc: 0.9985 - val_loss: 0.2360 - val_acc: 0.9474
Epoch 38/55
  - 2s - loss: 0.1049 - acc: 0.9851 - val_loss: 0.2267 - val_acc: 0.9387
Epoch 39/55
  - 2s - loss: 0.0541 - acc: 0.9997 - val_loss: 0.1830 - val_acc: 0.9755
Epoch 40/55
  - 2s - loss: 0.0512 - acc: 0.9994 - val_loss: 0.1914 - val_acc: 0.9719
Epoch 41/55
  - 2s - loss: 0.0473 - acc: 0.9997 - val_loss: 0.1718 - val_acc: 0.9776
Epoch 42/55
  - 2s - loss: 0.0748 - acc: 0.9933 - val_loss: 0.2307 - val_acc: 0.9466
Epoch 43/55
  - 2s - loss: 0.0778 - acc: 0.9945 - val_loss: 0.1910 - val_acc: 0.9726
Epoch 44/55
  - 2s - loss: 0.0500 - acc: 0.9994 - val_loss: 0.1732 - val_acc: 0.9798
Epoch 45/55
  - 2s - loss: 0.0456 - acc: 1.0000 - val_loss: 0.1595 - val_acc: 0.9805
Epoch 46/55
  - 2s - loss: 0.0462 - acc: 0.9997 - val_loss: 0.1879 - val_acc: 0.9611
Epoch 47/55
  - 2s - loss: 0.0434 - acc: 0.9994 - val_loss: 0.1799 - val_acc: 0.9712
Epoch 48/55
  - 2s - loss: 0.0433 - acc: 0.9997 - val_loss: 0.1789 - val_acc: 0.9668
Epoch 49/55
  - 2s - loss: 0.0412 - acc: 1.0000 - val_loss: 0.1608 - val_acc: 0.9755
Epoch 50/55
  - 2s - loss: 0.0578 - acc: 0.9957 - val_loss: 0.2164 - val_acc: 0.9445
Epoch 51/55
  - 2s - loss: 0.1062 - acc: 0.9863 - val_loss: 0.1680 - val_acc: 0.9690
Epoch 52/55
  - 2s - loss: 0.0526 - acc: 0.9997 - val_loss: 0.1748 - val_acc: 0.9611
Epoch 53/55
  - 2s - loss: 0.0429 - acc: 1.0000 - val_loss: 0.1553 - val_acc: 0.9805
Epoch 54/55
  - 2s - loss: 0.0446 - acc: 0.9991 - val_loss: 0.1530 - val_acc: 0.9798
Epoch 55/55
  - 2s - loss: 0.0382 - acc: 1.0000 - val_loss: 0.1646 - val_acc: 0.9798
Train accuracy 1.0 Test accuracy: 0.9798125450612833

```

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Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
<hr/>		
conv1d_2 (Conv1D)	(None, 116, 32)	7200

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dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

Total params: 32,931  
 Trainable params: 32,931  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 3s - loss: 98.0860 - acc: 0.5756 - val\_loss: 57.0230 - val\_acc: 0.7570

Epoch 2/55

- 2s - loss: 36.4008 - acc: 0.8718 - val\_loss: 21.6007 - val\_acc: 0.8068

Epoch 3/55

- 2s - loss: 13.6639 - acc: 0.9586 - val\_loss: 8.2817 - val\_acc: 0.8486

Epoch 4/55

- 2s - loss: 5.1161 - acc: 0.9632 - val\_loss: 3.2420 - val\_acc: 0.9128

Epoch 5/55

- 2s - loss: 1.9523 - acc: 0.9717 - val\_loss: 1.4428 - val\_acc: 0.9337

Epoch 6/55

- 2s - loss: 0.8338 - acc: 0.9814 - val\_loss: 0.8318 - val\_acc: 0.9373

Epoch 7/55

- 2s - loss: 0.4633 - acc: 0.9872 - val\_loss: 0.6273 - val\_acc: 0.9308

Epoch 8/55

- 2s - loss: 0.3491 - acc: 0.9860 - val\_loss: 0.5490 - val\_acc: 0.9373

Epoch 9/55

- 2s - loss: 0.2937 - acc: 0.9896 - val\_loss: 0.4785 - val\_acc: 0.9546

Epoch 10/55

- 2s - loss: 0.2852 - acc: 0.9820 - val\_loss: 0.5676 - val\_acc: 0.8673

Epoch 11/55

- 2s - loss: 0.2570 - acc: 0.9860 - val\_loss: 0.4621 - val\_acc: 0.9510

Epoch 12/55

- 2s - loss: 0.2428 - acc: 0.9875 - val\_loss: 0.4195 - val\_acc: 0.9712

Epoch 13/55

- 2s - loss: 0.2183 - acc: 0.9909 - val\_loss: 0.4220 - val\_acc: 0.9546

Epoch 14/55

- 2s - loss: 0.1990 - acc: 0.9933 - val\_loss: 0.3993 - val\_acc: 0.9531

Epoch 15/55

- 2s - loss: 0.2012 - acc: 0.9921 - val\_loss: 0.3749 - val\_acc: 0.9589

Epoch 16/55

- 2s - loss: 0.1971 - acc: 0.9896 - val\_loss: 0.3696 - val\_acc: 0.9632  
 Epoch 17/55  
 - 2s - loss: 0.1875 - acc: 0.9933 - val\_loss: 0.3405 - val\_acc: 0.9697  
 Epoch 18/55  
 - 2s - loss: 0.1649 - acc: 0.9973 - val\_loss: 0.3678 - val\_acc: 0.9430  
 Epoch 19/55  
 - 2s - loss: 0.2095 - acc: 0.9781 - val\_loss: 0.3421 - val\_acc: 0.9647  
 Epoch 20/55  
 - 2s - loss: 0.1738 - acc: 0.9933 - val\_loss: 0.3621 - val\_acc: 0.9366  
 Epoch 21/55  
 - 2s - loss: 0.1611 - acc: 0.9936 - val\_loss: 0.3395 - val\_acc: 0.9640  
 Epoch 22/55  
 - 2s - loss: 0.1597 - acc: 0.9890 - val\_loss: 0.3559 - val\_acc: 0.9394  
 Epoch 23/55  
 - 2s - loss: 0.1565 - acc: 0.9942 - val\_loss: 0.3087 - val\_acc: 0.9647  
 Epoch 24/55  
 - 2s - loss: 0.1686 - acc: 0.9842 - val\_loss: 0.3122 - val\_acc: 0.9567  
 Epoch 25/55  
 - 2s - loss: 0.1661 - acc: 0.9875 - val\_loss: 0.3118 - val\_acc: 0.9488  
 Epoch 26/55  
 - 2s - loss: 0.1435 - acc: 0.9924 - val\_loss: 0.3443 - val\_acc: 0.9301  
 Epoch 27/55  
 - 2s - loss: 0.1700 - acc: 0.9833 - val\_loss: 0.3077 - val\_acc: 0.9661  
 Epoch 28/55  
 - 2s - loss: 0.1618 - acc: 0.9887 - val\_loss: 0.2861 - val\_acc: 0.9632  
 Epoch 29/55  
 - 2s - loss: 0.1312 - acc: 0.9945 - val\_loss: 0.3054 - val\_acc: 0.9466  
 Epoch 30/55  
 - 2s - loss: 0.1411 - acc: 0.9918 - val\_loss: 0.2626 - val\_acc: 0.9733  
 Epoch 31/55  
 - 2s - loss: 0.1262 - acc: 0.9960 - val\_loss: 0.2612 - val\_acc: 0.9704  
 Epoch 32/55  
 - 2s - loss: 0.2283 - acc: 0.9653 - val\_loss: 0.3004 - val\_acc: 0.9668  
 Epoch 33/55  
 - 2s - loss: 0.1269 - acc: 0.9982 - val\_loss: 0.2753 - val\_acc: 0.9697  
 Epoch 34/55  
 - 2s - loss: 0.1178 - acc: 0.9970 - val\_loss: 0.2613 - val\_acc: 0.9618  
 Epoch 35/55  
 - 2s - loss: 0.1184 - acc: 0.9957 - val\_loss: 0.2762 - val\_acc: 0.9625  
 Epoch 36/55  
 - 2s - loss: 0.1161 - acc: 0.9954 - val\_loss: 0.2764 - val\_acc: 0.9539  
 Epoch 37/55  
 - 2s - loss: 0.1183 - acc: 0.9936 - val\_loss: 0.2642 - val\_acc: 0.9625  
 Epoch 38/55  
 - 2s - loss: 0.1114 - acc: 0.9948 - val\_loss: 0.2556 - val\_acc: 0.9647  
 Epoch 39/55  
 - 2s - loss: 0.1871 - acc: 0.9714 - val\_loss: 0.3782 - val\_acc: 0.9257  
 Epoch 40/55

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- 2s - loss: 0.1543 - acc: 0.9915 - val_loss: 0.2378 - val_acc: 0.9726
Epoch 41/55
- 2s - loss: 0.1042 - acc: 0.9979 - val_loss: 0.2327 - val_acc: 0.9726
Epoch 42/55
- 2s - loss: 0.1094 - acc: 0.9936 - val_loss: 0.2322 - val_acc: 0.9712
Epoch 43/55
- 2s - loss: 0.1216 - acc: 0.9909 - val_loss: 0.2492 - val_acc: 0.9697
Epoch 44/55
- 2s - loss: 0.1138 - acc: 0.9921 - val_loss: 0.2467 - val_acc: 0.9640
Epoch 45/55
- 2s - loss: 0.1037 - acc: 0.9942 - val_loss: 0.2311 - val_acc: 0.9762
Epoch 46/55
- 2s - loss: 0.1016 - acc: 0.9963 - val_loss: 0.2705 - val_acc: 0.9531
Epoch 47/55
- 2s - loss: 0.1257 - acc: 0.9872 - val_loss: 0.2563 - val_acc: 0.9466
Epoch 48/55
- 2s - loss: 0.1119 - acc: 0.9957 - val_loss: 0.2309 - val_acc: 0.9733
Epoch 49/55
- 2s - loss: 0.0981 - acc: 0.9939 - val_loss: 0.2499 - val_acc: 0.9488
Epoch 50/55
- 2s - loss: 0.1047 - acc: 0.9939 - val_loss: 0.2270 - val_acc: 0.9654
Epoch 51/55
- 2s - loss: 0.0883 - acc: 0.9963 - val_loss: 0.2758 - val_acc: 0.9221
Epoch 52/55
- 2s - loss: 0.0936 - acc: 0.9973 - val_loss: 0.2158 - val_acc: 0.9733
Epoch 53/55
- 2s - loss: 0.1000 - acc: 0.9918 - val_loss: 0.2790 - val_acc: 0.9380
Epoch 54/55
- 2s - loss: 0.0944 - acc: 0.9963 - val_loss: 0.2284 - val_acc: 0.9661
Epoch 55/55
- 2s - loss: 0.1015 - acc: 0.9933 - val_loss: 0.3090 - val_acc: 0.9351
Train accuracy 0.9841704718417047 Test accuracy: 0.9351117519826965

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 28)	784
conv1d_2 (Conv1D)	(None, 120, 32)	6304
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 32)	0
flatten_1 (Flatten)	(None, 1280)	0
dense_1 (Dense)	(None, 32)	40992

dense\_2 (Dense) (None, 3) 99

=====

Total params: 48,179

Trainable params: 48,179

Non-trainable params: 0

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None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 2s - loss: 7.7747 - acc: 0.6384 - val\_loss: 1.2915 - val\_acc: 0.8226

Epoch 2/55

- 1s - loss: 0.5992 - acc: 0.9406 - val\_loss: 0.5756 - val\_acc: 0.9185

Epoch 3/55

- 1s - loss: 0.3410 - acc: 0.9589 - val\_loss: 0.4868 - val\_acc: 0.9041

Epoch 4/55

- 1s - loss: 0.2780 - acc: 0.9671 - val\_loss: 0.5049 - val\_acc: 0.8955

Epoch 5/55

- 1s - loss: 0.2543 - acc: 0.9723 - val\_loss: 0.4320 - val\_acc: 0.9092

Epoch 6/55

- 1s - loss: 0.2465 - acc: 0.9683 - val\_loss: 0.4105 - val\_acc: 0.8991

Epoch 7/55

- 1s - loss: 0.2094 - acc: 0.9741 - val\_loss: 0.4870 - val\_acc: 0.8709

Epoch 8/55

- 1s - loss: 0.2039 - acc: 0.9769 - val\_loss: 0.3932 - val\_acc: 0.9041

Epoch 9/55

- 1s - loss: 0.1763 - acc: 0.9839 - val\_loss: 0.3367 - val\_acc: 0.9452

Epoch 10/55

- 1s - loss: 0.1745 - acc: 0.9836 - val\_loss: 0.3482 - val\_acc: 0.9279

Epoch 11/55

- 1s - loss: 0.1672 - acc: 0.9775 - val\_loss: 0.3254 - val\_acc: 0.9236

Epoch 12/55

- 1s - loss: 0.2306 - acc: 0.9668 - val\_loss: 0.4703 - val\_acc: 0.9027

Epoch 13/55

- 1s - loss: 0.1691 - acc: 0.9826 - val\_loss: 0.3900 - val\_acc: 0.8947

Epoch 14/55

- 1s - loss: 0.1624 - acc: 0.9842 - val\_loss: 0.3129 - val\_acc: 0.9250

Epoch 15/55

- 1s - loss: 0.1531 - acc: 0.9836 - val\_loss: 0.3506 - val\_acc: 0.9041

Epoch 16/55

- 1s - loss: 0.1796 - acc: 0.9784 - val\_loss: 0.3311 - val\_acc: 0.9344

Epoch 17/55

- 1s - loss: 0.1617 - acc: 0.9805 - val\_loss: 0.3021 - val\_acc: 0.9459

Epoch 18/55

- 1s - loss: 0.1319 - acc: 0.9884 - val\_loss: 0.3956 - val\_acc: 0.8991

Epoch 19/55

- 1s - loss: 0.1426 - acc: 0.9836 - val\_loss: 0.2747 - val\_acc: 0.9373

Epoch 20/55

- 1s - loss: 0.2121 - acc: 0.9659 - val\_loss: 0.4720 - val\_acc: 0.9250



Epoch 21/55  
- 1s - loss: 0.1730 - acc: 0.9817 - val\_loss: 0.4136 - val\_acc: 0.9092  
Epoch 22/55  
- 1s - loss: 0.1401 - acc: 0.9854 - val\_loss: 0.3136 - val\_acc: 0.9257  
Epoch 23/55  
- 1s - loss: 0.1372 - acc: 0.9854 - val\_loss: 0.2984 - val\_acc: 0.9438  
Epoch 24/55  
- 1s - loss: 0.1470 - acc: 0.9826 - val\_loss: 0.2549 - val\_acc: 0.9481  
Epoch 25/55  
- 1s - loss: 0.1320 - acc: 0.9830 - val\_loss: 0.4524 - val\_acc: 0.8803  
Epoch 26/55  
- 1s - loss: 0.1479 - acc: 0.9814 - val\_loss: 0.4383 - val\_acc: 0.8774  
Epoch 27/55  
- 1s - loss: 0.1193 - acc: 0.9887 - val\_loss: 0.3895 - val\_acc: 0.8933  
Epoch 28/55  
- 1s - loss: 0.1320 - acc: 0.9836 - val\_loss: 0.3176 - val\_acc: 0.9358  
Epoch 29/55  
- 1s - loss: 0.1482 - acc: 0.9778 - val\_loss: 0.5657 - val\_acc: 0.8457  
Epoch 30/55  
- 1s - loss: 0.1709 - acc: 0.9772 - val\_loss: 0.3220 - val\_acc: 0.9214  
Epoch 31/55  
- 1s - loss: 0.0957 - acc: 0.9933 - val\_loss: 0.2943 - val\_acc: 0.9164  
Epoch 32/55  
- 1s - loss: 0.1242 - acc: 0.9848 - val\_loss: 0.3496 - val\_acc: 0.8991  
Epoch 33/55  
- 1s - loss: 0.1157 - acc: 0.9854 - val\_loss: 0.3082 - val\_acc: 0.9178  
Epoch 34/55  
- 1s - loss: 0.1132 - acc: 0.9878 - val\_loss: 0.2845 - val\_acc: 0.9358  
Epoch 35/55  
- 1s - loss: 0.1455 - acc: 0.9790 - val\_loss: 0.3278 - val\_acc: 0.9315  
Epoch 36/55  
- 1s - loss: 0.1344 - acc: 0.9863 - val\_loss: 0.2828 - val\_acc: 0.9337  
Epoch 37/55  
- 1s - loss: 0.1591 - acc: 0.9796 - val\_loss: 0.3178 - val\_acc: 0.9272  
Epoch 38/55  
- 1s - loss: 0.1295 - acc: 0.9881 - val\_loss: 0.4592 - val\_acc: 0.9019  
Epoch 39/55  
- 1s - loss: 0.1099 - acc: 0.9900 - val\_loss: 0.3245 - val\_acc: 0.9164  
Epoch 40/55  
- 1s - loss: 0.0920 - acc: 0.9915 - val\_loss: 0.3050 - val\_acc: 0.9200  
Epoch 41/55  
- 1s - loss: 0.1197 - acc: 0.9863 - val\_loss: 0.3110 - val\_acc: 0.9344  
Epoch 42/55  
- 1s - loss: 0.1306 - acc: 0.9820 - val\_loss: 0.3438 - val\_acc: 0.9135  
Epoch 43/55  
- 1s - loss: 0.1100 - acc: 0.9887 - val\_loss: 0.2969 - val\_acc: 0.9358  
Epoch 44/55  
- 1s - loss: 0.1120 - acc: 0.9872 - val\_loss: 0.3601 - val\_acc: 0.9207

```

Epoch 45/55
  - 1s - loss: 0.1021 - acc: 0.9890 - val_loss: 0.3800 - val_acc: 0.8782
Epoch 46/55
  - 1s - loss: 0.0979 - acc: 0.9893 - val_loss: 0.4270 - val_acc: 0.8854
Epoch 47/55
  - 1s - loss: 0.1452 - acc: 0.9805 - val_loss: 0.4866 - val_acc: 0.8933
Epoch 48/55
  - 1s - loss: 0.0933 - acc: 0.9924 - val_loss: 0.3003 - val_acc: 0.9481
Epoch 49/55
  - 1s - loss: 0.1073 - acc: 0.9866 - val_loss: 0.4197 - val_acc: 0.8933
Epoch 50/55
  - 1s - loss: 0.1101 - acc: 0.9872 - val_loss: 0.2763 - val_acc: 0.9380
Epoch 51/55
  - 1s - loss: 0.0886 - acc: 0.9912 - val_loss: 0.3320 - val_acc: 0.9164
Epoch 52/55
  - 1s - loss: 0.1334 - acc: 0.9814 - val_loss: 0.6968 - val_acc: 0.8032
Epoch 53/55
  - 1s - loss: 0.1591 - acc: 0.9823 - val_loss: 0.3913 - val_acc: 0.9092
Epoch 54/55
  - 1s - loss: 0.1416 - acc: 0.9799 - val_loss: 0.6950 - val_acc: 0.8147
Epoch 55/55
  - 1s - loss: 0.1313 - acc: 0.9836 - val_loss: 0.3751 - val_acc: 0.9012
Train accuracy 0.986910197869102 Test accuracy: 0.9012256669069935

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

---

```

Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0

```

---

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55

```

- 3s - loss: 24.8588 - acc: 0.5233 - val\_loss: 1.5026 - val\_acc: 0.6265  
 Epoch 2/55  
 - 2s - loss: 0.7139 - acc: 0.8600 - val\_loss: 0.7046 - val\_acc: 0.8363  
 Epoch 3/55  
 - 2s - loss: 0.4505 - acc: 0.9181 - val\_loss: 0.5498 - val\_acc: 0.9185  
 Epoch 4/55  
 - 2s - loss: 0.3511 - acc: 0.9422 - val\_loss: 0.5768 - val\_acc: 0.8767  
 Epoch 5/55  
 - 2s - loss: 0.3388 - acc: 0.9400 - val\_loss: 0.4764 - val\_acc: 0.9171  
 Epoch 6/55  
 - 2s - loss: 0.3214 - acc: 0.9495 - val\_loss: 0.4510 - val\_acc: 0.9236  
 Epoch 7/55  
 - 2s - loss: 0.2492 - acc: 0.9686 - val\_loss: 0.4813 - val\_acc: 0.8846  
 Epoch 8/55  
 - 2s - loss: 0.2983 - acc: 0.9495 - val\_loss: 0.5326 - val\_acc: 0.8558  
 Epoch 9/55  
 - 2s - loss: 0.2363 - acc: 0.9711 - val\_loss: 0.4440 - val\_acc: 0.8818  
 Epoch 10/55  
 - 2s - loss: 0.2265 - acc: 0.9750 - val\_loss: 0.5004 - val\_acc: 0.8688  
 Epoch 11/55  
 - 2s - loss: 0.2301 - acc: 0.9772 - val\_loss: 0.3355 - val\_acc: 0.9503  
 Epoch 12/55  
 - 2s - loss: 0.1772 - acc: 0.9896 - val\_loss: 0.3641 - val\_acc: 0.9466  
 Epoch 13/55  
 - 2s - loss: 0.2088 - acc: 0.9796 - val\_loss: 0.4175 - val\_acc: 0.9077  
 Epoch 14/55  
 - 2s - loss: 0.1847 - acc: 0.9805 - val\_loss: 0.5665 - val\_acc: 0.8551  
 Epoch 15/55  
 - 2s - loss: 0.2889 - acc: 0.9653 - val\_loss: 0.3521 - val\_acc: 0.9445  
 Epoch 16/55  
 - 2s - loss: 0.1522 - acc: 0.9939 - val\_loss: 0.3119 - val\_acc: 0.9748  
 Epoch 17/55  
 - 2s - loss: 0.1942 - acc: 0.9763 - val\_loss: 0.4319 - val\_acc: 0.9012  
 Epoch 18/55  
 - 2s - loss: 0.3080 - acc: 0.9665 - val\_loss: 0.3903 - val\_acc: 0.9077  
 Epoch 19/55  
 - 2s - loss: 0.1504 - acc: 0.9906 - val\_loss: 0.3511 - val\_acc: 0.9286  
 Epoch 20/55  
 - 2s - loss: 0.1578 - acc: 0.9854 - val\_loss: 0.2859 - val\_acc: 0.9589  
 Epoch 21/55  
 - 2s - loss: 0.1422 - acc: 0.9893 - val\_loss: 0.4422 - val\_acc: 0.8933  
 Epoch 22/55  
 - 2s - loss: 0.2109 - acc: 0.9699 - val\_loss: 0.5357 - val\_acc: 0.8486  
 Epoch 23/55  
 - 2s - loss: 0.1938 - acc: 0.9814 - val\_loss: 0.2750 - val\_acc: 0.9654  
 Epoch 24/55  
 - 2s - loss: 0.1804 - acc: 0.9799 - val\_loss: 0.5093 - val\_acc: 0.8839  
 Epoch 25/55

- 2s - loss: 0.1490 - acc: 0.9900 - val\_loss: 0.3261 - val\_acc: 0.9221  
 Epoch 26/55  
 - 2s - loss: 0.2114 - acc: 0.9720 - val\_loss: 0.5730 - val\_acc: 0.8738  
 Epoch 27/55  
 - 2s - loss: 0.2146 - acc: 0.9756 - val\_loss: 0.3308 - val\_acc: 0.9402  
 Epoch 28/55  
 - 2s - loss: 0.1616 - acc: 0.9854 - val\_loss: 0.3528 - val\_acc: 0.9229  
 Epoch 29/55  
 - 2s - loss: 0.1221 - acc: 0.9957 - val\_loss: 0.2810 - val\_acc: 0.9488  
 Epoch 30/55  
 - 2s - loss: 0.1715 - acc: 0.9811 - val\_loss: 0.4312 - val\_acc: 0.9113  
 Epoch 31/55  
 - 2s - loss: 0.1349 - acc: 0.9915 - val\_loss: 0.3008 - val\_acc: 0.9402  
 Epoch 32/55  
 - 2s - loss: 0.2621 - acc: 0.9601 - val\_loss: 0.4196 - val\_acc: 0.9221  
 Epoch 33/55  
 - 2s - loss: 0.1754 - acc: 0.9845 - val\_loss: 0.5700 - val\_acc: 0.8133  
 Epoch 34/55  
 - 2s - loss: 0.2163 - acc: 0.9772 - val\_loss: 0.3576 - val\_acc: 0.8998  
 Epoch 35/55  
 - 2s - loss: 0.1326 - acc: 0.9890 - val\_loss: 0.4260 - val\_acc: 0.9063  
 Epoch 36/55  
 - 2s - loss: 0.1586 - acc: 0.9826 - val\_loss: 0.3991 - val\_acc: 0.9193  
 Epoch 37/55  
 - 2s - loss: 0.1540 - acc: 0.9836 - val\_loss: 0.3442 - val\_acc: 0.9135  
 Epoch 38/55  
 - 2s - loss: 0.1277 - acc: 0.9884 - val\_loss: 0.4091 - val\_acc: 0.8875  
 Epoch 39/55  
 - 2s - loss: 0.3054 - acc: 0.9549 - val\_loss: 0.4579 - val\_acc: 0.9149  
 Epoch 40/55  
 - 2s - loss: 0.1430 - acc: 0.9942 - val\_loss: 0.3050 - val\_acc: 0.9286  
 Epoch 41/55  
 - 2s - loss: 0.1093 - acc: 0.9933 - val\_loss: 0.4026 - val\_acc: 0.8652  
 Epoch 42/55  
 - 2s - loss: 0.2423 - acc: 0.9650 - val\_loss: 0.4019 - val\_acc: 0.8955  
 Epoch 43/55  
 - 2s - loss: 0.1235 - acc: 0.9927 - val\_loss: 0.3978 - val\_acc: 0.8832  
 Epoch 44/55  
 - 2s - loss: 0.1354 - acc: 0.9866 - val\_loss: 0.4277 - val\_acc: 0.8695  
 Epoch 45/55  
 - 2s - loss: 0.2453 - acc: 0.9619 - val\_loss: 0.3488 - val\_acc: 0.9229  
 Epoch 46/55  
 - 2s - loss: 0.1261 - acc: 0.9951 - val\_loss: 0.3298 - val\_acc: 0.9113  
 Epoch 47/55  
 - 2s - loss: 0.1468 - acc: 0.9799 - val\_loss: 0.3963 - val\_acc: 0.9063  
 Epoch 48/55  
 - 2s - loss: 0.2172 - acc: 0.9708 - val\_loss: 0.4442 - val\_acc: 0.9301  
 Epoch 49/55

```

- 2s - loss: 0.1537 - acc: 0.9896 - val_loss: 0.3751 - val_acc: 0.8962
Epoch 50/55
- 2s - loss: 0.1314 - acc: 0.9893 - val_loss: 0.3139 - val_acc: 0.9250
Epoch 51/55
- 2s - loss: 0.1032 - acc: 0.9930 - val_loss: 0.4291 - val_acc: 0.8882
Epoch 52/55
- 2s - loss: 0.1228 - acc: 0.9893 - val_loss: 0.3309 - val_acc: 0.9070
Epoch 53/55
- 2s - loss: 0.1441 - acc: 0.9787 - val_loss: 0.5148 - val_acc: 0.8572
Epoch 54/55
- 2s - loss: 0.2421 - acc: 0.9711 - val_loss: 0.3363 - val_acc: 0.9142
Epoch 55/55
- 2s - loss: 0.1141 - acc: 0.9945 - val_loss: 0.2397 - val_acc: 0.9438
Train accuracy 0.9987823439878234 Test accuracy: 0.9437635183850036
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
- 3s - loss: 12.9563 - acc: 0.5769 - val_loss: 1.3726 - val_acc: 0.7945
Epoch 2/55
- 2s - loss: 0.6045 - acc: 0.9056 - val_loss: 0.6964 - val_acc: 0.8717
Epoch 3/55
- 2s - loss: 0.3090 - acc: 0.9717 - val_loss: 0.5066 - val_acc: 0.9380
Epoch 4/55
- 2s - loss: 0.2624 - acc: 0.9769 - val_loss: 0.4605 - val_acc: 0.9265
Epoch 5/55
- 2s - loss: 0.2046 - acc: 0.9866 - val_loss: 0.4159 - val_acc: 0.9488

```

Epoch 6/55  
- 2s - loss: 0.2691 - acc: 0.9659 - val\_loss: 0.4304 - val\_acc: 0.9272  
Epoch 7/55  
- 2s - loss: 0.1610 - acc: 0.9927 - val\_loss: 0.3746 - val\_acc: 0.9322  
Epoch 8/55  
- 2s - loss: 0.2126 - acc: 0.9747 - val\_loss: 0.3806 - val\_acc: 0.9567  
Epoch 9/55  
- 2s - loss: 0.2412 - acc: 0.9708 - val\_loss: 0.3701 - val\_acc: 0.9394  
Epoch 10/55  
- 2s - loss: 0.1689 - acc: 0.9906 - val\_loss: 0.4385 - val\_acc: 0.9250  
Epoch 11/55  
- 2s - loss: 0.1733 - acc: 0.9814 - val\_loss: 0.3801 - val\_acc: 0.9488  
Epoch 12/55  
- 2s - loss: 0.2105 - acc: 0.9711 - val\_loss: 0.5535 - val\_acc: 0.9034  
Epoch 13/55  
- 2s - loss: 0.1502 - acc: 0.9909 - val\_loss: 0.3637 - val\_acc: 0.9524  
Epoch 14/55  
- 2s - loss: 0.1140 - acc: 0.9948 - val\_loss: 0.3865 - val\_acc: 0.9315  
Epoch 15/55  
- 2s - loss: 0.1353 - acc: 0.9875 - val\_loss: 0.3257 - val\_acc: 0.9200  
Epoch 16/55  
- 2s - loss: 0.1305 - acc: 0.9893 - val\_loss: 0.3176 - val\_acc: 0.9589  
Epoch 17/55  
- 2s - loss: 0.1522 - acc: 0.9842 - val\_loss: 0.3434 - val\_acc: 0.9243  
Epoch 18/55  
- 2s - loss: 0.1321 - acc: 0.9930 - val\_loss: 0.3180 - val\_acc: 0.9337  
Epoch 19/55  
- 2s - loss: 0.3041 - acc: 0.9534 - val\_loss: 0.5594 - val\_acc: 0.9149  
Epoch 20/55  
- 2s - loss: 0.1941 - acc: 0.9887 - val\_loss: 0.3544 - val\_acc: 0.9120  
Epoch 21/55  
- 2s - loss: 0.1088 - acc: 0.9967 - val\_loss: 0.3097 - val\_acc: 0.9560  
Epoch 22/55  
- 2s - loss: 0.1162 - acc: 0.9881 - val\_loss: 0.4786 - val\_acc: 0.9048  
Epoch 23/55  
- 2s - loss: 0.1543 - acc: 0.9848 - val\_loss: 0.3031 - val\_acc: 0.9366  
Epoch 24/55  
- 2s - loss: 0.1537 - acc: 0.9826 - val\_loss: 0.7018 - val\_acc: 0.7527  
Epoch 25/55  
- 2s - loss: 0.2051 - acc: 0.9805 - val\_loss: 0.2949 - val\_acc: 0.9524  
Epoch 26/55  
- 2s - loss: 0.1201 - acc: 0.9903 - val\_loss: 0.3260 - val\_acc: 0.9221  
Epoch 27/55  
- 2s - loss: 0.1247 - acc: 0.9872 - val\_loss: 0.3796 - val\_acc: 0.9286  
Epoch 28/55  
- 2s - loss: 0.1838 - acc: 0.9805 - val\_loss: 0.2642 - val\_acc: 0.9560  
Epoch 29/55  
- 2s - loss: 0.0988 - acc: 0.9960 - val\_loss: 0.2699 - val\_acc: 0.9524

Epoch 30/55  
- 2s - loss: 0.1907 - acc: 0.9711 - val\_loss: 0.3348 - val\_acc: 0.9236

Epoch 31/55  
- 2s - loss: 0.1755 - acc: 0.9869 - val\_loss: 0.2889 - val\_acc: 0.9322

Epoch 32/55  
- 2s - loss: 0.1268 - acc: 0.9869 - val\_loss: 0.3945 - val\_acc: 0.9135

Epoch 33/55  
- 2s - loss: 0.1409 - acc: 0.9860 - val\_loss: 0.3744 - val\_acc: 0.9099

Epoch 34/55  
- 2s - loss: 0.1139 - acc: 0.9878 - val\_loss: 0.3379 - val\_acc: 0.9366

Epoch 35/55  
- 2s - loss: 0.1480 - acc: 0.9836 - val\_loss: 0.2780 - val\_acc: 0.9337

Epoch 36/55  
- 2s - loss: 0.1224 - acc: 0.9860 - val\_loss: 0.4327 - val\_acc: 0.8825

Epoch 37/55  
- 2s - loss: 0.1216 - acc: 0.9918 - val\_loss: 0.2404 - val\_acc: 0.9488

Epoch 38/55  
- 2s - loss: 0.1429 - acc: 0.9814 - val\_loss: 0.3606 - val\_acc: 0.9012

Epoch 39/55  
- 2s - loss: 0.1254 - acc: 0.9869 - val\_loss: 0.4088 - val\_acc: 0.8709

Epoch 40/55  
- 2s - loss: 0.0981 - acc: 0.9963 - val\_loss: 0.3044 - val\_acc: 0.9207

Epoch 41/55  
- 2s - loss: 0.1828 - acc: 0.9787 - val\_loss: 0.3144 - val\_acc: 0.9452

Epoch 42/55  
- 2s - loss: 0.0904 - acc: 0.9976 - val\_loss: 0.2888 - val\_acc: 0.9351

Epoch 43/55  
- 2s - loss: 0.0897 - acc: 0.9933 - val\_loss: 0.3529 - val\_acc: 0.9344

Epoch 44/55  
- 2s - loss: 0.0940 - acc: 0.9909 - val\_loss: 0.5145 - val\_acc: 0.8774

Epoch 45/55  
- 2s - loss: 0.2916 - acc: 0.9616 - val\_loss: 0.4114 - val\_acc: 0.9344

Epoch 46/55  
- 2s - loss: 0.1417 - acc: 0.9896 - val\_loss: 0.3473 - val\_acc: 0.8919

Epoch 47/55  
- 2s - loss: 0.1140 - acc: 0.9915 - val\_loss: 0.2943 - val\_acc: 0.9531

Epoch 48/55  
- 2s - loss: 0.1469 - acc: 0.9793 - val\_loss: 0.4008 - val\_acc: 0.9185

Epoch 49/55  
- 2s - loss: 0.1575 - acc: 0.9863 - val\_loss: 0.2579 - val\_acc: 0.9474

Epoch 50/55  
- 2s - loss: 0.1322 - acc: 0.9845 - val\_loss: 0.2644 - val\_acc: 0.9495

Epoch 51/55  
- 2s - loss: 0.1085 - acc: 0.9912 - val\_loss: 0.2621 - val\_acc: 0.9344

Epoch 52/55  
- 2s - loss: 0.0704 - acc: 0.9988 - val\_loss: 0.2722 - val\_acc: 0.9286

Epoch 53/55  
- 2s - loss: 0.0801 - acc: 0.9930 - val\_loss: 0.5023 - val\_acc: 0.8724

Epoch 54/55  
 - 2s - loss: 0.1665 - acc: 0.9772 - val\_loss: 0.3331 - val\_acc: 0.9366  
 Epoch 55/55  
 - 2s - loss: 0.1266 - acc: 0.9893 - val\_loss: 0.3140 - val\_acc: 0.9279  
 Train accuracy 0.993607305936073 Test accuracy: 0.9279019466474405

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 116, 32)	7200
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
-----		
flatten_1 (Flatten)	(None, 1216)	0
-----		
dense_1 (Dense)	(None, 32)	38944
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 48,291  
 Trainable params: 48,291  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/55  
 - 3s - loss: 7.0416 - acc: 0.7126 - val\_loss: 1.0029 - val\_acc: 0.8032  
 Epoch 2/55  
 - 2s - loss: 0.4580 - acc: 0.9419 - val\_loss: 0.4853 - val\_acc: 0.9358  
 Epoch 3/55  
 - 2s - loss: 0.2770 - acc: 0.9653 - val\_loss: 0.3693 - val\_acc: 0.9582  
 Epoch 4/55  
 - 2s - loss: 0.1770 - acc: 0.9884 - val\_loss: 0.3044 - val\_acc: 0.9596  
 Epoch 5/55  
 - 2s - loss: 0.1748 - acc: 0.9836 - val\_loss: 0.2859 - val\_acc: 0.9690  
 Epoch 6/55  
 - 2s - loss: 0.2096 - acc: 0.9756 - val\_loss: 0.2546 - val\_acc: 0.9740  
 Epoch 7/55  
 - 2s - loss: 0.1449 - acc: 0.9842 - val\_loss: 0.2840 - val\_acc: 0.9394  
 Epoch 8/55  
 - 2s - loss: 0.1339 - acc: 0.9900 - val\_loss: 0.2507 - val\_acc: 0.9517  
 Epoch 9/55  
 - 2s - loss: 0.1574 - acc: 0.9790 - val\_loss: 0.3206 - val\_acc: 0.9394  
 Epoch 10/55



- 2s - loss: 0.1446 - acc: 0.9893 - val\_loss: 0.3977 - val\_acc: 0.9012  
 Epoch 11/55  
 - 2s - loss: 0.1392 - acc: 0.9848 - val\_loss: 0.2923 - val\_acc: 0.9315  
 Epoch 12/55  
 - 2s - loss: 0.1341 - acc: 0.9866 - val\_loss: 0.3001 - val\_acc: 0.9438  
 Epoch 13/55  
 - 2s - loss: 0.1895 - acc: 0.9735 - val\_loss: 0.5303 - val\_acc: 0.8745  
 Epoch 14/55  
 - 2s - loss: 0.1423 - acc: 0.9906 - val\_loss: 0.3069 - val\_acc: 0.9402  
 Epoch 15/55  
 - 2s - loss: 0.1217 - acc: 0.9863 - val\_loss: 0.3860 - val\_acc: 0.9229  
 Epoch 16/55  
 - 2s - loss: 0.1495 - acc: 0.9839 - val\_loss: 0.3447 - val\_acc: 0.9380  
 Epoch 17/55  
 - 2s - loss: 0.0974 - acc: 0.9951 - val\_loss: 0.2245 - val\_acc: 0.9495  
 Epoch 18/55  
 - 2s - loss: 0.1310 - acc: 0.9842 - val\_loss: 0.2853 - val\_acc: 0.9402  
 Epoch 19/55  
 - 2s - loss: 0.1282 - acc: 0.9839 - val\_loss: 0.4234 - val\_acc: 0.8760  
 Epoch 20/55  
 - 2s - loss: 0.1697 - acc: 0.9836 - val\_loss: 0.2611 - val\_acc: 0.9438  
 Epoch 21/55  
 - 2s - loss: 0.0939 - acc: 0.9945 - val\_loss: 0.2497 - val\_acc: 0.9409  
 Epoch 22/55  
 - 2s - loss: 0.1089 - acc: 0.9869 - val\_loss: 0.3894 - val\_acc: 0.8983  
 Epoch 23/55  
 - 2s - loss: 0.1123 - acc: 0.9893 - val\_loss: 0.2725 - val\_acc: 0.9409  
 Epoch 24/55  
 - 2s - loss: 0.0995 - acc: 0.9884 - val\_loss: 0.2865 - val\_acc: 0.9207  
 Epoch 25/55  
 - 2s - loss: 0.1222 - acc: 0.9866 - val\_loss: 0.3125 - val\_acc: 0.9214  
 Epoch 26/55  
 - 2s - loss: 0.1081 - acc: 0.9860 - val\_loss: 0.3518 - val\_acc: 0.9113  
 Epoch 27/55  
 - 2s - loss: 0.1364 - acc: 0.9845 - val\_loss: 0.2543 - val\_acc: 0.9366  
 Epoch 28/55  
 - 2s - loss: 0.1912 - acc: 0.9744 - val\_loss: 0.2410 - val\_acc: 0.9452  
 Epoch 29/55  
 - 2s - loss: 0.1166 - acc: 0.9890 - val\_loss: 0.2610 - val\_acc: 0.9546  
 Epoch 30/55  
 - 2s - loss: 0.0945 - acc: 0.9918 - val\_loss: 0.3574 - val\_acc: 0.9344  
 Epoch 31/55  
 - 2s - loss: 0.0982 - acc: 0.9918 - val\_loss: 0.2320 - val\_acc: 0.9495  
 Epoch 32/55  
 - 2s - loss: 0.0748 - acc: 0.9957 - val\_loss: 0.2440 - val\_acc: 0.9409  
 Epoch 33/55  
 - 2s - loss: 0.0815 - acc: 0.9915 - val\_loss: 0.2981 - val\_acc: 0.9394  
 Epoch 34/55

```

- 2s - loss: 0.1641 - acc: 0.9732 - val_loss: 0.5382 - val_acc: 0.9178
Epoch 35/55
- 2s - loss: 0.1353 - acc: 0.9881 - val_loss: 0.2308 - val_acc: 0.9517
Epoch 36/55
- 2s - loss: 0.1170 - acc: 0.9869 - val_loss: 0.2597 - val_acc: 0.9250
Epoch 37/55
- 2s - loss: 0.1394 - acc: 0.9848 - val_loss: 0.2913 - val_acc: 0.9142
Epoch 38/55
- 2s - loss: 0.1475 - acc: 0.9775 - val_loss: 0.3130 - val_acc: 0.9308
Epoch 39/55
- 2s - loss: 0.1230 - acc: 0.9848 - val_loss: 0.4036 - val_acc: 0.8832
Epoch 40/55
- 2s - loss: 0.1353 - acc: 0.9823 - val_loss: 0.2762 - val_acc: 0.9272
Epoch 41/55
- 2s - loss: 0.1430 - acc: 0.9808 - val_loss: 0.5107 - val_acc: 0.8457
Epoch 42/55
- 2s - loss: 0.1269 - acc: 0.9848 - val_loss: 0.2661 - val_acc: 0.9337
Epoch 43/55
- 2s - loss: 0.1275 - acc: 0.9863 - val_loss: 0.2531 - val_acc: 0.9517
Epoch 44/55
- 2s - loss: 0.1388 - acc: 0.9802 - val_loss: 0.2902 - val_acc: 0.9265
Epoch 45/55
- 2s - loss: 0.0989 - acc: 0.9884 - val_loss: 0.2624 - val_acc: 0.9322
Epoch 46/55
- 2s - loss: 0.1053 - acc: 0.9906 - val_loss: 0.3638 - val_acc: 0.9070
Epoch 47/55
- 2s - loss: 0.0871 - acc: 0.9927 - val_loss: 0.2662 - val_acc: 0.9366
Epoch 48/55
- 2s - loss: 0.0898 - acc: 0.9915 - val_loss: 0.3073 - val_acc: 0.9380
Epoch 49/55
- 2s - loss: 0.1460 - acc: 0.9741 - val_loss: 0.4713 - val_acc: 0.9005
Epoch 50/55
- 2s - loss: 0.1091 - acc: 0.9927 - val_loss: 0.2388 - val_acc: 0.9416
Epoch 51/55
- 2s - loss: 0.1188 - acc: 0.9839 - val_loss: 0.3750 - val_acc: 0.9178
Epoch 52/55
- 2s - loss: 0.0970 - acc: 0.9909 - val_loss: 0.4656 - val_acc: 0.9214
Epoch 53/55
- 2s - loss: 0.0855 - acc: 0.9909 - val_loss: 0.3124 - val_acc: 0.9099
Epoch 54/55
- 2s - loss: 0.1467 - acc: 0.9750 - val_loss: 0.3423 - val_acc: 0.9344
Epoch 55/55
- 2s - loss: 0.1196 - acc: 0.9851 - val_loss: 0.3224 - val_acc: 0.9322
Train accuracy 0.9899543378995433 Test accuracy: 0.9322278298485941

```

```

-----
Layer (type)                Output Shape                Param #
=====

```

conv1d_1 (Conv1D)	(None, 126, 28)	784
-----		
conv1d_2 (Conv1D)	(None, 120, 32)	6304
-----		
dropout_1 (Dropout)	(None, 120, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
-----		
flatten_1 (Flatten)	(None, 768)	0
-----		
dense_1 (Dense)	(None, 32)	24608
-----		
dense_2 (Dense)	(None, 3)	99
=====		
Total params: 31,795		
Trainable params: 31,795		
Non-trainable params: 0		
-----		
None		
Train on 3285 samples, validate on 1387 samples		
Epoch 1/55		
- 2s - loss: 127.4787 - acc: 0.4928 - val_loss: 78.9895 - val_acc: 0.6373		
Epoch 2/55		
- 1s - loss: 54.2764 - acc: 0.7184 - val_loss: 36.1670 - val_acc: 0.7361		
Epoch 3/55		
- 1s - loss: 26.2325 - acc: 0.8761 - val_loss: 19.0841 - val_acc: 0.7722		
Epoch 4/55		
- 1s - loss: 14.3704 - acc: 0.9075 - val_loss: 11.1097 - val_acc: 0.8277		
Epoch 5/55		
- 1s - loss: 8.4175 - acc: 0.9297 - val_loss: 6.7636 - val_acc: 0.8104		
Epoch 6/55		
- 1s - loss: 5.0178 - acc: 0.9455 - val_loss: 4.1564 - val_acc: 0.8738		
Epoch 7/55		
- 1s - loss: 3.0078 - acc: 0.9556 - val_loss: 2.6408 - val_acc: 0.8262		
Epoch 8/55		
- 1s - loss: 1.8347 - acc: 0.9580 - val_loss: 1.7423 - val_acc: 0.9070		
Epoch 9/55		
- 1s - loss: 1.1723 - acc: 0.9537 - val_loss: 1.2949 - val_acc: 0.8392		
Epoch 10/55		
- 1s - loss: 0.8216 - acc: 0.9486 - val_loss: 1.0811 - val_acc: 0.7686		
Epoch 11/55		
- 1s - loss: 0.6169 - acc: 0.9556 - val_loss: 0.8366 - val_acc: 0.9164		
Epoch 12/55		
- 1s - loss: 0.5018 - acc: 0.9635 - val_loss: 0.7682 - val_acc: 0.8969		
Epoch 13/55		
- 1s - loss: 0.4510 - acc: 0.9601 - val_loss: 0.7364 - val_acc: 0.8839		
Epoch 14/55		
- 1s - loss: 0.4088 - acc: 0.9623 - val_loss: 0.6839 - val_acc: 0.9185		

Epoch 15/55  
- 1s - loss: 0.3900 - acc: 0.9583 - val\_loss: 0.6414 - val\_acc: 0.9293  
Epoch 16/55  
- 1s - loss: 0.3683 - acc: 0.9616 - val\_loss: 0.6925 - val\_acc: 0.8255  
Epoch 17/55  
- 1s - loss: 0.3553 - acc: 0.9650 - val\_loss: 0.5912 - val\_acc: 0.9344  
Epoch 18/55  
- 1s - loss: 0.3294 - acc: 0.9720 - val\_loss: 0.6102 - val\_acc: 0.9048  
Epoch 19/55  
- 1s - loss: 0.3437 - acc: 0.9650 - val\_loss: 0.6073 - val\_acc: 0.8868  
Epoch 20/55  
- 1s - loss: 0.3193 - acc: 0.9735 - val\_loss: 0.5734 - val\_acc: 0.9084  
Epoch 21/55  
- 1s - loss: 0.3015 - acc: 0.9720 - val\_loss: 0.5683 - val\_acc: 0.9257  
Epoch 22/55  
- 1s - loss: 0.2988 - acc: 0.9763 - val\_loss: 0.5565 - val\_acc: 0.9142  
Epoch 23/55  
- 1s - loss: 0.2792 - acc: 0.9769 - val\_loss: 0.5253 - val\_acc: 0.9272  
Epoch 24/55  
- 1s - loss: 0.2669 - acc: 0.9775 - val\_loss: 0.5467 - val\_acc: 0.8998  
Epoch 25/55  
- 1s - loss: 0.2644 - acc: 0.9756 - val\_loss: 0.5272 - val\_acc: 0.9135  
Epoch 26/55  
- 1s - loss: 0.2680 - acc: 0.9760 - val\_loss: 0.4899 - val\_acc: 0.9301  
Epoch 27/55  
- 1s - loss: 0.2726 - acc: 0.9732 - val\_loss: 0.4792 - val\_acc: 0.9445  
Epoch 28/55  
- 1s - loss: 0.2729 - acc: 0.9693 - val\_loss: 0.5061 - val\_acc: 0.9092  
Epoch 29/55  
- 1s - loss: 0.2439 - acc: 0.9793 - val\_loss: 0.4593 - val\_acc: 0.9474  
Epoch 30/55  
- 1s - loss: 0.2440 - acc: 0.9766 - val\_loss: 0.4677 - val\_acc: 0.9394  
Epoch 31/55  
- 1s - loss: 0.2332 - acc: 0.9799 - val\_loss: 0.4315 - val\_acc: 0.9546  
Epoch 32/55  
- 1s - loss: 0.2480 - acc: 0.9756 - val\_loss: 0.4309 - val\_acc: 0.9423  
Epoch 33/55  
- 1s - loss: 0.2471 - acc: 0.9720 - val\_loss: 0.4712 - val\_acc: 0.9070  
Epoch 34/55  
- 1s - loss: 0.2200 - acc: 0.9820 - val\_loss: 0.4916 - val\_acc: 0.8818  
Epoch 35/55  
- 1s - loss: 0.2124 - acc: 0.9814 - val\_loss: 0.4078 - val\_acc: 0.9517  
Epoch 36/55  
- 1s - loss: 0.2110 - acc: 0.9836 - val\_loss: 0.4272 - val\_acc: 0.9380  
Epoch 37/55  
- 1s - loss: 0.2227 - acc: 0.9766 - val\_loss: 0.4558 - val\_acc: 0.9164  
Epoch 38/55  
- 1s - loss: 0.2109 - acc: 0.9845 - val\_loss: 0.4269 - val\_acc: 0.9185

```

Epoch 39/55
- 1s - loss: 0.2175 - acc: 0.9796 - val_loss: 0.4465 - val_acc: 0.9113
Epoch 40/55
- 1s - loss: 0.2018 - acc: 0.9842 - val_loss: 0.4697 - val_acc: 0.8983
Epoch 41/55
- 1s - loss: 0.1949 - acc: 0.9881 - val_loss: 0.3965 - val_acc: 0.9402
Epoch 42/55
- 1s - loss: 0.1956 - acc: 0.9857 - val_loss: 0.4165 - val_acc: 0.9142
Epoch 43/55
- 1s - loss: 0.1903 - acc: 0.9860 - val_loss: 0.4023 - val_acc: 0.9286
Epoch 44/55
- 1s - loss: 0.1860 - acc: 0.9875 - val_loss: 0.4103 - val_acc: 0.9279
Epoch 45/55
- 1s - loss: 0.1938 - acc: 0.9793 - val_loss: 0.6222 - val_acc: 0.8053
Epoch 46/55
- 1s - loss: 0.2138 - acc: 0.9799 - val_loss: 0.3911 - val_acc: 0.9286
Epoch 47/55
- 1s - loss: 0.1574 - acc: 0.9942 - val_loss: 0.3855 - val_acc: 0.9423
Epoch 48/55
- 1s - loss: 0.1796 - acc: 0.9851 - val_loss: 0.4130 - val_acc: 0.9178
Epoch 49/55
- 1s - loss: 0.1885 - acc: 0.9820 - val_loss: 0.3574 - val_acc: 0.9466
Epoch 50/55
- 1s - loss: 0.1784 - acc: 0.9854 - val_loss: 0.3530 - val_acc: 0.9416
Epoch 51/55
- 1s - loss: 0.1615 - acc: 0.9860 - val_loss: 0.3983 - val_acc: 0.8998
Epoch 52/55
- 1s - loss: 0.1663 - acc: 0.9884 - val_loss: 0.3644 - val_acc: 0.9380
Epoch 53/55
- 1s - loss: 0.1531 - acc: 0.9912 - val_loss: 0.3698 - val_acc: 0.9409
Epoch 54/55
- 1s - loss: 0.1731 - acc: 0.9836 - val_loss: 0.3621 - val_acc: 0.9322
Epoch 55/55
- 1s - loss: 0.1482 - acc: 0.9918 - val_loss: 0.3392 - val_acc: 0.9517
Train accuracy 0.9990867579908675 Test accuracy: 0.9516943042537851

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0

---

```

-----
dense_1 (Dense)                (None, 32)                23584
-----
dense_2 (Dense)                (None, 3)                  99
=====
Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 3s - loss: 24.2610 - acc: 0.6654 - val_loss: 12.0453 - val_acc: 0.8933
Epoch 2/55
  - 2s - loss: 6.5776 - acc: 0.9671 - val_loss: 3.3836 - val_acc: 0.9200
Epoch 3/55
  - 2s - loss: 1.7335 - acc: 0.9909 - val_loss: 1.1485 - val_acc: 0.8969
Epoch 4/55
  - 2s - loss: 0.5381 - acc: 0.9881 - val_loss: 0.5616 - val_acc: 0.9517
Epoch 5/55
  - 2s - loss: 0.2641 - acc: 0.9890 - val_loss: 0.4568 - val_acc: 0.9308
Epoch 6/55
  - 2s - loss: 0.1953 - acc: 0.9896 - val_loss: 0.3689 - val_acc: 0.9632
Epoch 7/55
  - 2s - loss: 0.1582 - acc: 0.9924 - val_loss: 0.4338 - val_acc: 0.9193
Epoch 8/55
  - 2s - loss: 0.1699 - acc: 0.9909 - val_loss: 0.3995 - val_acc: 0.8983
Epoch 9/55
  - 2s - loss: 0.1369 - acc: 0.9948 - val_loss: 0.2801 - val_acc: 0.9748
Epoch 10/55
  - 2s - loss: 0.1242 - acc: 0.9957 - val_loss: 0.2946 - val_acc: 0.9575
Epoch 11/55
  - 2s - loss: 0.1174 - acc: 0.9957 - val_loss: 0.2937 - val_acc: 0.9452
Epoch 12/55
  - 2s - loss: 0.1305 - acc: 0.9884 - val_loss: 0.3544 - val_acc: 0.9265
Epoch 13/55
  - 2s - loss: 0.1139 - acc: 0.9942 - val_loss: 0.2651 - val_acc: 0.9589
Epoch 14/55
  - 2s - loss: 0.0931 - acc: 0.9973 - val_loss: 0.2543 - val_acc: 0.9596
Epoch 15/55
  - 2s - loss: 0.1182 - acc: 0.9896 - val_loss: 0.2453 - val_acc: 0.9719
Epoch 16/55
  - 2s - loss: 0.0926 - acc: 0.9982 - val_loss: 0.2264 - val_acc: 0.9755
Epoch 17/55
  - 2s - loss: 0.0947 - acc: 0.9933 - val_loss: 0.2458 - val_acc: 0.9553
Epoch 18/55
  - 2s - loss: 0.0803 - acc: 0.9988 - val_loss: 0.2151 - val_acc: 0.9755
Epoch 19/55

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- 2s - loss: 0.0931 - acc: 0.9915 - val\_loss: 0.2643 - val\_acc: 0.9481  
 Epoch 20/55  
 - 2s - loss: 0.1049 - acc: 0.9936 - val\_loss: 0.2093 - val\_acc: 0.9784  
 Epoch 21/55  
 - 2s - loss: 0.0666 - acc: 0.9994 - val\_loss: 0.2250 - val\_acc: 0.9683  
 Epoch 22/55  
 - 2s - loss: 0.0722 - acc: 0.9982 - val\_loss: 0.2065 - val\_acc: 0.9740  
 Epoch 23/55  
 - 2s - loss: 0.0997 - acc: 0.9909 - val\_loss: 0.1904 - val\_acc: 0.9805  
 Epoch 24/55  
 - 2s - loss: 0.1258 - acc: 0.9854 - val\_loss: 0.2518 - val\_acc: 0.9416  
 Epoch 25/55  
 - 2s - loss: 0.1222 - acc: 0.9887 - val\_loss: 0.1980 - val\_acc: 0.9719  
 Epoch 26/55  
 - 2s - loss: 0.0668 - acc: 0.9991 - val\_loss: 0.2233 - val\_acc: 0.9466  
 Epoch 27/55  
 - 2s - loss: 0.0613 - acc: 0.9997 - val\_loss: 0.2042 - val\_acc: 0.9733  
 Epoch 28/55  
 - 2s - loss: 0.0872 - acc: 0.9903 - val\_loss: 0.2346 - val\_acc: 0.9539  
 Epoch 29/55  
 - 2s - loss: 0.0836 - acc: 0.9939 - val\_loss: 0.1961 - val\_acc: 0.9704  
 Epoch 30/55  
 - 2s - loss: 0.0848 - acc: 0.9939 - val\_loss: 0.1701 - val\_acc: 0.9776  
 Epoch 31/55  
 - 2s - loss: 0.0578 - acc: 0.9997 - val\_loss: 0.1688 - val\_acc: 0.9827  
 Epoch 32/55  
 - 2s - loss: 0.0536 - acc: 0.9997 - val\_loss: 0.1721 - val\_acc: 0.9820  
 Epoch 33/55  
 - 2s - loss: 0.0510 - acc: 0.9994 - val\_loss: 0.1908 - val\_acc: 0.9654  
 Epoch 34/55  
 - 2s - loss: 0.1275 - acc: 0.9814 - val\_loss: 0.5246 - val\_acc: 0.8825  
 Epoch 35/55  
 - 2s - loss: 0.1794 - acc: 0.9848 - val\_loss: 0.2162 - val\_acc: 0.9697  
 Epoch 36/55  
 - 2s - loss: 0.0740 - acc: 0.9994 - val\_loss: 0.1895 - val\_acc: 0.9654  
 Epoch 37/55  
 - 2s - loss: 0.0570 - acc: 0.9982 - val\_loss: 0.1722 - val\_acc: 0.9769  
 Epoch 38/55  
 - 2s - loss: 0.1147 - acc: 0.9860 - val\_loss: 0.1601 - val\_acc: 0.9791  
 Epoch 39/55  
 - 2s - loss: 0.0564 - acc: 0.9997 - val\_loss: 0.1655 - val\_acc: 0.9805  
 Epoch 40/55  
 - 2s - loss: 0.0487 - acc: 0.9997 - val\_loss: 0.1759 - val\_acc: 0.9776  
 Epoch 41/55  
 - 2s - loss: 0.0455 - acc: 1.0000 - val\_loss: 0.1628 - val\_acc: 0.9776  
 Epoch 42/55  
 - 2s - loss: 0.1045 - acc: 0.9845 - val\_loss: 0.1860 - val\_acc: 0.9769  
 Epoch 43/55

```

- 2s - loss: 0.0968 - acc: 0.9957 - val_loss: 0.1811 - val_acc: 0.9733
Epoch 44/55
- 2s - loss: 0.0524 - acc: 1.0000 - val_loss: 0.1792 - val_acc: 0.9762
Epoch 45/55
- 2s - loss: 0.0503 - acc: 0.9985 - val_loss: 0.1859 - val_acc: 0.9733
Epoch 46/55
- 2s - loss: 0.0432 - acc: 0.9997 - val_loss: 0.1832 - val_acc: 0.9769
Epoch 47/55
- 2s - loss: 0.1126 - acc: 0.9817 - val_loss: 0.4094 - val_acc: 0.9394
Epoch 48/55
- 2s - loss: 0.1503 - acc: 0.9845 - val_loss: 0.1592 - val_acc: 0.9813
Epoch 49/55
- 2s - loss: 0.0602 - acc: 0.9997 - val_loss: 0.1871 - val_acc: 0.9719
Epoch 50/55
- 2s - loss: 0.0482 - acc: 1.0000 - val_loss: 0.1717 - val_acc: 0.9769
Epoch 51/55
- 2s - loss: 0.0430 - acc: 0.9997 - val_loss: 0.1693 - val_acc: 0.9776
Epoch 52/55
- 2s - loss: 0.0407 - acc: 0.9997 - val_loss: 0.1795 - val_acc: 0.9755
Epoch 53/55
- 2s - loss: 0.0627 - acc: 0.9924 - val_loss: 0.2183 - val_acc: 0.9582
Epoch 54/55
- 2s - loss: 0.1270 - acc: 0.9833 - val_loss: 0.2117 - val_acc: 0.9676
Epoch 55/55
- 2s - loss: 0.0712 - acc: 0.9988 - val_loss: 0.1676 - val_acc: 0.9697
Train accuracy 1.0 Test accuracy: 0.969718817591925

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 122, 32)          2048
-----
conv1d_2 (Conv1D)            (None, 116, 32)          7200
-----
dropout_1 (Dropout)          (None, 116, 32)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 23, 32)          0
-----
flatten_1 (Flatten)          (None, 736)              0
-----
dense_1 (Dense)              (None, 32)               23584
-----
dense_2 (Dense)              (None, 3)                99
=====
Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0
-----

```



None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 33.8299 - acc: 0.6201 - val\_loss: 18.2040 - val\_acc: 0.8140

Epoch 2/35

- 2s - loss: 10.6449 - acc: 0.9549 - val\_loss: 5.8735 - val\_acc: 0.8789

Epoch 3/35

- 2s - loss: 3.2984 - acc: 0.9805 - val\_loss: 2.0599 - val\_acc: 0.8609

Epoch 4/35

- 2s - loss: 1.0674 - acc: 0.9863 - val\_loss: 0.8590 - val\_acc: 0.9459

Epoch 5/35

- 2s - loss: 0.4261 - acc: 0.9924 - val\_loss: 0.5510 - val\_acc: 0.9481

Epoch 6/35

- 2s - loss: 0.2629 - acc: 0.9887 - val\_loss: 0.4369 - val\_acc: 0.9618

Epoch 7/35

- 2s - loss: 0.1953 - acc: 0.9948 - val\_loss: 0.4420 - val\_acc: 0.9301

Epoch 8/35

- 2s - loss: 0.1912 - acc: 0.9927 - val\_loss: 0.4204 - val\_acc: 0.9193

Epoch 9/35

- 2s - loss: 0.1792 - acc: 0.9893 - val\_loss: 0.3220 - val\_acc: 0.9748

Epoch 10/35

- 2s - loss: 0.1549 - acc: 0.9942 - val\_loss: 0.3557 - val\_acc: 0.9402

Epoch 11/35

- 2s - loss: 0.1372 - acc: 0.9967 - val\_loss: 0.3288 - val\_acc: 0.9517

Epoch 12/35

- 2s - loss: 0.1446 - acc: 0.9896 - val\_loss: 0.3371 - val\_acc: 0.9308

Epoch 13/35

- 2s - loss: 0.1271 - acc: 0.9951 - val\_loss: 0.3084 - val\_acc: 0.9690

Epoch 14/35

- 2s - loss: 0.1133 - acc: 0.9960 - val\_loss: 0.2901 - val\_acc: 0.9531

Epoch 15/35

- 2s - loss: 0.1421 - acc: 0.9857 - val\_loss: 0.2872 - val\_acc: 0.9690

Epoch 16/35

- 2s - loss: 0.1090 - acc: 0.9979 - val\_loss: 0.2575 - val\_acc: 0.9798

Epoch 17/35

- 2s - loss: 0.1059 - acc: 0.9951 - val\_loss: 0.2560 - val\_acc: 0.9654

Epoch 18/35

- 2s - loss: 0.0934 - acc: 0.9988 - val\_loss: 0.2535 - val\_acc: 0.9683

Epoch 19/35

- 2s - loss: 0.1594 - acc: 0.9787 - val\_loss: 0.3837 - val\_acc: 0.9214

Epoch 20/35

- 2s - loss: 0.1409 - acc: 0.9924 - val\_loss: 0.2385 - val\_acc: 0.9748

Epoch 21/35

- 2s - loss: 0.0863 - acc: 0.9991 - val\_loss: 0.2497 - val\_acc: 0.9676

Epoch 22/35

- 2s - loss: 0.0820 - acc: 0.9988 - val\_loss: 0.2385 - val\_acc: 0.9697

Epoch 23/35

- 2s - loss: 0.0827 - acc: 0.9979 - val\_loss: 0.2227 - val\_acc: 0.9791

```

Epoch 24/35
- 2s - loss: 0.0984 - acc: 0.9930 - val_loss: 0.2144 - val_acc: 0.9704
Epoch 25/35
- 2s - loss: 0.1146 - acc: 0.9921 - val_loss: 0.2358 - val_acc: 0.9668
Epoch 26/35
- 2s - loss: 0.0771 - acc: 1.0000 - val_loss: 0.2416 - val_acc: 0.9546
Epoch 27/35
- 2s - loss: 0.0706 - acc: 1.0000 - val_loss: 0.1986 - val_acc: 0.9849
Epoch 28/35
- 2s - loss: 0.1028 - acc: 0.9900 - val_loss: 0.2284 - val_acc: 0.9625
Epoch 29/35
- 2s - loss: 0.0775 - acc: 0.9991 - val_loss: 0.2125 - val_acc: 0.9647
Epoch 30/35
- 2s - loss: 0.0747 - acc: 0.9957 - val_loss: 0.2263 - val_acc: 0.9603
Epoch 31/35
- 2s - loss: 0.0717 - acc: 0.9985 - val_loss: 0.1841 - val_acc: 0.9805
Epoch 32/35
- 2s - loss: 0.1216 - acc: 0.9854 - val_loss: 0.2781 - val_acc: 0.9236
Epoch 33/35
- 2s - loss: 0.0819 - acc: 0.9988 - val_loss: 0.2039 - val_acc: 0.9755
Epoch 34/35
- 2s - loss: 0.0636 - acc: 0.9991 - val_loss: 0.1936 - val_acc: 0.9748
Epoch 35/35
- 2s - loss: 0.0624 - acc: 0.9979 - val_loss: 0.2231 - val_acc: 0.9640
Train accuracy 0.9996955859969558 Test accuracy: 0.9639509733237203

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 122, 32)          2048
-----
conv1d_2 (Conv1D)            (None, 116, 32)          7200
-----
dropout_1 (Dropout)          (None, 116, 32)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 23, 32)          0
-----
flatten_1 (Flatten)          (None, 736)              0
-----
dense_1 (Dense)              (None, 32)               23584
-----
dense_2 (Dense)              (None, 3)                99
=====
Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0

```

```

-----
None

```

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 12.4054 - acc: 0.6880 - val\_loss: 2.9512 - val\_acc: 0.8991

Epoch 2/35

- 2s - loss: 1.0416 - acc: 0.9799 - val\_loss: 0.5244 - val\_acc: 0.9510

Epoch 3/35

- 2s - loss: 0.2410 - acc: 0.9839 - val\_loss: 0.4275 - val\_acc: 0.9236

Epoch 4/35

- 2s - loss: 0.1772 - acc: 0.9909 - val\_loss: 0.3098 - val\_acc: 0.9539

Epoch 5/35

- 2s - loss: 0.1723 - acc: 0.9866 - val\_loss: 0.3970 - val\_acc: 0.9481

Epoch 6/35

- 2s - loss: 0.1348 - acc: 0.9960 - val\_loss: 0.2674 - val\_acc: 0.9589

Epoch 7/35

- 2s - loss: 0.1275 - acc: 0.9915 - val\_loss: 0.2340 - val\_acc: 0.9712

Epoch 8/35

- 2s - loss: 0.1021 - acc: 0.9979 - val\_loss: 0.2558 - val\_acc: 0.9567

Epoch 9/35

- 2s - loss: 0.1390 - acc: 0.9872 - val\_loss: 0.2929 - val\_acc: 0.9618

Epoch 10/35

- 2s - loss: 0.0993 - acc: 1.0000 - val\_loss: 0.2197 - val\_acc: 0.9690

Epoch 11/35

- 2s - loss: 0.1208 - acc: 0.9939 - val\_loss: 0.2199 - val\_acc: 0.9654

Epoch 12/35

- 2s - loss: 0.0836 - acc: 0.9985 - val\_loss: 0.4287 - val\_acc: 0.8601

Epoch 13/35

- 2s - loss: 0.1126 - acc: 0.9936 - val\_loss: 0.1780 - val\_acc: 0.9762

Epoch 14/35

- 2s - loss: 0.0804 - acc: 0.9960 - val\_loss: 0.2246 - val\_acc: 0.9603

Epoch 15/35

- 2s - loss: 0.0809 - acc: 0.9967 - val\_loss: 0.2218 - val\_acc: 0.9625

Epoch 16/35

- 2s - loss: 0.0822 - acc: 0.9948 - val\_loss: 0.1725 - val\_acc: 0.9733

Epoch 17/35

- 2s - loss: 0.1170 - acc: 0.9890 - val\_loss: 0.2205 - val\_acc: 0.9791

Epoch 18/35

- 2s - loss: 0.0730 - acc: 0.9991 - val\_loss: 0.1871 - val\_acc: 0.9712

Epoch 19/35

- 2s - loss: 0.0549 - acc: 0.9991 - val\_loss: 0.1535 - val\_acc: 0.9740

Epoch 20/35

- 2s - loss: 0.0585 - acc: 0.9985 - val\_loss: 0.1716 - val\_acc: 0.9733

Epoch 21/35

- 2s - loss: 0.0578 - acc: 0.9960 - val\_loss: 0.2746 - val\_acc: 0.9293

Epoch 22/35

- 2s - loss: 0.0880 - acc: 0.9960 - val\_loss: 0.1761 - val\_acc: 0.9640

Epoch 23/35

- 2s - loss: 0.0687 - acc: 0.9967 - val\_loss: 0.2233 - val\_acc: 0.9611

Epoch 24/35

```

- 2s - loss: 0.0599 - acc: 0.9963 - val_loss: 0.2014 - val_acc: 0.9582
Epoch 25/35
- 2s - loss: 0.0595 - acc: 0.9982 - val_loss: 0.2330 - val_acc: 0.9589
Epoch 26/35
- 2s - loss: 0.0738 - acc: 0.9951 - val_loss: 0.1452 - val_acc: 0.9740
Epoch 27/35
- 2s - loss: 0.0546 - acc: 0.9970 - val_loss: 0.2822 - val_acc: 0.9524
Epoch 28/35
- 2s - loss: 0.0627 - acc: 0.9985 - val_loss: 0.1997 - val_acc: 0.9510
Epoch 29/35
- 2s - loss: 0.0446 - acc: 0.9979 - val_loss: 0.2828 - val_acc: 0.9106
Epoch 30/35
- 2s - loss: 0.0537 - acc: 0.9957 - val_loss: 0.2731 - val_acc: 0.9358
Epoch 31/35
- 2s - loss: 0.0638 - acc: 0.9973 - val_loss: 0.1536 - val_acc: 0.9769
Epoch 32/35
- 2s - loss: 0.0382 - acc: 0.9994 - val_loss: 0.1363 - val_acc: 0.9769
Epoch 33/35
- 2s - loss: 0.0401 - acc: 0.9988 - val_loss: 0.1391 - val_acc: 0.9697
Epoch 34/35
- 2s - loss: 0.0415 - acc: 0.9976 - val_loss: 0.1227 - val_acc: 0.9769
Epoch 35/35
- 2s - loss: 0.0338 - acc: 0.9997 - val_loss: 0.2562 - val_acc: 0.9402
Train accuracy 0.9929984779481292 Test accuracy: 0.9401586157173756

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 32)	5152
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

Total params: 30,883
Trainable params: 30,883
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples

```

Epoch 1/55  
- 3s - loss: 30.0575 - acc: 0.5872 - val\_loss: 12.1152 - val\_acc: 0.8652

Epoch 2/55  
- 1s - loss: 5.6932 - acc: 0.9534 - val\_loss: 2.3814 - val\_acc: 0.9344

Epoch 3/55  
- 1s - loss: 1.0691 - acc: 0.9842 - val\_loss: 0.7974 - val\_acc: 0.9156

Epoch 4/55  
- 1s - loss: 0.3638 - acc: 0.9863 - val\_loss: 0.5032 - val\_acc: 0.9560

Epoch 5/55  
- 1s - loss: 0.2435 - acc: 0.9872 - val\_loss: 0.4398 - val\_acc: 0.9387

Epoch 6/55  
- 1s - loss: 0.1944 - acc: 0.9912 - val\_loss: 0.3969 - val\_acc: 0.9582

Epoch 7/55  
- 1s - loss: 0.1620 - acc: 0.9963 - val\_loss: 0.3830 - val\_acc: 0.9358

Epoch 8/55  
- 1s - loss: 0.2009 - acc: 0.9830 - val\_loss: 0.3909 - val\_acc: 0.9286

Epoch 9/55  
- 1s - loss: 0.1693 - acc: 0.9900 - val\_loss: 0.2936 - val\_acc: 0.9712

Epoch 10/55  
- 1s - loss: 0.1812 - acc: 0.9823 - val\_loss: 0.4286 - val\_acc: 0.9041

Epoch 11/55  
- 1s - loss: 0.1438 - acc: 0.9939 - val\_loss: 0.3309 - val\_acc: 0.9481

Epoch 12/55  
- 1s - loss: 0.1416 - acc: 0.9881 - val\_loss: 0.3438 - val\_acc: 0.9293

Epoch 13/55  
- 1s - loss: 0.1245 - acc: 0.9924 - val\_loss: 0.3138 - val\_acc: 0.9488

Epoch 14/55  
- 1s - loss: 0.1335 - acc: 0.9896 - val\_loss: 0.3081 - val\_acc: 0.9474

Epoch 15/55  
- 1s - loss: 0.1384 - acc: 0.9878 - val\_loss: 0.2589 - val\_acc: 0.9726

Epoch 16/55  
- 1s - loss: 0.1192 - acc: 0.9924 - val\_loss: 0.2488 - val\_acc: 0.9762

Epoch 17/55  
- 1s - loss: 0.1166 - acc: 0.9890 - val\_loss: 0.2562 - val\_acc: 0.9654

Epoch 18/55  
- 1s - loss: 0.1190 - acc: 0.9906 - val\_loss: 0.2675 - val\_acc: 0.9488

Epoch 19/55  
- 1s - loss: 0.2077 - acc: 0.9677 - val\_loss: 0.4630 - val\_acc: 0.9092

Epoch 20/55  
- 1s - loss: 0.1670 - acc: 0.9909 - val\_loss: 0.2331 - val\_acc: 0.9726

Epoch 21/55  
- 1s - loss: 0.0956 - acc: 0.9973 - val\_loss: 0.2826 - val\_acc: 0.9553

Epoch 22/55  
- 1s - loss: 0.0888 - acc: 0.9960 - val\_loss: 0.2486 - val\_acc: 0.9654

Epoch 23/55  
- 1s - loss: 0.1057 - acc: 0.9906 - val\_loss: 0.3201 - val\_acc: 0.9142

Epoch 24/55  
- 1s - loss: 0.1493 - acc: 0.9830 - val\_loss: 0.2374 - val\_acc: 0.9676

Epoch 25/55  
- 1s - loss: 0.0972 - acc: 0.9942 - val\_loss: 0.2333 - val\_acc: 0.9654

Epoch 26/55  
- 1s - loss: 0.0801 - acc: 0.9976 - val\_loss: 0.2245 - val\_acc: 0.9632

Epoch 27/55  
- 1s - loss: 0.0749 - acc: 0.9982 - val\_loss: 0.2245 - val\_acc: 0.9748

Epoch 28/55  
- 1s - loss: 0.1147 - acc: 0.9851 - val\_loss: 0.4022 - val\_acc: 0.9012

Epoch 29/55  
- 1s - loss: 0.2274 - acc: 0.9717 - val\_loss: 0.2786 - val\_acc: 0.9582

Epoch 30/55  
- 1s - loss: 0.0912 - acc: 0.9982 - val\_loss: 0.2470 - val\_acc: 0.9495

Epoch 31/55  
- 1s - loss: 0.0718 - acc: 0.9985 - val\_loss: 0.2468 - val\_acc: 0.9647

Epoch 32/55  
- 1s - loss: 0.0700 - acc: 0.9982 - val\_loss: 0.2151 - val\_acc: 0.9676

Epoch 33/55  
- 1s - loss: 0.1409 - acc: 0.9805 - val\_loss: 0.3086 - val\_acc: 0.9387

Epoch 34/55  
- 1s - loss: 0.0795 - acc: 0.9988 - val\_loss: 0.2519 - val\_acc: 0.9596

Epoch 35/55  
- 1s - loss: 0.0678 - acc: 0.9973 - val\_loss: 0.2300 - val\_acc: 0.9596

Epoch 36/55  
- 1s - loss: 0.0679 - acc: 0.9979 - val\_loss: 0.2563 - val\_acc: 0.9560

Epoch 37/55  
- 1s - loss: 0.1323 - acc: 0.9866 - val\_loss: 0.2214 - val\_acc: 0.9625

Epoch 38/55  
- 1s - loss: 0.0722 - acc: 0.9963 - val\_loss: 0.2683 - val\_acc: 0.9308

Epoch 39/55  
- 1s - loss: 0.2114 - acc: 0.9677 - val\_loss: 0.2797 - val\_acc: 0.9510

Epoch 40/55  
- 1s - loss: 0.1066 - acc: 0.9948 - val\_loss: 0.2120 - val\_acc: 0.9625

Epoch 41/55  
- 1s - loss: 0.0696 - acc: 0.9994 - val\_loss: 0.2382 - val\_acc: 0.9495

Epoch 42/55  
- 1s - loss: 0.0602 - acc: 0.9994 - val\_loss: 0.2280 - val\_acc: 0.9495

Epoch 43/55  
- 1s - loss: 0.0672 - acc: 0.9976 - val\_loss: 0.2233 - val\_acc: 0.9632

Epoch 44/55  
- 1s - loss: 0.0768 - acc: 0.9933 - val\_loss: 0.2257 - val\_acc: 0.9618

Epoch 45/55  
- 1s - loss: 0.0836 - acc: 0.9921 - val\_loss: 0.4462 - val\_acc: 0.8342

Epoch 46/55  
- 1s - loss: 0.1921 - acc: 0.9763 - val\_loss: 0.2439 - val\_acc: 0.9517

Epoch 47/55  
- 1s - loss: 0.0740 - acc: 0.9988 - val\_loss: 0.2807 - val\_acc: 0.9416

Epoch 48/55  
- 1s - loss: 0.0850 - acc: 0.9921 - val\_loss: 0.2659 - val\_acc: 0.9358

```

Epoch 49/55
- 1s - loss: 0.0888 - acc: 0.9933 - val_loss: 0.2086 - val_acc: 0.9683
Epoch 50/55
- 1s - loss: 0.0752 - acc: 0.9954 - val_loss: 0.2088 - val_acc: 0.9676
Epoch 51/55
- 1s - loss: 0.1111 - acc: 0.9866 - val_loss: 0.2327 - val_acc: 0.9647
Epoch 52/55
- 1s - loss: 0.0739 - acc: 0.9967 - val_loss: 0.1805 - val_acc: 0.9712
Epoch 53/55
- 1s - loss: 0.0908 - acc: 0.9887 - val_loss: 0.2454 - val_acc: 0.9495
Epoch 54/55
- 1s - loss: 0.0988 - acc: 0.9918 - val_loss: 0.3255 - val_acc: 0.8983
Epoch 55/55
- 1s - loss: 0.1113 - acc: 0.9900 - val_loss: 0.2279 - val_acc: 0.9524
Train accuracy 0.9984779299847792 Test accuracy: 0.9524152847873107
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 70.6791 - acc: 0.5756 - val_loss: 38.3261 - val_acc: 0.7765
Epoch 2/35
- 1s - loss: 23.4649 - acc: 0.8743 - val_loss: 13.4407 - val_acc: 0.7895
Epoch 3/35
- 1s - loss: 8.3101 - acc: 0.9559 - val_loss: 5.1595 - val_acc: 0.8472
Epoch 4/35
- 1s - loss: 3.1539 - acc: 0.9638 - val_loss: 2.1823 - val_acc: 0.9178
Epoch 5/35

```

- 1s - loss: 1.2929 - acc: 0.9778 - val\_loss: 1.1255 - val\_acc: 0.9329  
 Epoch 6/35  
 - 1s - loss: 0.6270 - acc: 0.9830 - val\_loss: 0.7440 - val\_acc: 0.9387  
 Epoch 7/35  
 - 1s - loss: 0.3914 - acc: 0.9903 - val\_loss: 0.6129 - val\_acc: 0.9250  
 Epoch 8/35  
 - 1s - loss: 0.3157 - acc: 0.9893 - val\_loss: 0.5490 - val\_acc: 0.9329  
 Epoch 9/35  
 - 1s - loss: 0.2709 - acc: 0.9924 - val\_loss: 0.4815 - val\_acc: 0.9503  
 Epoch 10/35  
 - 1s - loss: 0.2625 - acc: 0.9857 - val\_loss: 0.5425 - val\_acc: 0.8832  
 Epoch 11/35  
 - 1s - loss: 0.2370 - acc: 0.9900 - val\_loss: 0.4596 - val\_acc: 0.9560  
 Epoch 12/35  
 - 1s - loss: 0.2260 - acc: 0.9878 - val\_loss: 0.4211 - val\_acc: 0.9690  
 Epoch 13/35  
 - 1s - loss: 0.2071 - acc: 0.9918 - val\_loss: 0.4161 - val\_acc: 0.9582  
 Epoch 14/35  
 - 1s - loss: 0.1857 - acc: 0.9957 - val\_loss: 0.3968 - val\_acc: 0.9582  
 Epoch 15/35  
 - 1s - loss: 0.1903 - acc: 0.9927 - val\_loss: 0.3718 - val\_acc: 0.9712  
 Epoch 16/35  
 - 1s - loss: 0.1816 - acc: 0.9930 - val\_loss: 0.3703 - val\_acc: 0.9690  
 Epoch 17/35  
 - 1s - loss: 0.1738 - acc: 0.9942 - val\_loss: 0.3362 - val\_acc: 0.9762  
 Epoch 18/35  
 - 1s - loss: 0.1583 - acc: 0.9967 - val\_loss: 0.3643 - val\_acc: 0.9488  
 Epoch 19/35  
 - 1s - loss: 0.2171 - acc: 0.9763 - val\_loss: 0.3535 - val\_acc: 0.9640  
 Epoch 20/35  
 - 1s - loss: 0.1754 - acc: 0.9924 - val\_loss: 0.3488 - val\_acc: 0.9546  
 Epoch 21/35  
 - 1s - loss: 0.1424 - acc: 0.9976 - val\_loss: 0.3295 - val\_acc: 0.9733  
 Epoch 22/35  
 - 1s - loss: 0.1398 - acc: 0.9963 - val\_loss: 0.3283 - val\_acc: 0.9625  
 Epoch 23/35  
 - 1s - loss: 0.1405 - acc: 0.9967 - val\_loss: 0.2996 - val\_acc: 0.9769  
 Epoch 24/35  
 - 1s - loss: 0.1535 - acc: 0.9893 - val\_loss: 0.3000 - val\_acc: 0.9668  
 Epoch 25/35  
 - 1s - loss: 0.1387 - acc: 0.9936 - val\_loss: 0.3070 - val\_acc: 0.9531  
 Epoch 26/35  
 - 1s - loss: 0.1352 - acc: 0.9930 - val\_loss: 0.3288 - val\_acc: 0.9445  
 Epoch 27/35  
 - 1s - loss: 0.1318 - acc: 0.9939 - val\_loss: 0.2590 - val\_acc: 0.9748  
 Epoch 28/35  
 - 1s - loss: 0.1591 - acc: 0.9848 - val\_loss: 0.3034 - val\_acc: 0.9567  
 Epoch 29/35



```

- 1s - loss: 0.1210 - acc: 0.9957 - val_loss: 0.2993 - val_acc: 0.9539
Epoch 30/35
- 1s - loss: 0.1226 - acc: 0.9957 - val_loss: 0.2751 - val_acc: 0.9704
Epoch 31/35
- 1s - loss: 0.1132 - acc: 0.9963 - val_loss: 0.2688 - val_acc: 0.9611
Epoch 32/35
- 1s - loss: 0.2361 - acc: 0.9662 - val_loss: 0.3697 - val_acc: 0.9488
Epoch 33/35
- 1s - loss: 0.1433 - acc: 0.9948 - val_loss: 0.2660 - val_acc: 0.9726
Epoch 34/35
- 1s - loss: 0.1096 - acc: 0.9973 - val_loss: 0.2511 - val_acc: 0.9791
Epoch 35/35
- 1s - loss: 0.1080 - acc: 0.9967 - val_loss: 0.2602 - val_acc: 0.9740
Train accuracy 1.0 Test accuracy: 0.9740447007930786

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 116, 32)	7200
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
-----		
flatten_1 (Flatten)	(None, 736)	0
-----		
dense_1 (Dense)	(None, 32)	23584
-----		
dense_2 (Dense)	(None, 3)	99
=====		

```

Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0

```

---

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
- 2s - loss: 68.5268 - acc: 0.5869 - val_loss: 28.5923 - val_acc: 0.7505
Epoch 2/55
- 1s - loss: 15.0941 - acc: 0.8810 - val_loss: 7.1496 - val_acc: 0.8234
Epoch 3/55
- 1s - loss: 3.8607 - acc: 0.9391 - val_loss: 2.1828 - val_acc: 0.8522
Epoch 4/55
- 1s - loss: 1.1669 - acc: 0.9641 - val_loss: 0.9338 - val_acc: 0.9279
Epoch 5/55
- 1s - loss: 0.5158 - acc: 0.9726 - val_loss: 0.6667 - val_acc: 0.9185

```

Epoch 6/55  
 - 1s - loss: 0.3637 - acc: 0.9781 - val\_loss: 0.5614 - val\_acc: 0.9329

Epoch 7/55  
 - 1s - loss: 0.2938 - acc: 0.9890 - val\_loss: 0.4998 - val\_acc: 0.9293

Epoch 8/55  
 - 1s - loss: 0.2792 - acc: 0.9845 - val\_loss: 0.4622 - val\_acc: 0.9531

Epoch 9/55  
 - 1s - loss: 0.2464 - acc: 0.9890 - val\_loss: 0.4670 - val\_acc: 0.9329

Epoch 10/55  
 - 1s - loss: 0.2446 - acc: 0.9857 - val\_loss: 0.4752 - val\_acc: 0.9092

Epoch 11/55  
 - 1s - loss: 0.2297 - acc: 0.9857 - val\_loss: 0.4182 - val\_acc: 0.9387

Epoch 12/55  
 - 1s - loss: 0.2303 - acc: 0.9836 - val\_loss: 0.4456 - val\_acc: 0.9149

Epoch 13/55  
 - 1s - loss: 0.2006 - acc: 0.9906 - val\_loss: 0.4089 - val\_acc: 0.9358

Epoch 14/55  
 - 1s - loss: 0.1790 - acc: 0.9912 - val\_loss: 0.3701 - val\_acc: 0.9611

Epoch 15/55  
 - 1s - loss: 0.1954 - acc: 0.9869 - val\_loss: 0.3411 - val\_acc: 0.9647

Epoch 16/55  
 - 1s - loss: 0.1785 - acc: 0.9881 - val\_loss: 0.3401 - val\_acc: 0.9632

Epoch 17/55  
 - 1s - loss: 0.1866 - acc: 0.9869 - val\_loss: 0.3123 - val\_acc: 0.9683

Epoch 18/55  
 - 1s - loss: 0.1544 - acc: 0.9948 - val\_loss: 0.3460 - val\_acc: 0.9481

Epoch 19/55  
 - 1s - loss: 0.2052 - acc: 0.9784 - val\_loss: 0.3648 - val\_acc: 0.9495

Epoch 20/55  
 - 1s - loss: 0.1895 - acc: 0.9869 - val\_loss: 0.3354 - val\_acc: 0.9402

Epoch 21/55  
 - 1s - loss: 0.1510 - acc: 0.9927 - val\_loss: 0.3350 - val\_acc: 0.9423

Epoch 22/55  
 - 1s - loss: 0.1482 - acc: 0.9918 - val\_loss: 0.3567 - val\_acc: 0.9351

Epoch 23/55  
 - 1s - loss: 0.1536 - acc: 0.9927 - val\_loss: 0.2985 - val\_acc: 0.9546

Epoch 24/55  
 - 1s - loss: 0.1860 - acc: 0.9778 - val\_loss: 0.3128 - val\_acc: 0.9560

Epoch 25/55  
 - 1s - loss: 0.1463 - acc: 0.9912 - val\_loss: 0.3144 - val\_acc: 0.9394

Epoch 26/55  
 - 1s - loss: 0.1387 - acc: 0.9909 - val\_loss: 0.3460 - val\_acc: 0.9250

Epoch 27/55  
 - 1s - loss: 0.1514 - acc: 0.9863 - val\_loss: 0.2619 - val\_acc: 0.9697

Epoch 28/55  
 - 1s - loss: 0.1522 - acc: 0.9887 - val\_loss: 0.2828 - val\_acc: 0.9481

Epoch 29/55  
 - 1s - loss: 0.1175 - acc: 0.9954 - val\_loss: 0.2857 - val\_acc: 0.9589

Epoch 30/55  
- 1s - loss: 0.1317 - acc: 0.9918 - val\_loss: 0.2707 - val\_acc: 0.9575  
Epoch 31/55  
- 1s - loss: 0.1177 - acc: 0.9951 - val\_loss: 0.2788 - val\_acc: 0.9466  
Epoch 32/55  
- 1s - loss: 0.1787 - acc: 0.9781 - val\_loss: 0.2763 - val\_acc: 0.9582  
Epoch 33/55  
- 1s - loss: 0.1150 - acc: 0.9970 - val\_loss: 0.2666 - val\_acc: 0.9618  
Epoch 34/55  
- 1s - loss: 0.1135 - acc: 0.9939 - val\_loss: 0.2404 - val\_acc: 0.9704  
Epoch 35/55  
- 1s - loss: 0.1118 - acc: 0.9951 - val\_loss: 0.2910 - val\_acc: 0.9387  
Epoch 36/55  
- 1s - loss: 0.1319 - acc: 0.9881 - val\_loss: 0.2419 - val\_acc: 0.9697  
Epoch 37/55  
- 1s - loss: 0.1010 - acc: 0.9967 - val\_loss: 0.2559 - val\_acc: 0.9560  
Epoch 38/55  
- 1s - loss: 0.1490 - acc: 0.9820 - val\_loss: 0.3134 - val\_acc: 0.9142  
Epoch 39/55  
- 1s - loss: 0.2256 - acc: 0.9686 - val\_loss: 0.4581 - val\_acc: 0.8904  
Epoch 40/55  
- 1s - loss: 0.1351 - acc: 0.9942 - val\_loss: 0.2442 - val\_acc: 0.9704  
Epoch 41/55  
- 1s - loss: 0.0979 - acc: 0.9979 - val\_loss: 0.2374 - val\_acc: 0.9654  
Epoch 42/55  
- 1s - loss: 0.1542 - acc: 0.9787 - val\_loss: 0.3136 - val\_acc: 0.9236  
Epoch 43/55  
- 1s - loss: 0.1723 - acc: 0.9860 - val\_loss: 0.2451 - val\_acc: 0.9748  
Epoch 44/55  
- 1s - loss: 0.0950 - acc: 0.9985 - val\_loss: 0.2617 - val\_acc: 0.9668  
Epoch 45/55  
- 1s - loss: 0.0914 - acc: 0.9973 - val\_loss: 0.2413 - val\_acc: 0.9748  
Epoch 46/55  
- 1s - loss: 0.0915 - acc: 0.9970 - val\_loss: 0.2641 - val\_acc: 0.9589  
Epoch 47/55  
- 1s - loss: 0.1132 - acc: 0.9884 - val\_loss: 0.3052 - val\_acc: 0.9430  
Epoch 48/55  
- 1s - loss: 0.1023 - acc: 0.9957 - val\_loss: 0.2329 - val\_acc: 0.9740  
Epoch 49/55  
- 1s - loss: 0.0961 - acc: 0.9945 - val\_loss: 0.2479 - val\_acc: 0.9539  
Epoch 50/55  
- 1s - loss: 0.1503 - acc: 0.9823 - val\_loss: 0.3036 - val\_acc: 0.9380  
Epoch 51/55  
- 1s - loss: 0.0942 - acc: 0.9960 - val\_loss: 0.2843 - val\_acc: 0.9351  
Epoch 52/55  
- 1s - loss: 0.1695 - acc: 0.9729 - val\_loss: 0.3425 - val\_acc: 0.9481  
Epoch 53/55  
- 1s - loss: 0.1568 - acc: 0.9875 - val\_loss: 0.2240 - val\_acc: 0.9640

Epoch 54/55

- 1s - loss: 0.1076 - acc: 0.9906 - val\_loss: 0.2328 - val\_acc: 0.9567

Epoch 55/55

- 1s - loss: 0.0904 - acc: 0.9960 - val\_loss: 0.2556 - val\_acc: 0.9358

Train accuracy 0.9908675799086758 Test accuracy: 0.935832732516222

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 116, 32)	7200
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
-----		
flatten_1 (Flatten)	(None, 736)	0
-----		
dense_1 (Dense)	(None, 32)	23584
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 32,931

Trainable params: 32,931

Non-trainable params: 0

---

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 2s - loss: 47.1620 - acc: 0.5833 - val\_loss: 23.1930 - val\_acc: 0.7736

Epoch 2/35

- 1s - loss: 13.2359 - acc: 0.8855 - val\_loss: 7.1029 - val\_acc: 0.8226

Epoch 3/35

- 1s - loss: 4.1596 - acc: 0.9699 - val\_loss: 2.7097 - val\_acc: 0.8508

Epoch 4/35

- 1s - loss: 1.5831 - acc: 0.9790 - val\_loss: 1.2738 - val\_acc: 0.9358

Epoch 5/35

- 1s - loss: 0.7208 - acc: 0.9875 - val\_loss: 0.7887 - val\_acc: 0.9387

Epoch 6/35

- 1s - loss: 0.4091 - acc: 0.9896 - val\_loss: 0.5885 - val\_acc: 0.9531

Epoch 7/35

- 1s - loss: 0.2893 - acc: 0.9918 - val\_loss: 0.5150 - val\_acc: 0.9423

Epoch 8/35

- 1s - loss: 0.2429 - acc: 0.9924 - val\_loss: 0.4907 - val\_acc: 0.9236

Epoch 9/35

- 1s - loss: 0.2166 - acc: 0.9936 - val\_loss: 0.4149 - val\_acc: 0.9517

Epoch 10/35

- 1s - loss: 0.2045 - acc: 0.9939 - val\_loss: 0.4684 - val\_acc: 0.8919  
 Epoch 11/35  
 - 1s - loss: 0.1843 - acc: 0.9933 - val\_loss: 0.3945 - val\_acc: 0.9575  
 Epoch 12/35  
 - 1s - loss: 0.1846 - acc: 0.9918 - val\_loss: 0.3713 - val\_acc: 0.9603  
 Epoch 13/35  
 - 1s - loss: 0.1555 - acc: 0.9979 - val\_loss: 0.3550 - val\_acc: 0.9640  
 Epoch 14/35  
 - 1s - loss: 0.1453 - acc: 0.9976 - val\_loss: 0.3405 - val\_acc: 0.9618  
 Epoch 15/35  
 - 1s - loss: 0.1686 - acc: 0.9869 - val\_loss: 0.3129 - val\_acc: 0.9748  
 Epoch 16/35  
 - 1s - loss: 0.1437 - acc: 0.9954 - val\_loss: 0.3288 - val\_acc: 0.9503  
 Epoch 17/35  
 - 1s - loss: 0.1369 - acc: 0.9951 - val\_loss: 0.3001 - val\_acc: 0.9784  
 Epoch 18/35  
 - 1s - loss: 0.1232 - acc: 0.9982 - val\_loss: 0.2939 - val\_acc: 0.9769  
 Epoch 19/35  
 - 1s - loss: 0.1350 - acc: 0.9918 - val\_loss: 0.2713 - val\_acc: 0.9704  
 Epoch 20/35  
 - 1s - loss: 0.1164 - acc: 0.9979 - val\_loss: 0.2963 - val\_acc: 0.9582  
 Epoch 21/35  
 - 1s - loss: 0.1104 - acc: 0.9985 - val\_loss: 0.2877 - val\_acc: 0.9719  
 Epoch 22/35  
 - 1s - loss: 0.1107 - acc: 0.9967 - val\_loss: 0.2949 - val\_acc: 0.9517  
 Epoch 23/35  
 - 1s - loss: 0.1136 - acc: 0.9963 - val\_loss: 0.2730 - val\_acc: 0.9632  
 Epoch 24/35  
 - 1s - loss: 0.1278 - acc: 0.9915 - val\_loss: 0.2600 - val\_acc: 0.9755  
 Epoch 25/35  
 - 1s - loss: 0.1038 - acc: 0.9973 - val\_loss: 0.2705 - val\_acc: 0.9582  
 Epoch 26/35  
 - 1s - loss: 0.1028 - acc: 0.9960 - val\_loss: 0.3131 - val\_acc: 0.9279  
 Epoch 27/35  
 - 1s - loss: 0.1055 - acc: 0.9954 - val\_loss: 0.2441 - val\_acc: 0.9647  
 Epoch 28/35  
 - 1s - loss: 0.1317 - acc: 0.9887 - val\_loss: 0.2317 - val\_acc: 0.9798  
 Epoch 29/35  
 - 1s - loss: 0.0919 - acc: 0.9982 - val\_loss: 0.2565 - val\_acc: 0.9575  
 Epoch 30/35  
 - 1s - loss: 0.0922 - acc: 0.9970 - val\_loss: 0.2404 - val\_acc: 0.9712  
 Epoch 31/35  
 - 1s - loss: 0.0856 - acc: 0.9994 - val\_loss: 0.2177 - val\_acc: 0.9769  
 Epoch 32/35  
 - 1s - loss: 0.1173 - acc: 0.9912 - val\_loss: 0.2199 - val\_acc: 0.9762  
 Epoch 33/35  
 - 1s - loss: 0.0840 - acc: 0.9991 - val\_loss: 0.2322 - val\_acc: 0.9719  
 Epoch 34/35

- 1s - loss: 0.1013 - acc: 0.9921 - val\_loss: 0.2009 - val\_acc: 0.9791  
Epoch 35/35  
- 1s - loss: 0.0993 - acc: 0.9933 - val\_loss: 0.2392 - val\_acc: 0.9661  
Train accuracy 0.9996955859969558 Test accuracy: 0.966113914924297

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 116, 16)	3600
-----		
dropout_1 (Dropout)	(None, 116, 16)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 16)	0
-----		
flatten_1 (Flatten)	(None, 368)	0
-----		
dense_1 (Dense)	(None, 32)	11808
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 17,555  
Trainable params: 17,555  
Non-trainable params: 0

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None  
Train on 3285 samples, validate on 1387 samples  
Epoch 1/35  
- 2s - loss: 26.0256 - acc: 0.5592 - val\_loss: 10.9857 - val\_acc: 0.7275  
Epoch 2/35  
- 2s - loss: 5.7352 - acc: 0.9005 - val\_loss: 2.9695 - val\_acc: 0.9178  
Epoch 3/35  
- 2s - loss: 1.6942 - acc: 0.9735 - val\_loss: 1.2948 - val\_acc: 0.9351  
Epoch 4/35  
- 2s - loss: 0.7384 - acc: 0.9909 - val\_loss: 0.7685 - val\_acc: 0.9596  
Epoch 5/35  
- 2s - loss: 0.4166 - acc: 0.9924 - val\_loss: 0.5881 - val\_acc: 0.9445  
Epoch 6/35  
- 2s - loss: 0.2842 - acc: 0.9936 - val\_loss: 0.4709 - val\_acc: 0.9546  
Epoch 7/35  
- 2s - loss: 0.2260 - acc: 0.9951 - val\_loss: 0.4287 - val\_acc: 0.9474  
Epoch 8/35  
- 2s - loss: 0.1964 - acc: 0.9948 - val\_loss: 0.4140 - val\_acc: 0.9279  
Epoch 9/35  
- 2s - loss: 0.1732 - acc: 0.9976 - val\_loss: 0.3476 - val\_acc: 0.9531  
Epoch 10/35  
- 2s - loss: 0.1646 - acc: 0.9957 - val\_loss: 0.4298 - val\_acc: 0.8890

Epoch 11/35  
- 2s - loss: 0.1526 - acc: 0.9973 - val\_loss: 0.3264 - val\_acc: 0.9575

Epoch 12/35  
- 2s - loss: 0.1515 - acc: 0.9942 - val\_loss: 0.3729 - val\_acc: 0.9257

Epoch 13/35  
- 2s - loss: 0.1390 - acc: 0.9963 - val\_loss: 0.3167 - val\_acc: 0.9567

Epoch 14/35  
- 2s - loss: 0.1183 - acc: 0.9988 - val\_loss: 0.2893 - val\_acc: 0.9654

Epoch 15/35  
- 2s - loss: 0.1248 - acc: 0.9957 - val\_loss: 0.2685 - val\_acc: 0.9762

Epoch 16/35  
- 2s - loss: 0.1305 - acc: 0.9915 - val\_loss: 0.2639 - val\_acc: 0.9748

Epoch 17/35  
- 2s - loss: 0.1160 - acc: 0.9963 - val\_loss: 0.2522 - val\_acc: 0.9733

Epoch 18/35  
- 2s - loss: 0.1003 - acc: 0.9991 - val\_loss: 0.2884 - val\_acc: 0.9373

Epoch 19/35  
- 2s - loss: 0.1062 - acc: 0.9957 - val\_loss: 0.2848 - val\_acc: 0.9618

Epoch 20/35  
- 2s - loss: 0.1029 - acc: 0.9960 - val\_loss: 0.2242 - val\_acc: 0.9820

Epoch 21/35  
- 2s - loss: 0.0928 - acc: 0.9988 - val\_loss: 0.2478 - val\_acc: 0.9618

Epoch 22/35  
- 2s - loss: 0.0968 - acc: 0.9954 - val\_loss: 0.2317 - val\_acc: 0.9726

Epoch 23/35  
- 2s - loss: 0.1094 - acc: 0.9933 - val\_loss: 0.2238 - val\_acc: 0.9784

Epoch 24/35  
- 2s - loss: 0.0940 - acc: 0.9973 - val\_loss: 0.2295 - val\_acc: 0.9690

Epoch 25/35  
- 2s - loss: 0.0849 - acc: 0.9976 - val\_loss: 0.2230 - val\_acc: 0.9661

Epoch 26/35  
- 2s - loss: 0.0836 - acc: 0.9982 - val\_loss: 0.2236 - val\_acc: 0.9704

Epoch 27/35  
- 2s - loss: 0.0768 - acc: 0.9991 - val\_loss: 0.1917 - val\_acc: 0.9748

Epoch 28/35  
- 2s - loss: 0.1731 - acc: 0.9796 - val\_loss: 0.2107 - val\_acc: 0.9791

Epoch 29/35  
- 2s - loss: 0.0816 - acc: 0.9997 - val\_loss: 0.2004 - val\_acc: 0.9762

Epoch 30/35  
- 2s - loss: 0.0748 - acc: 0.9988 - val\_loss: 0.2015 - val\_acc: 0.9784

Epoch 31/35  
- 2s - loss: 0.0705 - acc: 0.9979 - val\_loss: 0.1972 - val\_acc: 0.9733

Epoch 32/35  
- 2s - loss: 0.0704 - acc: 0.9982 - val\_loss: 0.2548 - val\_acc: 0.9394

Epoch 33/35  
- 2s - loss: 0.0897 - acc: 0.9918 - val\_loss: 0.1882 - val\_acc: 0.9654

Epoch 34/35  
- 2s - loss: 0.1054 - acc: 0.9903 - val\_loss: 0.1833 - val\_acc: 0.9791

Epoch 35/35

- 2s - loss: 0.0869 - acc: 0.9954 - val\_loss: 0.1849 - val\_acc: 0.9733

Train accuracy 0.9996955859969558 Test accuracy: 0.9733237202595529

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 116, 32)	7200
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
-----		
flatten_1 (Flatten)	(None, 1216)	0
-----		
dense_1 (Dense)	(None, 32)	38944
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 48,291

Trainable params: 48,291

Non-trainable params: 0

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None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 4s - loss: 57.4970 - acc: 0.6064 - val\_loss: 15.8464 - val\_acc: 0.7383

Epoch 2/55

- 2s - loss: 6.9257 - acc: 0.9059 - val\_loss: 2.7177 - val\_acc: 0.8125

Epoch 3/55

- 2s - loss: 1.2632 - acc: 0.9482 - val\_loss: 0.8784 - val\_acc: 0.8947

Epoch 4/55

- 2s - loss: 0.4735 - acc: 0.9632 - val\_loss: 0.6392 - val\_acc: 0.8991

Epoch 5/55

- 2s - loss: 0.3344 - acc: 0.9799 - val\_loss: 0.5286 - val\_acc: 0.9402

Epoch 6/55

- 2s - loss: 0.3083 - acc: 0.9744 - val\_loss: 0.4808 - val\_acc: 0.9409

Epoch 7/55

- 2s - loss: 0.3054 - acc: 0.9726 - val\_loss: 0.5816 - val\_acc: 0.8572

Epoch 8/55

- 2s - loss: 0.2712 - acc: 0.9775 - val\_loss: 0.4293 - val\_acc: 0.9546

Epoch 9/55

- 2s - loss: 0.2222 - acc: 0.9884 - val\_loss: 0.4103 - val\_acc: 0.9301

Epoch 10/55

- 2s - loss: 0.2168 - acc: 0.9863 - val\_loss: 0.3725 - val\_acc: 0.9524

Epoch 11/55



- 2s - loss: 0.2198 - acc: 0.9842 - val\_loss: 0.3440 - val\_acc: 0.9611  
 Epoch 12/55  
 - 2s - loss: 0.2035 - acc: 0.9851 - val\_loss: 0.3777 - val\_acc: 0.9495  
 Epoch 13/55  
 - 2s - loss: 0.2070 - acc: 0.9790 - val\_loss: 0.3319 - val\_acc: 0.9704  
 Epoch 14/55  
 - 2s - loss: 0.1999 - acc: 0.9808 - val\_loss: 0.3269 - val\_acc: 0.9575  
 Epoch 15/55  
 - 2s - loss: 0.1695 - acc: 0.9900 - val\_loss: 0.2941 - val\_acc: 0.9668  
 Epoch 16/55  
 - 2s - loss: 0.1582 - acc: 0.9909 - val\_loss: 0.2947 - val\_acc: 0.9546  
 Epoch 17/55  
 - 2s - loss: 0.1811 - acc: 0.9826 - val\_loss: 0.3099 - val\_acc: 0.9430  
 Epoch 18/55  
 - 2s - loss: 0.1524 - acc: 0.9906 - val\_loss: 0.3233 - val\_acc: 0.9495  
 Epoch 19/55  
 - 2s - loss: 0.1518 - acc: 0.9896 - val\_loss: 0.2815 - val\_acc: 0.9539  
 Epoch 20/55  
 - 2s - loss: 0.1577 - acc: 0.9887 - val\_loss: 0.2656 - val\_acc: 0.9661  
 Epoch 21/55  
 - 2s - loss: 0.1574 - acc: 0.9826 - val\_loss: 0.3773 - val\_acc: 0.9293  
 Epoch 22/55  
 - 2s - loss: 0.1438 - acc: 0.9909 - val\_loss: 0.2730 - val\_acc: 0.9582  
 Epoch 23/55  
 - 2s - loss: 0.1253 - acc: 0.9948 - val\_loss: 0.2499 - val\_acc: 0.9625  
 Epoch 24/55  
 - 2s - loss: 0.1492 - acc: 0.9842 - val\_loss: 0.3273 - val\_acc: 0.9416  
 Epoch 25/55  
 - 2s - loss: 0.1757 - acc: 0.9802 - val\_loss: 0.3768 - val\_acc: 0.9344  
 Epoch 26/55  
 - 2s - loss: 0.1164 - acc: 0.9973 - val\_loss: 0.2685 - val\_acc: 0.9524  
 Epoch 27/55  
 - 2s - loss: 0.1625 - acc: 0.9814 - val\_loss: 0.2321 - val\_acc: 0.9676  
 Epoch 28/55  
 - 2s - loss: 0.1138 - acc: 0.9960 - val\_loss: 0.2443 - val\_acc: 0.9697  
 Epoch 29/55  
 - 2s - loss: 0.1348 - acc: 0.9863 - val\_loss: 0.8768 - val\_acc: 0.7678  
 Epoch 30/55  
 - 2s - loss: 0.1836 - acc: 0.9799 - val\_loss: 0.2684 - val\_acc: 0.9373  
 Epoch 31/55  
 - 2s - loss: 0.1101 - acc: 0.9963 - val\_loss: 0.2112 - val\_acc: 0.9784  
 Epoch 32/55  
 - 2s - loss: 0.1240 - acc: 0.9915 - val\_loss: 0.2290 - val\_acc: 0.9661  
 Epoch 33/55  
 - 2s - loss: 0.1217 - acc: 0.9909 - val\_loss: 0.2647 - val\_acc: 0.9452  
 Epoch 34/55  
 - 2s - loss: 0.1008 - acc: 0.9976 - val\_loss: 0.2634 - val\_acc: 0.9567  
 Epoch 35/55

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- 2s - loss: 0.1245 - acc: 0.9890 - val_loss: 0.2488 - val_acc: 0.9430
Epoch 36/55
- 2s - loss: 0.1252 - acc: 0.9900 - val_loss: 0.2620 - val_acc: 0.9683
Epoch 37/55
- 2s - loss: 0.0927 - acc: 0.9973 - val_loss: 0.2169 - val_acc: 0.9733
Epoch 38/55
- 2s - loss: 0.1540 - acc: 0.9820 - val_loss: 0.2586 - val_acc: 0.9553
Epoch 39/55
- 2s - loss: 0.1315 - acc: 0.9857 - val_loss: 0.3045 - val_acc: 0.9459
Epoch 40/55
- 2s - loss: 0.1117 - acc: 0.9948 - val_loss: 0.2454 - val_acc: 0.9654
Epoch 41/55
- 2s - loss: 0.1126 - acc: 0.9878 - val_loss: 0.2682 - val_acc: 0.9668
Epoch 42/55
- 2s - loss: 0.1112 - acc: 0.9939 - val_loss: 0.2188 - val_acc: 0.9676
Epoch 43/55
- 2s - loss: 0.1014 - acc: 0.9915 - val_loss: 0.2874 - val_acc: 0.9466
Epoch 44/55
- 2s - loss: 0.0999 - acc: 0.9954 - val_loss: 0.2068 - val_acc: 0.9596
Epoch 45/55
- 2s - loss: 0.1060 - acc: 0.9890 - val_loss: 0.2042 - val_acc: 0.9654
Epoch 46/55
- 2s - loss: 0.1836 - acc: 0.9744 - val_loss: 0.4512 - val_acc: 0.9092
Epoch 47/55
- 2s - loss: 0.1095 - acc: 0.9942 - val_loss: 0.2335 - val_acc: 0.9704
Epoch 48/55
- 2s - loss: 0.1001 - acc: 0.9948 - val_loss: 0.2726 - val_acc: 0.9668
Epoch 49/55
- 2s - loss: 0.1107 - acc: 0.9875 - val_loss: 0.2767 - val_acc: 0.9524
Epoch 50/55
- 2s - loss: 0.1221 - acc: 0.9893 - val_loss: 0.2280 - val_acc: 0.9603
Epoch 51/55
- 2s - loss: 0.1006 - acc: 0.9893 - val_loss: 0.2894 - val_acc: 0.9409
Epoch 52/55
- 2s - loss: 0.1624 - acc: 0.9842 - val_loss: 0.1883 - val_acc: 0.9661
Epoch 53/55
- 2s - loss: 0.0781 - acc: 0.9988 - val_loss: 0.2179 - val_acc: 0.9668
Epoch 54/55
- 2s - loss: 0.0719 - acc: 0.9988 - val_loss: 0.2511 - val_acc: 0.9632
Epoch 55/55
- 2s - loss: 0.0824 - acc: 0.9945 - val_loss: 0.4337 - val_acc: 0.8753
Train accuracy 0.9470319634703196 Test accuracy: 0.875270367700072

```

```

-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 122, 32)            2048
-----

```

conv1d_2 (Conv1D)	(None, 116, 32)	7200
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
-----		
flatten_1 (Flatten)	(None, 736)	0
-----		
dense_1 (Dense)	(None, 32)	23584
-----		
dense_2 (Dense)	(None, 3)	99
=====		
Total params: 32,931		
Trainable params: 32,931		
Non-trainable params: 0		
-----		
None		
Train on 3285 samples, validate on 1387 samples		
Epoch 1/35		
- 2s - loss: 88.0710 - acc: 0.5330 - val_loss: 51.7343 - val_acc: 0.6929		
Epoch 2/35		
- 1s - loss: 33.3994 - acc: 0.8457 - val_loss: 20.3058 - val_acc: 0.7880		
Epoch 3/35		
- 1s - loss: 13.2721 - acc: 0.9470 - val_loss: 8.5835 - val_acc: 0.8176		
Epoch 4/35		
- 1s - loss: 5.6171 - acc: 0.9531 - val_loss: 3.8872 - val_acc: 0.9005		
Epoch 5/35		
- 1s - loss: 2.5066 - acc: 0.9647 - val_loss: 1.9472 - val_acc: 0.9063		
Epoch 6/35		
- 1s - loss: 1.1884 - acc: 0.9805 - val_loss: 1.1184 - val_acc: 0.9272		
Epoch 7/35		
- 1s - loss: 0.6467 - acc: 0.9875 - val_loss: 0.7939 - val_acc: 0.9142		
Epoch 8/35		
- 1s - loss: 0.4357 - acc: 0.9854 - val_loss: 0.6486 - val_acc: 0.9178		
Epoch 9/35		
- 1s - loss: 0.3412 - acc: 0.9896 - val_loss: 0.5491 - val_acc: 0.9474		
Epoch 10/35		
- 1s - loss: 0.3044 - acc: 0.9863 - val_loss: 0.5745 - val_acc: 0.8962		
Epoch 11/35		
- 1s - loss: 0.2736 - acc: 0.9912 - val_loss: 0.5110 - val_acc: 0.9539		
Epoch 12/35		
- 1s - loss: 0.2564 - acc: 0.9900 - val_loss: 0.4725 - val_acc: 0.9596		
Epoch 13/35		
- 1s - loss: 0.2371 - acc: 0.9921 - val_loss: 0.4568 - val_acc: 0.9575		
Epoch 14/35		
- 1s - loss: 0.2178 - acc: 0.9948 - val_loss: 0.4416 - val_acc: 0.9560		
Epoch 15/35		
- 1s - loss: 0.2197 - acc: 0.9921 - val_loss: 0.4154 - val_acc: 0.9618		

```

Epoch 16/35
- 1s - loss: 0.2058 - acc: 0.9945 - val_loss: 0.4134 - val_acc: 0.9589
Epoch 17/35
- 1s - loss: 0.2009 - acc: 0.9927 - val_loss: 0.3766 - val_acc: 0.9755
Epoch 18/35
- 1s - loss: 0.1821 - acc: 0.9957 - val_loss: 0.3897 - val_acc: 0.9553
Epoch 19/35
- 1s - loss: 0.1979 - acc: 0.9866 - val_loss: 0.3604 - val_acc: 0.9697
Epoch 20/35
- 1s - loss: 0.1784 - acc: 0.9930 - val_loss: 0.3977 - val_acc: 0.9329
Epoch 21/35
- 1s - loss: 0.1714 - acc: 0.9942 - val_loss: 0.3581 - val_acc: 0.9733
Epoch 22/35
- 1s - loss: 0.1663 - acc: 0.9939 - val_loss: 0.3785 - val_acc: 0.9416
Epoch 23/35
- 1s - loss: 0.1637 - acc: 0.9954 - val_loss: 0.3348 - val_acc: 0.9683
Epoch 24/35
- 1s - loss: 0.1726 - acc: 0.9893 - val_loss: 0.3466 - val_acc: 0.9459
Epoch 25/35
- 1s - loss: 0.1582 - acc: 0.9930 - val_loss: 0.3395 - val_acc: 0.9510
Epoch 26/35
- 1s - loss: 0.1533 - acc: 0.9927 - val_loss: 0.3488 - val_acc: 0.9524
Epoch 27/35
- 1s - loss: 0.1508 - acc: 0.9939 - val_loss: 0.2830 - val_acc: 0.9748
Epoch 28/35
- 1s - loss: 0.1489 - acc: 0.9915 - val_loss: 0.3176 - val_acc: 0.9603
Epoch 29/35
- 1s - loss: 0.1380 - acc: 0.9948 - val_loss: 0.3255 - val_acc: 0.9517
Epoch 30/35
- 1s - loss: 0.1411 - acc: 0.9936 - val_loss: 0.3003 - val_acc: 0.9676
Epoch 31/35
- 1s - loss: 0.1285 - acc: 0.9970 - val_loss: 0.2944 - val_acc: 0.9632
Epoch 32/35
- 1s - loss: 0.1950 - acc: 0.9760 - val_loss: 0.3334 - val_acc: 0.9618
Epoch 33/35
- 1s - loss: 0.1392 - acc: 0.9954 - val_loss: 0.2958 - val_acc: 0.9625
Epoch 34/35
- 1s - loss: 0.1286 - acc: 0.9936 - val_loss: 0.2811 - val_acc: 0.9719
Epoch 35/35
- 1s - loss: 0.1250 - acc: 0.9942 - val_loss: 0.2910 - val_acc: 0.9618
Train accuracy 0.995738203957382 Test accuracy: 0.9617880317231434

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 120, 32)	7200

dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1d)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 32)	24608
dense_2 (Dense)	(None, 3)	99

Total params: 32,803  
 Trainable params: 32,803  
 Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 2s - loss: 66.5345 - acc: 0.6414 - val\_loss: 26.0567 - val\_acc: 0.7866

Epoch 2/55

- 1s - loss: 13.9297 - acc: 0.9078 - val\_loss: 6.5261 - val\_acc: 0.8089

Epoch 3/55

- 1s - loss: 3.3686 - acc: 0.9315 - val\_loss: 1.8112 - val\_acc: 0.9019

Epoch 4/55

- 1s - loss: 0.9589 - acc: 0.9568 - val\_loss: 0.9207 - val\_acc: 0.8399

Epoch 5/55

- 1s - loss: 0.5110 - acc: 0.9562 - val\_loss: 0.7577 - val\_acc: 0.8198

Epoch 6/55

- 1s - loss: 0.4269 - acc: 0.9574 - val\_loss: 0.6574 - val\_acc: 0.8594

Epoch 7/55

- 1s - loss: 0.3728 - acc: 0.9720 - val\_loss: 0.5376 - val\_acc: 0.9481

Epoch 8/55

- 1s - loss: 0.3874 - acc: 0.9565 - val\_loss: 0.6158 - val\_acc: 0.8572

Epoch 9/55

- 1s - loss: 0.3220 - acc: 0.9717 - val\_loss: 0.5100 - val\_acc: 0.9358

Epoch 10/55

- 1s - loss: 0.3054 - acc: 0.9744 - val\_loss: 0.5724 - val\_acc: 0.8983

Epoch 11/55

- 1s - loss: 0.3025 - acc: 0.9772 - val\_loss: 0.4511 - val\_acc: 0.9603

Epoch 12/55

- 1s - loss: 0.2844 - acc: 0.9741 - val\_loss: 0.4715 - val\_acc: 0.9221

Epoch 13/55

- 1s - loss: 0.2566 - acc: 0.9811 - val\_loss: 0.4395 - val\_acc: 0.9366

Epoch 14/55

- 1s - loss: 0.2459 - acc: 0.9790 - val\_loss: 0.4444 - val\_acc: 0.9510

Epoch 15/55

- 1s - loss: 0.2234 - acc: 0.9869 - val\_loss: 0.4302 - val\_acc: 0.9207

Epoch 16/55

- 1s - loss: 0.2127 - acc: 0.9872 - val\_loss: 0.4226 - val\_acc: 0.9019  
 Epoch 17/55  
 - 1s - loss: 0.3064 - acc: 0.9598 - val\_loss: 0.4006 - val\_acc: 0.9546  
 Epoch 18/55  
 - 1s - loss: 0.2107 - acc: 0.9851 - val\_loss: 0.3774 - val\_acc: 0.9611  
 Epoch 19/55  
 - 1s - loss: 0.2227 - acc: 0.9814 - val\_loss: 0.3752 - val\_acc: 0.9337  
 Epoch 20/55  
 - 1s - loss: 0.1856 - acc: 0.9893 - val\_loss: 0.5023 - val\_acc: 0.8327  
 Epoch 21/55  
 - 1s - loss: 0.2469 - acc: 0.9656 - val\_loss: 0.5149 - val\_acc: 0.9207  
 Epoch 22/55  
 - 1s - loss: 0.2097 - acc: 0.9811 - val\_loss: 0.3650 - val\_acc: 0.9293  
 Epoch 23/55  
 - 1s - loss: 0.1832 - acc: 0.9875 - val\_loss: 0.2918 - val\_acc: 0.9690  
 Epoch 24/55  
 - 1s - loss: 0.1711 - acc: 0.9875 - val\_loss: 0.3080 - val\_acc: 0.9632  
 Epoch 25/55  
 - 1s - loss: 0.1784 - acc: 0.9851 - val\_loss: 0.3080 - val\_acc: 0.9611  
 Epoch 26/55  
 - 1s - loss: 0.1622 - acc: 0.9887 - val\_loss: 0.3501 - val\_acc: 0.9229  
 Epoch 27/55  
 - 1s - loss: 0.1897 - acc: 0.9826 - val\_loss: 0.3444 - val\_acc: 0.9229  
 Epoch 28/55  
 - 1s - loss: 0.1725 - acc: 0.9860 - val\_loss: 0.5234 - val\_acc: 0.8443  
 Epoch 29/55  
 - 1s - loss: 0.1769 - acc: 0.9830 - val\_loss: 0.2998 - val\_acc: 0.9488  
 Epoch 30/55  
 - 1s - loss: 0.1673 - acc: 0.9875 - val\_loss: 0.2628 - val\_acc: 0.9640  
 Epoch 31/55  
 - 1s - loss: 0.1763 - acc: 0.9811 - val\_loss: 0.2993 - val\_acc: 0.9567  
 Epoch 32/55  
 - 1s - loss: 0.1950 - acc: 0.9775 - val\_loss: 0.3056 - val\_acc: 0.9668  
 Epoch 33/55  
 - 1s - loss: 0.1670 - acc: 0.9848 - val\_loss: 0.2929 - val\_acc: 0.9337  
 Epoch 34/55  
 - 1s - loss: 0.1387 - acc: 0.9890 - val\_loss: 0.3786 - val\_acc: 0.8890  
 Epoch 35/55  
 - 1s - loss: 0.2102 - acc: 0.9760 - val\_loss: 0.3294 - val\_acc: 0.9409  
 Epoch 36/55  
 - 1s - loss: 0.1491 - acc: 0.9924 - val\_loss: 0.2775 - val\_acc: 0.9438  
 Epoch 37/55  
 - 1s - loss: 0.1547 - acc: 0.9823 - val\_loss: 0.2807 - val\_acc: 0.9726  
 Epoch 38/55  
 - 1s - loss: 0.1523 - acc: 0.9887 - val\_loss: 0.2410 - val\_acc: 0.9712  
 Epoch 39/55  
 - 1s - loss: 0.1577 - acc: 0.9842 - val\_loss: 0.2982 - val\_acc: 0.9474  
 Epoch 40/55

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- 1s - loss: 0.1417 - acc: 0.9872 - val_loss: 0.3376 - val_acc: 0.9214
Epoch 41/55
- 1s - loss: 0.1171 - acc: 0.9930 - val_loss: 0.3441 - val_acc: 0.8983
Epoch 42/55
- 1s - loss: 0.1646 - acc: 0.9775 - val_loss: 0.3191 - val_acc: 0.9618
Epoch 43/55
- 1s - loss: 0.1425 - acc: 0.9893 - val_loss: 0.2315 - val_acc: 0.9647
Epoch 44/55
- 1s - loss: 0.1279 - acc: 0.9918 - val_loss: 0.3356 - val_acc: 0.9077
Epoch 45/55
- 1s - loss: 0.1307 - acc: 0.9878 - val_loss: 0.3211 - val_acc: 0.9337
Epoch 46/55
- 1s - loss: 0.1579 - acc: 0.9814 - val_loss: 0.2722 - val_acc: 0.9596
Epoch 47/55
- 1s - loss: 0.1878 - acc: 0.9708 - val_loss: 0.3955 - val_acc: 0.9358
Epoch 48/55
- 1s - loss: 0.1472 - acc: 0.9890 - val_loss: 0.2255 - val_acc: 0.9668
Epoch 49/55
- 1s - loss: 0.1275 - acc: 0.9875 - val_loss: 0.2283 - val_acc: 0.9589
Epoch 50/55
- 1s - loss: 0.1230 - acc: 0.9896 - val_loss: 0.2491 - val_acc: 0.9358
Epoch 51/55
- 1s - loss: 0.1232 - acc: 0.9881 - val_loss: 0.2380 - val_acc: 0.9481
Epoch 52/55
- 1s - loss: 0.1528 - acc: 0.9802 - val_loss: 0.2679 - val_acc: 0.9481
Epoch 53/55
- 1s - loss: 0.1375 - acc: 0.9872 - val_loss: 0.2876 - val_acc: 0.9200
Epoch 54/55
- 1s - loss: 0.1360 - acc: 0.9857 - val_loss: 0.2461 - val_acc: 0.9409
Epoch 55/55
- 1s - loss: 0.1243 - acc: 0.9890 - val_loss: 0.2481 - val_acc: 0.9430
Train accuracy 0.9984779299847792 Test accuracy: 0.943042537851478

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 16)	3600
dropout_1 (Dropout)	(None, 116, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 16)	0
flatten_1 (Flatten)	(None, 368)	0
dense_1 (Dense)	(None, 32)	11808

dense\_2 (Dense) (None, 3) 99

=====

Total params: 17,555

Trainable params: 17,555

Non-trainable params: 0

-----

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 2s - loss: 26.5752 - acc: 0.5321 - val\_loss: 1.2807 - val\_acc: 0.6280

Epoch 2/35

- 1s - loss: 0.7391 - acc: 0.8502 - val\_loss: 0.6879 - val\_acc: 0.8998

Epoch 3/35

- 1s - loss: 0.4494 - acc: 0.9248 - val\_loss: 0.6523 - val\_acc: 0.8356

Epoch 4/35

- 1s - loss: 0.3951 - acc: 0.9333 - val\_loss: 0.6194 - val\_acc: 0.8558

Epoch 5/35

- 1s - loss: 0.3236 - acc: 0.9607 - val\_loss: 0.4957 - val\_acc: 0.8998

Epoch 6/35

- 1s - loss: 0.3225 - acc: 0.9543 - val\_loss: 0.5858 - val\_acc: 0.8551

Epoch 7/35

- 1s - loss: 0.2733 - acc: 0.9641 - val\_loss: 0.7998 - val\_acc: 0.7282

Epoch 8/35

- 1s - loss: 0.3384 - acc: 0.9537 - val\_loss: 0.5695 - val\_acc: 0.8868

Epoch 9/35

- 1s - loss: 0.3391 - acc: 0.9479 - val\_loss: 0.5731 - val\_acc: 0.8616

Epoch 10/35

- 1s - loss: 0.3216 - acc: 0.9546 - val\_loss: 0.5629 - val\_acc: 0.8717

Epoch 11/35

- 1s - loss: 0.2785 - acc: 0.9659 - val\_loss: 0.4446 - val\_acc: 0.9229

Epoch 12/35

- 1s - loss: 0.2493 - acc: 0.9699 - val\_loss: 0.3798 - val\_acc: 0.9344

Epoch 13/35

- 1s - loss: 0.2704 - acc: 0.9607 - val\_loss: 0.5078 - val\_acc: 0.9099

Epoch 14/35

- 1s - loss: 0.3202 - acc: 0.9577 - val\_loss: 0.6360 - val\_acc: 0.8277

Epoch 15/35

- 1s - loss: 0.2962 - acc: 0.9592 - val\_loss: 0.4518 - val\_acc: 0.9084

Epoch 16/35

- 1s - loss: 0.2060 - acc: 0.9823 - val\_loss: 0.3917 - val\_acc: 0.9293

Epoch 17/35

- 1s - loss: 0.3320 - acc: 0.9540 - val\_loss: 0.4050 - val\_acc: 0.9445

Epoch 18/35

- 1s - loss: 0.2095 - acc: 0.9854 - val\_loss: 0.5467 - val\_acc: 0.8616

Epoch 19/35

- 1s - loss: 0.2285 - acc: 0.9705 - val\_loss: 0.3853 - val\_acc: 0.9380

Epoch 20/35

- 1s - loss: 0.2948 - acc: 0.9580 - val\_loss: 0.3945 - val\_acc: 0.9279



Epoch 21/35  
 - 1s - loss: 0.2311 - acc: 0.9738 - val\_loss: 0.4746 - val\_acc: 0.9070  
 Epoch 22/35  
 - 1s - loss: 0.2784 - acc: 0.9604 - val\_loss: 0.4976 - val\_acc: 0.9092  
 Epoch 23/35  
 - 1s - loss: 0.2841 - acc: 0.9607 - val\_loss: 0.4825 - val\_acc: 0.8724  
 Epoch 24/35  
 - 1s - loss: 0.3092 - acc: 0.9565 - val\_loss: 0.7474 - val\_acc: 0.7859  
 Epoch 25/35  
 - 1s - loss: 0.3801 - acc: 0.9607 - val\_loss: 0.4244 - val\_acc: 0.9351  
 Epoch 26/35  
 - 1s - loss: 0.2565 - acc: 0.9677 - val\_loss: 0.4607 - val\_acc: 0.9257  
 Epoch 27/35  
 - 1s - loss: 0.3247 - acc: 0.9543 - val\_loss: 0.7980 - val\_acc: 0.8443  
 Epoch 28/35  
 - 1s - loss: 0.3151 - acc: 0.9732 - val\_loss: 0.5430 - val\_acc: 0.8572  
 Epoch 29/35  
 - 1s - loss: 0.2327 - acc: 0.9683 - val\_loss: 1.2830 - val\_acc: 0.7541  
 Epoch 30/35  
 - 1s - loss: 0.3364 - acc: 0.9616 - val\_loss: 0.5026 - val\_acc: 0.8825  
 Epoch 31/35  
 - 1s - loss: 0.3263 - acc: 0.9482 - val\_loss: 0.7585 - val\_acc: 0.8212  
 Epoch 32/35  
 - 1s - loss: 0.2349 - acc: 0.9753 - val\_loss: 0.5829 - val\_acc: 0.8594  
 Epoch 33/35  
 - 1s - loss: 0.2314 - acc: 0.9693 - val\_loss: 0.6747 - val\_acc: 0.8363  
 Epoch 34/35  
 - 1s - loss: 0.2437 - acc: 0.9744 - val\_loss: 0.5027 - val\_acc: 0.8947  
 Epoch 35/35  
 - 1s - loss: 0.2642 - acc: 0.9619 - val\_loss: 0.5761 - val\_acc: 0.8486  
 Train accuracy 0.9181126331811263 Test accuracy: 0.8485940879596251

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 116, 32)	6304
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

=====
Total params: 31,779
Trainable params: 31,779
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
  - 3s - loss: 33.2984 - acc: 0.7336 - val_loss: 1.8914 - val_acc: 0.7851
Epoch 2/35
  - 2s - loss: 0.7319 - acc: 0.9181 - val_loss: 0.7281 - val_acc: 0.8753
Epoch 3/35
  - 2s - loss: 0.4238 - acc: 0.9470 - val_loss: 0.6094 - val_acc: 0.8962
Epoch 4/35
  - 2s - loss: 0.3594 - acc: 0.9534 - val_loss: 0.5441 - val_acc: 0.9221
Epoch 5/35
  - 2s - loss: 0.3170 - acc: 0.9629 - val_loss: 0.5004 - val_acc: 0.9279
Epoch 6/35
  - 2s - loss: 0.2758 - acc: 0.9714 - val_loss: 0.5287 - val_acc: 0.8767
Epoch 7/35
  - 2s - loss: 0.3241 - acc: 0.9577 - val_loss: 0.5364 - val_acc: 0.8753
Epoch 8/35
  - 2s - loss: 0.2694 - acc: 0.9677 - val_loss: 0.5514 - val_acc: 0.9207
Epoch 9/35
  - 2s - loss: 0.2204 - acc: 0.9823 - val_loss: 0.4260 - val_acc: 0.9200
Epoch 10/35
  - 2s - loss: 0.2483 - acc: 0.9705 - val_loss: 0.4417 - val_acc: 0.9409
Epoch 11/35
  - 2s - loss: 0.2958 - acc: 0.9598 - val_loss: 0.4637 - val_acc: 0.9286
Epoch 12/35
  - 2s - loss: 0.2074 - acc: 0.9805 - val_loss: 0.4391 - val_acc: 0.9229
Epoch 13/35
  - 2s - loss: 0.2382 - acc: 0.9689 - val_loss: 0.8106 - val_acc: 0.8673
Epoch 14/35
  - 2s - loss: 0.2157 - acc: 0.9790 - val_loss: 0.3906 - val_acc: 0.9380
Epoch 15/35
  - 2s - loss: 0.1979 - acc: 0.9772 - val_loss: 0.3768 - val_acc: 0.9358
Epoch 16/35
  - 2s - loss: 0.2173 - acc: 0.9744 - val_loss: 0.3631 - val_acc: 0.9394
Epoch 17/35
  - 2s - loss: 0.2535 - acc: 0.9689 - val_loss: 0.3599 - val_acc: 0.9351
Epoch 18/35
  - 2s - loss: 0.1681 - acc: 0.9872 - val_loss: 0.4044 - val_acc: 0.9344
Epoch 19/35
  - 2s - loss: 0.2695 - acc: 0.9586 - val_loss: 0.4775 - val_acc: 0.9214
Epoch 20/35
  - 2s - loss: 0.1699 - acc: 0.9900 - val_loss: 0.3850 - val_acc: 0.9106
Epoch 21/35

```

```

- 2s - loss: 0.1624 - acc: 0.9854 - val_loss: 0.3389 - val_acc: 0.9503
Epoch 22/35
- 2s - loss: 0.2166 - acc: 0.9714 - val_loss: 0.3548 - val_acc: 0.9409
Epoch 23/35
- 2s - loss: 0.1860 - acc: 0.9799 - val_loss: 0.3200 - val_acc: 0.9539
Epoch 24/35
- 2s - loss: 0.2098 - acc: 0.9723 - val_loss: 0.3924 - val_acc: 0.9394
Epoch 25/35
- 2s - loss: 0.2098 - acc: 0.9763 - val_loss: 0.3871 - val_acc: 0.9387
Epoch 26/35
- 2s - loss: 0.1480 - acc: 0.9900 - val_loss: 0.3321 - val_acc: 0.9149
Epoch 27/35
- 2s - loss: 0.2112 - acc: 0.9683 - val_loss: 0.3969 - val_acc: 0.9315
Epoch 28/35
- 2s - loss: 0.1634 - acc: 0.9833 - val_loss: 0.4958 - val_acc: 0.8839
Epoch 29/35
- 2s - loss: 0.2182 - acc: 0.9760 - val_loss: 0.3182 - val_acc: 0.9293
Epoch 30/35
- 2s - loss: 0.1970 - acc: 0.9738 - val_loss: 0.4005 - val_acc: 0.9048
Epoch 31/35
- 2s - loss: 0.1573 - acc: 0.9851 - val_loss: 0.3957 - val_acc: 0.9019
Epoch 32/35
- 2s - loss: 0.2038 - acc: 0.9693 - val_loss: 0.5161 - val_acc: 0.8904
Epoch 33/35
- 2s - loss: 0.2087 - acc: 0.9763 - val_loss: 0.3565 - val_acc: 0.9149
Epoch 34/35
- 2s - loss: 0.1707 - acc: 0.9790 - val_loss: 0.3654 - val_acc: 0.9077
Epoch 35/35
- 2s - loss: 0.1925 - acc: 0.9732 - val_loss: 0.5267 - val_acc: 0.9012
Train accuracy 0.9881278538812786 Test accuracy: 0.9012256669069935

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 32)	5152
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 39, 32)	0
flatten_1 (Flatten)	(None, 1248)	0
dense_1 (Dense)	(None, 32)	39968
dense_2 (Dense)	(None, 3)	99

Total params: 47,267  
Trainable params: 47,267  
Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 3s - loss: 84.9849 - acc: 0.4798 - val\_loss: 30.2096 - val\_acc: 0.5854

Epoch 2/55

- 2s - loss: 14.0525 - acc: 0.7766 - val\_loss: 5.1948 - val\_acc: 0.7376

Epoch 3/55

- 2s - loss: 2.4103 - acc: 0.8877 - val\_loss: 1.2967 - val\_acc: 0.7779

Epoch 4/55

- 2s - loss: 0.6878 - acc: 0.9297 - val\_loss: 0.7648 - val\_acc: 0.8479

Epoch 5/55

- 2s - loss: 0.4692 - acc: 0.9282 - val\_loss: 0.7042 - val\_acc: 0.8558

Epoch 6/55

- 2s - loss: 0.4104 - acc: 0.9486 - val\_loss: 0.6351 - val\_acc: 0.8616

Epoch 7/55

- 2s - loss: 0.3419 - acc: 0.9738 - val\_loss: 0.5470 - val\_acc: 0.9041

Epoch 8/55

- 2s - loss: 0.3173 - acc: 0.9750 - val\_loss: 0.5085 - val\_acc: 0.9380

Epoch 9/55

- 2s - loss: 0.2970 - acc: 0.9763 - val\_loss: 0.4823 - val\_acc: 0.9272

Epoch 10/55

- 2s - loss: 0.3058 - acc: 0.9680 - val\_loss: 0.5204 - val\_acc: 0.8890

Epoch 11/55

- 2s - loss: 0.2736 - acc: 0.9808 - val\_loss: 0.4361 - val\_acc: 0.9402

Epoch 12/55

- 2s - loss: 0.2612 - acc: 0.9808 - val\_loss: 0.4578 - val\_acc: 0.9164

Epoch 13/55

- 2s - loss: 0.2824 - acc: 0.9674 - val\_loss: 0.4196 - val\_acc: 0.9409

Epoch 14/55

- 2s - loss: 0.2412 - acc: 0.9826 - val\_loss: 0.3856 - val\_acc: 0.9503

Epoch 15/55

- 2s - loss: 0.2408 - acc: 0.9775 - val\_loss: 0.3727 - val\_acc: 0.9560

Epoch 16/55

- 2s - loss: 0.2158 - acc: 0.9872 - val\_loss: 0.4013 - val\_acc: 0.9358

Epoch 17/55

- 2s - loss: 0.2325 - acc: 0.9814 - val\_loss: 0.3420 - val\_acc: 0.9690

Epoch 18/55

- 2s - loss: 0.1852 - acc: 0.9912 - val\_loss: 0.3642 - val\_acc: 0.9380

Epoch 19/55

- 2s - loss: 0.2799 - acc: 0.9632 - val\_loss: 0.3817 - val\_acc: 0.9510

Epoch 20/55

- 2s - loss: 0.2108 - acc: 0.9845 - val\_loss: 0.3402 - val\_acc: 0.9603

Epoch 21/55

- 2s - loss: 0.1819 - acc: 0.9881 - val\_loss: 0.3506 - val\_acc: 0.9567

Epoch 22/55  
- 2s - loss: 0.1726 - acc: 0.9890 - val\_loss: 0.3258 - val\_acc: 0.9676

Epoch 23/55  
- 2s - loss: 0.1674 - acc: 0.9887 - val\_loss: 0.3298 - val\_acc: 0.9589

Epoch 24/55  
- 2s - loss: 0.2056 - acc: 0.9766 - val\_loss: 0.3552 - val\_acc: 0.9452

Epoch 25/55  
- 2s - loss: 0.2224 - acc: 0.9756 - val\_loss: 0.4055 - val\_acc: 0.9156

Epoch 26/55  
- 2s - loss: 0.2465 - acc: 0.9714 - val\_loss: 0.3511 - val\_acc: 0.9481

Epoch 27/55  
- 2s - loss: 0.1753 - acc: 0.9875 - val\_loss: 0.3218 - val\_acc: 0.9510

Epoch 28/55  
- 2s - loss: 0.1848 - acc: 0.9866 - val\_loss: 0.3037 - val\_acc: 0.9618

Epoch 29/55  
- 2s - loss: 0.1371 - acc: 0.9982 - val\_loss: 0.2908 - val\_acc: 0.9697

Epoch 30/55  
- 2s - loss: 0.1490 - acc: 0.9900 - val\_loss: 0.2868 - val\_acc: 0.9582

Epoch 31/55  
- 2s - loss: 0.1716 - acc: 0.9820 - val\_loss: 0.3332 - val\_acc: 0.9438

Epoch 32/55  
- 2s - loss: 0.1989 - acc: 0.9787 - val\_loss: 0.2628 - val\_acc: 0.9748

Epoch 33/55  
- 2s - loss: 0.1873 - acc: 0.9811 - val\_loss: 0.5150 - val\_acc: 0.8962

Epoch 34/55  
- 2s - loss: 0.2537 - acc: 0.9720 - val\_loss: 0.3835 - val\_acc: 0.9149

Epoch 35/55  
- 2s - loss: 0.1493 - acc: 0.9903 - val\_loss: 0.2866 - val\_acc: 0.9647

Epoch 36/55  
- 2s - loss: 0.1414 - acc: 0.9921 - val\_loss: 0.2833 - val\_acc: 0.9640

Epoch 37/55  
- 2s - loss: 0.1297 - acc: 0.9936 - val\_loss: 0.3054 - val\_acc: 0.9539

Epoch 38/55  
- 2s - loss: 0.1494 - acc: 0.9860 - val\_loss: 0.3141 - val\_acc: 0.9423

Epoch 39/55  
- 2s - loss: 0.2089 - acc: 0.9766 - val\_loss: 0.3268 - val\_acc: 0.9301

Epoch 40/55  
- 2s - loss: 0.1487 - acc: 0.9887 - val\_loss: 0.4908 - val\_acc: 0.8320

Epoch 41/55  
- 2s - loss: 0.1829 - acc: 0.9790 - val\_loss: 0.3412 - val\_acc: 0.9510

Epoch 42/55  
- 2s - loss: 0.2176 - acc: 0.9763 - val\_loss: 0.3136 - val\_acc: 0.9596

Epoch 43/55  
- 2s - loss: 0.1323 - acc: 0.9954 - val\_loss: 0.2601 - val\_acc: 0.9618

Epoch 44/55  
- 2s - loss: 0.1246 - acc: 0.9936 - val\_loss: 0.2613 - val\_acc: 0.9611

Epoch 45/55  
- 2s - loss: 0.1312 - acc: 0.9924 - val\_loss: 0.2610 - val\_acc: 0.9567

Epoch 46/55  
 - 2s - loss: 0.1235 - acc: 0.9930 - val\_loss: 0.2527 - val\_acc: 0.9560  
 Epoch 47/55  
 - 2s - loss: 0.1582 - acc: 0.9830 - val\_loss: 0.3716 - val\_acc: 0.9156  
 Epoch 48/55  
 - 2s - loss: 0.1378 - acc: 0.9900 - val\_loss: 0.2629 - val\_acc: 0.9488  
 Epoch 49/55  
 - 2s - loss: 0.1692 - acc: 0.9805 - val\_loss: 0.3277 - val\_acc: 0.9524  
 Epoch 50/55  
 - 2s - loss: 0.1633 - acc: 0.9860 - val\_loss: 0.2851 - val\_acc: 0.9503  
 Epoch 51/55  
 - 2s - loss: 0.1089 - acc: 0.9960 - val\_loss: 0.2913 - val\_acc: 0.9474  
 Epoch 52/55  
 - 2s - loss: 0.1560 - acc: 0.9796 - val\_loss: 0.3366 - val\_acc: 0.9366  
 Epoch 53/55  
 - 2s - loss: 0.1536 - acc: 0.9884 - val\_loss: 0.3652 - val\_acc: 0.8911  
 Epoch 54/55  
 - 2s - loss: 0.1505 - acc: 0.9842 - val\_loss: 0.2622 - val\_acc: 0.9596  
 Epoch 55/55  
 - 2s - loss: 0.1248 - acc: 0.9896 - val\_loss: 0.3493 - val\_acc: 0.9301  
 Train accuracy 0.9792998477929985 Test accuracy: 0.9300648882480173

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 120, 32)	7200
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 64)	49216
dense_2 (Dense)	(None, 3)	195

---

Total params: 57,507  
 Trainable params: 57,507  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/35  
 - 3s - loss: 61.9289 - acc: 0.7434 - val\_loss: 31.5040 - val\_acc: 0.8594  
 Epoch 2/35

- 2s - loss: 19.5066 - acc: 0.9522 - val\_loss: 11.5553 - val\_acc: 0.8219  
 Epoch 3/35  
 - 2s - loss: 7.1339 - acc: 0.9656 - val\_loss: 4.3558 - val\_acc: 0.9358  
 Epoch 4/35  
 - 2s - loss: 2.5993 - acc: 0.9702 - val\_loss: 1.7722 - val\_acc: 0.9286  
 Epoch 5/35  
 - 2s - loss: 1.0276 - acc: 0.9708 - val\_loss: 0.9580 - val\_acc: 0.8911  
 Epoch 6/35  
 - 2s - loss: 0.5159 - acc: 0.9787 - val\_loss: 0.7202 - val\_acc: 0.8457  
 Epoch 7/35  
 - 2s - loss: 0.3905 - acc: 0.9708 - val\_loss: 0.5576 - val\_acc: 0.9308  
 Epoch 8/35  
 - 2s - loss: 0.3298 - acc: 0.9750 - val\_loss: 0.5118 - val\_acc: 0.9315  
 Epoch 9/35  
 - 2s - loss: 0.2802 - acc: 0.9820 - val\_loss: 0.4767 - val\_acc: 0.9380  
 Epoch 10/35  
 - 2s - loss: 0.2636 - acc: 0.9826 - val\_loss: 0.4563 - val\_acc: 0.9329  
 Epoch 11/35  
 - 2s - loss: 0.2577 - acc: 0.9842 - val\_loss: 0.4307 - val\_acc: 0.9380  
 Epoch 12/35  
 - 2s - loss: 0.2392 - acc: 0.9823 - val\_loss: 0.4447 - val\_acc: 0.9135  
 Epoch 13/35  
 - 2s - loss: 0.2225 - acc: 0.9863 - val\_loss: 0.4120 - val\_acc: 0.9423  
 Epoch 14/35  
 - 2s - loss: 0.1998 - acc: 0.9909 - val\_loss: 0.3562 - val\_acc: 0.9647  
 Epoch 15/35  
 - 2s - loss: 0.1931 - acc: 0.9866 - val\_loss: 0.4689 - val\_acc: 0.8753  
 Epoch 16/35  
 - 2s - loss: 0.2090 - acc: 0.9842 - val\_loss: 0.4996 - val\_acc: 0.8248  
 Epoch 17/35  
 - 2s - loss: 0.2163 - acc: 0.9833 - val\_loss: 0.3756 - val\_acc: 0.9394  
 Epoch 18/35  
 - 2s - loss: 0.1800 - acc: 0.9903 - val\_loss: 0.3692 - val\_acc: 0.9445  
 Epoch 19/35  
 - 2s - loss: 0.1871 - acc: 0.9845 - val\_loss: 0.4578 - val\_acc: 0.8976  
 Epoch 20/35  
 - 2s - loss: 0.1638 - acc: 0.9924 - val\_loss: 0.3847 - val\_acc: 0.9019  
 Epoch 21/35  
 - 2s - loss: 0.1718 - acc: 0.9854 - val\_loss: 0.3571 - val\_acc: 0.9445  
 Epoch 22/35  
 - 2s - loss: 0.1725 - acc: 0.9830 - val\_loss: 0.3832 - val\_acc: 0.9329  
 Epoch 23/35  
 - 2s - loss: 0.1671 - acc: 0.9893 - val\_loss: 0.3157 - val\_acc: 0.9625  
 Epoch 24/35  
 - 2s - loss: 0.1790 - acc: 0.9823 - val\_loss: 0.3117 - val\_acc: 0.9596  
 Epoch 25/35  
 - 2s - loss: 0.1382 - acc: 0.9960 - val\_loss: 0.2875 - val\_acc: 0.9510  
 Epoch 26/35

```

- 2s - loss: 0.1505 - acc: 0.9875 - val_loss: 0.3194 - val_acc: 0.9452
Epoch 27/35
- 2s - loss: 0.1566 - acc: 0.9839 - val_loss: 0.3554 - val_acc: 0.9214
Epoch 28/35
- 2s - loss: 0.1331 - acc: 0.9939 - val_loss: 0.2711 - val_acc: 0.9661
Epoch 29/35
- 2s - loss: 0.1544 - acc: 0.9857 - val_loss: 0.3961 - val_acc: 0.8897
Epoch 30/35
- 2s - loss: 0.1626 - acc: 0.9872 - val_loss: 0.2571 - val_acc: 0.9690
Epoch 31/35
- 2s - loss: 0.1518 - acc: 0.9845 - val_loss: 0.3051 - val_acc: 0.9567
Epoch 32/35
- 2s - loss: 0.1354 - acc: 0.9945 - val_loss: 0.2588 - val_acc: 0.9647
Epoch 33/35
- 2s - loss: 0.1228 - acc: 0.9933 - val_loss: 0.2451 - val_acc: 0.9654
Epoch 34/35
- 2s - loss: 0.1250 - acc: 0.9915 - val_loss: 0.3148 - val_acc: 0.9337
Epoch 35/35
- 2s - loss: 0.1655 - acc: 0.9823 - val_loss: 0.2391 - val_acc: 0.9704
Train accuracy 0.9990867579908675 Test accuracy: 0.9704397981254506

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 16)	3600
dropout_1 (Dropout)	(None, 116, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 16)	0
flatten_1 (Flatten)	(None, 368)	0
dense_1 (Dense)	(None, 32)	11808
dense_2 (Dense)	(None, 3)	99

---

```

Total params: 17,555
Trainable params: 17,555
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 3s - loss: 26.0067 - acc: 0.5686 - val_loss: 5.4353 - val_acc: 0.7851
Epoch 2/35
- 2s - loss: 2.1143 - acc: 0.9056 - val_loss: 0.9471 - val_acc: 0.9034

```



Epoch 3/35  
- 2s - loss: 0.4410 - acc: 0.9729 - val\_loss: 0.5537 - val\_acc: 0.9279

Epoch 4/35  
- 2s - loss: 0.3186 - acc: 0.9766 - val\_loss: 0.4684 - val\_acc: 0.9495

Epoch 5/35  
- 2s - loss: 0.2542 - acc: 0.9802 - val\_loss: 0.4509 - val\_acc: 0.9344

Epoch 6/35  
- 2s - loss: 0.2291 - acc: 0.9814 - val\_loss: 0.4334 - val\_acc: 0.9308

Epoch 7/35  
- 2s - loss: 0.2055 - acc: 0.9817 - val\_loss: 0.4379 - val\_acc: 0.9084

Epoch 8/35  
- 2s - loss: 0.2157 - acc: 0.9799 - val\_loss: 0.3888 - val\_acc: 0.9560

Epoch 9/35  
- 2s - loss: 0.1782 - acc: 0.9881 - val\_loss: 0.3432 - val\_acc: 0.9488

Epoch 10/35  
- 2s - loss: 0.2061 - acc: 0.9790 - val\_loss: 0.4806 - val\_acc: 0.8681

Epoch 11/35  
- 2s - loss: 0.1728 - acc: 0.9863 - val\_loss: 0.3193 - val\_acc: 0.9546

Epoch 12/35  
- 2s - loss: 0.2246 - acc: 0.9714 - val\_loss: 0.3512 - val\_acc: 0.9531

Epoch 13/35  
- 2s - loss: 0.1908 - acc: 0.9802 - val\_loss: 0.4023 - val\_acc: 0.9329

Epoch 14/35  
- 2s - loss: 0.1425 - acc: 0.9933 - val\_loss: 0.3587 - val\_acc: 0.9445

Epoch 15/35  
- 2s - loss: 0.1684 - acc: 0.9814 - val\_loss: 0.3347 - val\_acc: 0.9329

Epoch 16/35  
- 2s - loss: 0.1606 - acc: 0.9875 - val\_loss: 0.2951 - val\_acc: 0.9387

Epoch 17/35  
- 2s - loss: 0.1573 - acc: 0.9839 - val\_loss: 0.2964 - val\_acc: 0.9618

Epoch 18/35  
- 2s - loss: 0.1269 - acc: 0.9933 - val\_loss: 0.3427 - val\_acc: 0.9193

Epoch 19/35  
- 2s - loss: 0.2529 - acc: 0.9623 - val\_loss: 0.4386 - val\_acc: 0.9272

Epoch 20/35  
- 2s - loss: 0.1839 - acc: 0.9903 - val\_loss: 0.3160 - val\_acc: 0.9308

Epoch 21/35  
- 2s - loss: 0.1134 - acc: 0.9963 - val\_loss: 0.3186 - val\_acc: 0.9387

Epoch 22/35  
- 2s - loss: 0.1187 - acc: 0.9918 - val\_loss: 0.3964 - val\_acc: 0.9012

Epoch 23/35  
- 2s - loss: 0.1335 - acc: 0.9857 - val\_loss: 0.3176 - val\_acc: 0.9344

Epoch 24/35  
- 2s - loss: 0.1497 - acc: 0.9836 - val\_loss: 0.3261 - val\_acc: 0.9503

Epoch 25/35  
- 2s - loss: 0.1322 - acc: 0.9881 - val\_loss: 0.2992 - val\_acc: 0.9430

Epoch 26/35  
- 2s - loss: 0.1574 - acc: 0.9830 - val\_loss: 0.3393 - val\_acc: 0.9034

```

Epoch 27/35
- 2s - loss: 0.1497 - acc: 0.9869 - val_loss: 0.3149 - val_acc: 0.9438
Epoch 28/35
- 2s - loss: 0.1239 - acc: 0.9900 - val_loss: 0.2950 - val_acc: 0.9337
Epoch 29/35
- 2s - loss: 0.1672 - acc: 0.9772 - val_loss: 0.2781 - val_acc: 0.9387
Epoch 30/35
- 2s - loss: 0.1204 - acc: 0.9927 - val_loss: 0.3214 - val_acc: 0.9301
Epoch 31/35
- 2s - loss: 0.1023 - acc: 0.9924 - val_loss: 0.3047 - val_acc: 0.9250
Epoch 32/35
- 2s - loss: 0.1048 - acc: 0.9906 - val_loss: 0.3555 - val_acc: 0.9099
Epoch 33/35
- 2s - loss: 0.2256 - acc: 0.9714 - val_loss: 0.3411 - val_acc: 0.9106
Epoch 34/35
- 2s - loss: 0.1159 - acc: 0.9918 - val_loss: 0.3403 - val_acc: 0.9120
Epoch 35/35
- 2s - loss: 0.1137 - acc: 0.9896 - val_loss: 0.2675 - val_acc: 0.9423
Train accuracy 0.9881278538812786 Test accuracy: 0.9423215573179524

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```

Total params: 32,931
Trainable params: 32,931
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
- 4s - loss: 27.3055 - acc: 0.6843 - val_loss: 3.6043 - val_acc: 0.7347
Epoch 2/55
- 3s - loss: 1.2981 - acc: 0.9449 - val_loss: 0.8110 - val_acc: 0.8818
Epoch 3/55

```

- 3s - loss: 0.3955 - acc: 0.9689 - val\_loss: 0.6277 - val\_acc: 0.8861  
 Epoch 4/55  
 - 3s - loss: 0.3063 - acc: 0.9775 - val\_loss: 0.5536 - val\_acc: 0.9445  
 Epoch 5/55  
 - 3s - loss: 0.2680 - acc: 0.9784 - val\_loss: 0.5028 - val\_acc: 0.9301  
 Epoch 6/55  
 - 3s - loss: 0.2534 - acc: 0.9753 - val\_loss: 0.4591 - val\_acc: 0.9351  
 Epoch 7/55  
 - 3s - loss: 0.2596 - acc: 0.9769 - val\_loss: 0.5203 - val\_acc: 0.8832  
 Epoch 8/55  
 - 3s - loss: 0.2243 - acc: 0.9826 - val\_loss: 0.4407 - val\_acc: 0.9243  
 Epoch 9/55  
 - 3s - loss: 0.1819 - acc: 0.9881 - val\_loss: 0.3835 - val\_acc: 0.9430  
 Epoch 10/55  
 - 3s - loss: 0.1912 - acc: 0.9857 - val\_loss: 0.3531 - val\_acc: 0.9582  
 Epoch 11/55  
 - 3s - loss: 0.2183 - acc: 0.9772 - val\_loss: 0.3504 - val\_acc: 0.9495  
 Epoch 12/55  
 - 3s - loss: 0.1637 - acc: 0.9881 - val\_loss: 0.3654 - val\_acc: 0.9423  
 Epoch 13/55  
 - 3s - loss: 0.1487 - acc: 0.9893 - val\_loss: 0.4071 - val\_acc: 0.9315  
 Epoch 14/55  
 - 3s - loss: 0.1896 - acc: 0.9817 - val\_loss: 0.3207 - val\_acc: 0.9531  
 Epoch 15/55  
 - 3s - loss: 0.1388 - acc: 0.9930 - val\_loss: 0.3134 - val\_acc: 0.9488  
 Epoch 16/55  
 - 3s - loss: 0.1317 - acc: 0.9924 - val\_loss: 0.3283 - val\_acc: 0.9503  
 Epoch 17/55  
 - 3s - loss: 0.1721 - acc: 0.9836 - val\_loss: 0.2906 - val\_acc: 0.9654  
 Epoch 18/55  
 - 3s - loss: 0.1361 - acc: 0.9875 - val\_loss: 0.4564 - val\_acc: 0.8969  
 Epoch 19/55  
 - 3s - loss: 0.1584 - acc: 0.9857 - val\_loss: 0.2769 - val\_acc: 0.9726  
 Epoch 20/55  
 - 3s - loss: 0.1212 - acc: 0.9927 - val\_loss: 0.2725 - val\_acc: 0.9603  
 Epoch 21/55  
 - 3s - loss: 0.1527 - acc: 0.9823 - val\_loss: 0.3542 - val\_acc: 0.9402  
 Epoch 22/55  
 - 3s - loss: 0.1233 - acc: 0.9918 - val\_loss: 0.2862 - val\_acc: 0.9640  
 Epoch 23/55  
 - 3s - loss: 0.0968 - acc: 0.9967 - val\_loss: 0.2734 - val\_acc: 0.9582  
 Epoch 24/55  
 - 3s - loss: 0.1921 - acc: 0.9735 - val\_loss: 0.4369 - val\_acc: 0.9301  
 Epoch 25/55  
 - 3s - loss: 0.1437 - acc: 0.9875 - val\_loss: 0.3561 - val\_acc: 0.9236  
 Epoch 26/55  
 - 3s - loss: 0.1060 - acc: 0.9957 - val\_loss: 0.2973 - val\_acc: 0.9481  
 Epoch 27/55

- 3s - loss: 0.1393 - acc: 0.9863 - val\_loss: 0.2855 - val\_acc: 0.9387  
 Epoch 28/55  
 - 3s - loss: 0.1533 - acc: 0.9839 - val\_loss: 0.2781 - val\_acc: 0.9596  
 Epoch 29/55  
 - 3s - loss: 0.0996 - acc: 0.9945 - val\_loss: 0.3370 - val\_acc: 0.9286  
 Epoch 30/55  
 - 3s - loss: 0.0886 - acc: 0.9960 - val\_loss: 0.3112 - val\_acc: 0.9164  
 Epoch 31/55  
 - 3s - loss: 0.1211 - acc: 0.9890 - val\_loss: 0.2562 - val\_acc: 0.9452  
 Epoch 32/55  
 - 3s - loss: 0.1138 - acc: 0.9875 - val\_loss: 0.3837 - val\_acc: 0.8998  
 Epoch 33/55  
 - 3s - loss: 0.1521 - acc: 0.9796 - val\_loss: 0.4394 - val\_acc: 0.9048  
 Epoch 34/55  
 - 3s - loss: 0.1251 - acc: 0.9930 - val\_loss: 0.2909 - val\_acc: 0.9358  
 Epoch 35/55  
 - 3s - loss: 0.1184 - acc: 0.9887 - val\_loss: 0.3634 - val\_acc: 0.8882  
 Epoch 36/55  
 - 3s - loss: 0.1015 - acc: 0.9939 - val\_loss: 0.3331 - val\_acc: 0.9164  
 Epoch 37/55  
 - 3s - loss: 0.1371 - acc: 0.9854 - val\_loss: 0.3038 - val\_acc: 0.9250  
 Epoch 38/55  
 - 3s - loss: 0.1044 - acc: 0.9948 - val\_loss: 0.2698 - val\_acc: 0.9503  
 Epoch 39/55  
 - 3s - loss: 0.1098 - acc: 0.9915 - val\_loss: 0.3248 - val\_acc: 0.9149  
 Epoch 40/55  
 - 3s - loss: 0.0926 - acc: 0.9942 - val\_loss: 0.3294 - val\_acc: 0.9337  
 Epoch 41/55  
 - 3s - loss: 0.0964 - acc: 0.9903 - val\_loss: 0.3177 - val\_acc: 0.9257  
 Epoch 42/55  
 - 3s - loss: 0.1724 - acc: 0.9775 - val\_loss: 0.4256 - val\_acc: 0.8789  
 Epoch 43/55  
 - 3s - loss: 0.0872 - acc: 0.9979 - val\_loss: 0.2935 - val\_acc: 0.9236  
 Epoch 44/55  
 - 3s - loss: 0.1139 - acc: 0.9884 - val\_loss: 0.3017 - val\_acc: 0.9567  
 Epoch 45/55  
 - 3s - loss: 0.1283 - acc: 0.9863 - val\_loss: 0.3306 - val\_acc: 0.9344  
 Epoch 46/55  
 - 3s - loss: 0.0963 - acc: 0.9933 - val\_loss: 0.2862 - val\_acc: 0.9409  
 Epoch 47/55  
 - 3s - loss: 0.1049 - acc: 0.9903 - val\_loss: 0.2764 - val\_acc: 0.9423  
 Epoch 48/55  
 - 3s - loss: 0.1044 - acc: 0.9900 - val\_loss: 0.3101 - val\_acc: 0.9185  
 Epoch 49/55  
 - 3s - loss: 0.0852 - acc: 0.9930 - val\_loss: 0.2861 - val\_acc: 0.9214  
 Epoch 50/55  
 - 3s - loss: 0.1026 - acc: 0.9884 - val\_loss: 0.2790 - val\_acc: 0.9265  
 Epoch 51/55

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- 3s - loss: 0.1151 - acc: 0.9860 - val_loss: 0.3267 - val_acc: 0.9301
Epoch 52/55
- 3s - loss: 0.0991 - acc: 0.9924 - val_loss: 0.2539 - val_acc: 0.9423
Epoch 53/55
- 3s - loss: 0.0893 - acc: 0.9924 - val_loss: 0.5798 - val_acc: 0.8536
Epoch 54/55
- 3s - loss: 0.1682 - acc: 0.9778 - val_loss: 0.2594 - val_acc: 0.9351
Epoch 55/55
- 3s - loss: 0.1001 - acc: 0.9909 - val_loss: 0.3277 - val_acc: 0.9221
Train accuracy 0.9917808219178083 Test accuracy: 0.9221341023792358

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 118, 32)	4512
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 16)	11792
dense_2 (Dense)	(None, 3)	51

```

Total params: 18,147
Trainable params: 18,147
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 27.7874 - acc: 0.4810 - val_loss: 12.2849 - val_acc: 0.6208
Epoch 2/35
- 1s - loss: 6.3928 - acc: 0.8265 - val_loss: 3.1274 - val_acc: 0.8803
Epoch 3/35
- 1s - loss: 1.5989 - acc: 0.9626 - val_loss: 1.2244 - val_acc: 0.9207
Epoch 4/35
- 1s - loss: 0.6285 - acc: 0.9723 - val_loss: 0.7783 - val_acc: 0.9185
Epoch 5/35
- 1s - loss: 0.3676 - acc: 0.9896 - val_loss: 0.6331 - val_acc: 0.9236
Epoch 6/35
- 1s - loss: 0.2947 - acc: 0.9881 - val_loss: 0.5416 - val_acc: 0.9575
Epoch 7/35
- 1s - loss: 0.2464 - acc: 0.9930 - val_loss: 0.5001 - val_acc: 0.9495

```

Epoch 8/35  
- 1s - loss: 0.2303 - acc: 0.9878 - val\_loss: 0.5032 - val\_acc: 0.9106  
Epoch 9/35  
- 1s - loss: 0.2022 - acc: 0.9936 - val\_loss: 0.4197 - val\_acc: 0.9668  
Epoch 10/35  
- 1s - loss: 0.1990 - acc: 0.9912 - val\_loss: 0.4492 - val\_acc: 0.9200  
Epoch 11/35  
- 1s - loss: 0.1755 - acc: 0.9948 - val\_loss: 0.4377 - val\_acc: 0.9279  
Epoch 12/35  
- 1s - loss: 0.1734 - acc: 0.9909 - val\_loss: 0.3932 - val\_acc: 0.9459  
Epoch 13/35  
- 1s - loss: 0.1498 - acc: 0.9970 - val\_loss: 0.3791 - val\_acc: 0.9611  
Epoch 14/35  
- 1s - loss: 0.1438 - acc: 0.9933 - val\_loss: 0.3844 - val\_acc: 0.9452  
Epoch 15/35  
- 1s - loss: 0.1476 - acc: 0.9918 - val\_loss: 0.3349 - val\_acc: 0.9676  
Epoch 16/35  
- 1s - loss: 0.1451 - acc: 0.9915 - val\_loss: 0.3554 - val\_acc: 0.9380  
Epoch 17/35  
- 1s - loss: 0.1603 - acc: 0.9866 - val\_loss: 0.3298 - val\_acc: 0.9416  
Epoch 18/35  
- 1s - loss: 0.1258 - acc: 0.9951 - val\_loss: 0.3292 - val\_acc: 0.9625  
Epoch 19/35  
- 1s - loss: 0.1225 - acc: 0.9939 - val\_loss: 0.3167 - val\_acc: 0.9517  
Epoch 20/35  
- 1s - loss: 0.1264 - acc: 0.9930 - val\_loss: 0.3727 - val\_acc: 0.9034  
Epoch 21/35  
- 1s - loss: 0.1147 - acc: 0.9960 - val\_loss: 0.3233 - val\_acc: 0.9445  
Epoch 22/35  
- 1s - loss: 0.1209 - acc: 0.9927 - val\_loss: 0.3088 - val\_acc: 0.9488  
Epoch 23/35  
- 1s - loss: 0.1178 - acc: 0.9921 - val\_loss: 0.2854 - val\_acc: 0.9668  
Epoch 24/35  
- 1s - loss: 0.1256 - acc: 0.9909 - val\_loss: 0.2761 - val\_acc: 0.9654  
Epoch 25/35  
- 1s - loss: 0.1054 - acc: 0.9970 - val\_loss: 0.2772 - val\_acc: 0.9712  
Epoch 26/35  
- 1s - loss: 0.0956 - acc: 0.9970 - val\_loss: 0.2667 - val\_acc: 0.9697  
Epoch 27/35  
- 1s - loss: 0.1257 - acc: 0.9854 - val\_loss: 0.4082 - val\_acc: 0.9070  
Epoch 28/35  
- 1s - loss: 0.1490 - acc: 0.9866 - val\_loss: 0.2711 - val\_acc: 0.9618  
Epoch 29/35  
- 1s - loss: 0.0913 - acc: 0.9991 - val\_loss: 0.2754 - val\_acc: 0.9618  
Epoch 30/35  
- 1s - loss: 0.1116 - acc: 0.9906 - val\_loss: 0.2690 - val\_acc: 0.9589  
Epoch 31/35  
- 1s - loss: 0.0934 - acc: 0.9982 - val\_loss: 0.2659 - val\_acc: 0.9625

```

Epoch 32/35
- 1s - loss: 0.1062 - acc: 0.9893 - val_loss: 0.2955 - val_acc: 0.9481
Epoch 33/35
- 1s - loss: 0.0911 - acc: 0.9979 - val_loss: 0.2514 - val_acc: 0.9740
Epoch 34/35
- 1s - loss: 0.0888 - acc: 0.9960 - val_loss: 0.2506 - val_acc: 0.9618
Epoch 35/35
- 1s - loss: 0.0985 - acc: 0.9930 - val_loss: 0.2561 - val_acc: 0.9596
Train accuracy 1.0 Test accuracy: 0.9596250901225667

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
flatten_1 (Flatten)	(None, 1216)	0
dense_1 (Dense)	(None, 32)	38944
dense_2 (Dense)	(None, 3)	99

---

```

Total params: 48,291
Trainable params: 48,291
Non-trainable params: 0

```

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```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 3s - loss: 38.8960 - acc: 0.5991 - val_loss: 17.2090 - val_acc: 0.8306
Epoch 2/35
- 2s - loss: 9.3178 - acc: 0.9400 - val_loss: 4.7509 - val_acc: 0.9077
Epoch 3/35
- 2s - loss: 2.6779 - acc: 0.9744 - val_loss: 1.7228 - val_acc: 0.8673
Epoch 4/35
- 2s - loss: 0.9279 - acc: 0.9851 - val_loss: 0.7867 - val_acc: 0.9322
Epoch 5/35
- 2s - loss: 0.4150 - acc: 0.9878 - val_loss: 0.5300 - val_acc: 0.9373
Epoch 6/35
- 2s - loss: 0.2724 - acc: 0.9863 - val_loss: 0.4391 - val_acc: 0.9459
Epoch 7/35
- 2s - loss: 0.2132 - acc: 0.9915 - val_loss: 0.4348 - val_acc: 0.9178
Epoch 8/35

```

- 2s - loss: 0.1972 - acc: 0.9918 - val\_loss: 0.4086 - val\_acc: 0.9120  
 Epoch 9/35  
 - 2s - loss: 0.1768 - acc: 0.9942 - val\_loss: 0.3255 - val\_acc: 0.9510  
 Epoch 10/35  
 - 2s - loss: 0.1657 - acc: 0.9924 - val\_loss: 0.4025 - val\_acc: 0.8818  
 Epoch 11/35  
 - 2s - loss: 0.1538 - acc: 0.9936 - val\_loss: 0.3004 - val\_acc: 0.9712  
 Epoch 12/35  
 - 2s - loss: 0.1721 - acc: 0.9863 - val\_loss: 0.3200 - val\_acc: 0.9546  
 Epoch 13/35  
 - 2s - loss: 0.1362 - acc: 0.9957 - val\_loss: 0.2827 - val\_acc: 0.9697  
 Epoch 14/35  
 - 2s - loss: 0.1218 - acc: 0.9973 - val\_loss: 0.2673 - val\_acc: 0.9683  
 Epoch 15/35  
 - 2s - loss: 0.1493 - acc: 0.9890 - val\_loss: 0.2758 - val\_acc: 0.9524  
 Epoch 16/35  
 - 2s - loss: 0.1271 - acc: 0.9945 - val\_loss: 0.2426 - val\_acc: 0.9776  
 Epoch 17/35  
 - 2s - loss: 0.1332 - acc: 0.9900 - val\_loss: 0.2268 - val\_acc: 0.9748  
 Epoch 18/35  
 - 2s - loss: 0.1162 - acc: 0.9973 - val\_loss: 0.2560 - val\_acc: 0.9546  
 Epoch 19/35  
 - 2s - loss: 0.1540 - acc: 0.9814 - val\_loss: 0.3681 - val\_acc: 0.9149  
 Epoch 20/35  
 - 2s - loss: 0.1355 - acc: 0.9936 - val\_loss: 0.2216 - val\_acc: 0.9733  
 Epoch 21/35  
 - 2s - loss: 0.0951 - acc: 0.9994 - val\_loss: 0.2297 - val\_acc: 0.9784  
 Epoch 22/35  
 - 2s - loss: 0.0933 - acc: 0.9991 - val\_loss: 0.2213 - val\_acc: 0.9690  
 Epoch 23/35  
 - 2s - loss: 0.0994 - acc: 0.9960 - val\_loss: 0.2224 - val\_acc: 0.9697  
 Epoch 24/35  
 - 2s - loss: 0.1085 - acc: 0.9921 - val\_loss: 0.2476 - val\_acc: 0.9553  
 Epoch 25/35  
 - 2s - loss: 0.1797 - acc: 0.9790 - val\_loss: 0.1993 - val\_acc: 0.9755  
 Epoch 26/35  
 - 2s - loss: 0.0888 - acc: 0.9994 - val\_loss: 0.2148 - val\_acc: 0.9676  
 Epoch 27/35  
 - 2s - loss: 0.0839 - acc: 0.9991 - val\_loss: 0.2077 - val\_acc: 0.9769  
 Epoch 28/35  
 - 2s - loss: 0.0841 - acc: 0.9982 - val\_loss: 0.1877 - val\_acc: 0.9798  
 Epoch 29/35  
 - 2s - loss: 0.0824 - acc: 0.9979 - val\_loss: 0.2056 - val\_acc: 0.9596  
 Epoch 30/35  
 - 2s - loss: 0.0924 - acc: 0.9942 - val\_loss: 0.1870 - val\_acc: 0.9762  
 Epoch 31/35  
 - 2s - loss: 0.0831 - acc: 0.9988 - val\_loss: 0.1728 - val\_acc: 0.9769  
 Epoch 32/35



```

- 2s - loss: 0.1719 - acc: 0.9756 - val_loss: 0.4165 - val_acc: 0.9077
Epoch 33/35
- 2s - loss: 0.1427 - acc: 0.9951 - val_loss: 0.1929 - val_acc: 0.9661
Epoch 34/35
- 2s - loss: 0.0834 - acc: 0.9985 - val_loss: 0.1873 - val_acc: 0.9755
Epoch 35/35
- 2s - loss: 0.0715 - acc: 0.9991 - val_loss: 0.1718 - val_acc: 0.9798
Train accuracy 1.0 Test accuracy: 0.9798125450612833
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 120, 16)	3600
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 64)	41024
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 45,715
Trainable params: 45,715
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
- 3s - loss: 8.5415 - acc: 0.7026 - val_loss: 3.7678 - val_acc: 0.9048
Epoch 2/55
- 2s - loss: 2.1438 - acc: 0.9686 - val_loss: 1.4563 - val_acc: 0.9481
Epoch 3/55
- 2s - loss: 0.8488 - acc: 0.9903 - val_loss: 0.7582 - val_acc: 0.9488
Epoch 4/55
- 2s - loss: 0.4135 - acc: 0.9936 - val_loss: 0.5107 - val_acc: 0.9416
Epoch 5/55
- 2s - loss: 0.2588 - acc: 0.9933 - val_loss: 0.4065 - val_acc: 0.9560
Epoch 6/55
- 2s - loss: 0.1839 - acc: 0.9945 - val_loss: 0.3803 - val_acc: 0.9394
Epoch 7/55
- 2s - loss: 0.1729 - acc: 0.9903 - val_loss: 0.3097 - val_acc: 0.9575
Epoch 8/55
- 2s - loss: 0.1354 - acc: 0.9948 - val_loss: 0.3041 - val_acc: 0.9517

```

Epoch 9/55  
- 2s - loss: 0.1309 - acc: 0.9933 - val\_loss: 0.2780 - val\_acc: 0.9553

Epoch 10/55  
- 2s - loss: 0.1137 - acc: 0.9960 - val\_loss: 0.2717 - val\_acc: 0.9531

Epoch 11/55  
- 2s - loss: 0.2032 - acc: 0.9689 - val\_loss: 0.3156 - val\_acc: 0.9539

Epoch 12/55  
- 2s - loss: 0.1186 - acc: 0.9988 - val\_loss: 0.2367 - val\_acc: 0.9690

Epoch 13/55  
- 2s - loss: 0.0932 - acc: 0.9982 - val\_loss: 0.2351 - val\_acc: 0.9603

Epoch 14/55  
- 2s - loss: 0.0853 - acc: 0.9988 - val\_loss: 0.2343 - val\_acc: 0.9546

Epoch 15/55  
- 2s - loss: 0.0766 - acc: 0.9973 - val\_loss: 0.2361 - val\_acc: 0.9517

Epoch 16/55  
- 2s - loss: 0.0746 - acc: 0.9970 - val\_loss: 0.2236 - val\_acc: 0.9495

Epoch 17/55  
- 2s - loss: 0.0789 - acc: 0.9960 - val\_loss: 0.2052 - val\_acc: 0.9553

Epoch 18/55  
- 2s - loss: 0.0846 - acc: 0.9939 - val\_loss: 0.2233 - val\_acc: 0.9560

Epoch 19/55  
- 2s - loss: 0.1006 - acc: 0.9909 - val\_loss: 0.1907 - val\_acc: 0.9611

Epoch 20/55  
- 2s - loss: 0.0767 - acc: 0.9970 - val\_loss: 0.1916 - val\_acc: 0.9596

Epoch 21/55  
- 2s - loss: 0.0639 - acc: 0.9979 - val\_loss: 0.2473 - val\_acc: 0.9517

Epoch 22/55  
- 2s - loss: 0.0751 - acc: 0.9963 - val\_loss: 0.1730 - val\_acc: 0.9603

Epoch 23/55  
- 2s - loss: 0.0627 - acc: 0.9957 - val\_loss: 0.2897 - val\_acc: 0.9193

Epoch 24/55  
- 2s - loss: 0.0923 - acc: 0.9887 - val\_loss: 0.2140 - val\_acc: 0.9517

Epoch 25/55  
- 2s - loss: 0.0689 - acc: 0.9979 - val\_loss: 0.2103 - val\_acc: 0.9524

Epoch 26/55  
- 2s - loss: 0.0686 - acc: 0.9954 - val\_loss: 0.2041 - val\_acc: 0.9416

Epoch 27/55  
- 2s - loss: 0.0525 - acc: 0.9991 - val\_loss: 0.2342 - val\_acc: 0.9387

Epoch 28/55  
- 2s - loss: 0.0553 - acc: 0.9973 - val\_loss: 0.1673 - val\_acc: 0.9690

Epoch 29/55  
- 2s - loss: 0.0531 - acc: 0.9970 - val\_loss: 0.2297 - val\_acc: 0.9459

Epoch 30/55  
- 2s - loss: 0.0817 - acc: 0.9936 - val\_loss: 0.2390 - val\_acc: 0.9430

Epoch 31/55  
- 2s - loss: 0.0697 - acc: 0.9960 - val\_loss: 0.1766 - val\_acc: 0.9582

Epoch 32/55  
- 2s - loss: 0.0562 - acc: 0.9985 - val\_loss: 0.2653 - val\_acc: 0.9236

Epoch 33/55  
- 2s - loss: 0.0868 - acc: 0.9893 - val\_loss: 0.1994 - val\_acc: 0.9495  
Epoch 34/55  
- 2s - loss: 0.0522 - acc: 0.9997 - val\_loss: 0.1956 - val\_acc: 0.9510  
Epoch 35/55  
- 2s - loss: 0.0536 - acc: 0.9967 - val\_loss: 0.2557 - val\_acc: 0.9366  
Epoch 36/55  
- 2s - loss: 0.0599 - acc: 0.9960 - val\_loss: 0.1863 - val\_acc: 0.9474  
Epoch 37/55  
- 2s - loss: 0.0549 - acc: 0.9973 - val\_loss: 0.2054 - val\_acc: 0.9503  
Epoch 38/55  
- 2s - loss: 0.0460 - acc: 0.9988 - val\_loss: 0.2229 - val\_acc: 0.9344  
Epoch 39/55  
- 2s - loss: 0.0622 - acc: 0.9942 - val\_loss: 0.1865 - val\_acc: 0.9582  
Epoch 40/55  
- 2s - loss: 0.0568 - acc: 0.9963 - val\_loss: 0.2667 - val\_acc: 0.9149  
Epoch 41/55  
- 2s - loss: 0.0555 - acc: 0.9960 - val\_loss: 0.1694 - val\_acc: 0.9539  
Epoch 42/55  
- 2s - loss: 0.0521 - acc: 0.9976 - val\_loss: 0.2094 - val\_acc: 0.9329  
Epoch 43/55  
- 2s - loss: 0.0512 - acc: 0.9973 - val\_loss: 0.1839 - val\_acc: 0.9553  
Epoch 44/55  
- 2s - loss: 0.0434 - acc: 0.9982 - val\_loss: 0.1852 - val\_acc: 0.9567  
Epoch 45/55  
- 2s - loss: 0.0572 - acc: 0.9936 - val\_loss: 0.1867 - val\_acc: 0.9459  
Epoch 46/55  
- 2s - loss: 0.0621 - acc: 0.9957 - val\_loss: 0.2916 - val\_acc: 0.9250  
Epoch 47/55  
- 2s - loss: 0.0579 - acc: 0.9963 - val\_loss: 0.2497 - val\_acc: 0.9430  
Epoch 48/55  
- 2s - loss: 0.0458 - acc: 0.9985 - val\_loss: 0.2003 - val\_acc: 0.9531  
Epoch 49/55  
- 2s - loss: 0.0764 - acc: 0.9896 - val\_loss: 0.2287 - val\_acc: 0.9416  
Epoch 50/55  
- 2s - loss: 0.0585 - acc: 0.9970 - val\_loss: 0.2139 - val\_acc: 0.9459  
Epoch 51/55  
- 2s - loss: 0.0539 - acc: 0.9945 - val\_loss: 0.2087 - val\_acc: 0.9474  
Epoch 52/55  
- 2s - loss: 0.0612 - acc: 0.9951 - val\_loss: 0.1458 - val\_acc: 0.9589  
Epoch 53/55  
- 2s - loss: 0.0562 - acc: 0.9957 - val\_loss: 0.1913 - val\_acc: 0.9560  
Epoch 54/55  
- 2s - loss: 0.0538 - acc: 0.9954 - val\_loss: 0.2297 - val\_acc: 0.9510  
Epoch 55/55  
- 2s - loss: 0.0566 - acc: 0.9957 - val\_loss: 0.2106 - val\_acc: 0.9517  
Train accuracy 1.0 Test accuracy: 0.9516943042537851

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 116, 32)	9440
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
flatten_1 (Flatten)	(None, 1216)	0
dense_1 (Dense)	(None, 32)	38944
dense_2 (Dense)	(None, 3)	99

Total params: 51,171

Trainable params: 51,171

Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 2.6849 - acc: 0.8825 - val\_loss: 0.5958 - val\_acc: 0.9135

Epoch 2/35

- 2s - loss: 0.3426 - acc: 0.9720 - val\_loss: 0.3723 - val\_acc: 0.9402

Epoch 3/35

- 2s - loss: 0.1920 - acc: 0.9872 - val\_loss: 0.3124 - val\_acc: 0.9358

Epoch 4/35

- 2s - loss: 0.1805 - acc: 0.9857 - val\_loss: 0.2593 - val\_acc: 0.9481

Epoch 5/35

- 2s - loss: 0.2038 - acc: 0.9775 - val\_loss: 0.3168 - val\_acc: 0.9409

Epoch 6/35

- 2s - loss: 0.1140 - acc: 0.9927 - val\_loss: 0.2110 - val\_acc: 0.9575

Epoch 7/35

- 2s - loss: 0.1318 - acc: 0.9866 - val\_loss: 0.2483 - val\_acc: 0.9553

Epoch 8/35

- 2s - loss: 0.1803 - acc: 0.9763 - val\_loss: 0.2362 - val\_acc: 0.9531

Epoch 9/35

- 2s - loss: 0.0754 - acc: 0.9970 - val\_loss: 0.2049 - val\_acc: 0.9445

Epoch 10/35

- 2s - loss: 0.0754 - acc: 0.9957 - val\_loss: 0.4773 - val\_acc: 0.8443

Epoch 11/35

- 2s - loss: 0.1252 - acc: 0.9854 - val\_loss: 0.2614 - val\_acc: 0.9344

Epoch 12/35

- 2s - loss: 0.0592 - acc: 0.9976 - val\_loss: 0.2241 - val\_acc: 0.9351

Epoch 13/35

```

- 2s - loss: 0.1024 - acc: 0.9909 - val_loss: 0.2325 - val_acc: 0.9481
Epoch 14/35
- 2s - loss: 0.1021 - acc: 0.9881 - val_loss: 0.2856 - val_acc: 0.9524
Epoch 15/35
- 2s - loss: 0.1042 - acc: 0.9896 - val_loss: 0.2529 - val_acc: 0.9409
Epoch 16/35
- 2s - loss: 0.0689 - acc: 0.9951 - val_loss: 0.3579 - val_acc: 0.8601
Epoch 17/35
- 2s - loss: 0.0782 - acc: 0.9939 - val_loss: 0.2222 - val_acc: 0.9380
Epoch 18/35
- 2s - loss: 0.1001 - acc: 0.9903 - val_loss: 0.3661 - val_acc: 0.9185
Epoch 19/35
- 2s - loss: 0.0716 - acc: 0.9936 - val_loss: 0.2637 - val_acc: 0.9214
Epoch 20/35
- 2s - loss: 0.0892 - acc: 0.9924 - val_loss: 0.3396 - val_acc: 0.9301
Epoch 21/35
- 2s - loss: 0.0477 - acc: 0.9988 - val_loss: 0.2275 - val_acc: 0.9524
Epoch 22/35
- 2s - loss: 0.0609 - acc: 0.9942 - val_loss: 0.4125 - val_acc: 0.9308
Epoch 23/35
- 2s - loss: 0.0627 - acc: 0.9957 - val_loss: 0.1783 - val_acc: 0.9531
Epoch 24/35
- 2s - loss: 0.1416 - acc: 0.9836 - val_loss: 0.3482 - val_acc: 0.9322
Epoch 25/35
- 2s - loss: 0.0783 - acc: 0.9957 - val_loss: 0.2636 - val_acc: 0.9423
Epoch 26/35
- 2s - loss: 0.0415 - acc: 0.9985 - val_loss: 0.3182 - val_acc: 0.9171
Epoch 27/35
- 2s - loss: 0.0499 - acc: 0.9970 - val_loss: 0.2968 - val_acc: 0.9265
Epoch 28/35
- 2s - loss: 0.0754 - acc: 0.9909 - val_loss: 0.2699 - val_acc: 0.9409
Epoch 29/35
- 2s - loss: 0.0986 - acc: 0.9878 - val_loss: 0.2593 - val_acc: 0.9351
Epoch 30/35
- 2s - loss: 0.0677 - acc: 0.9963 - val_loss: 0.1945 - val_acc: 0.9402
Epoch 31/35
- 2s - loss: 0.0370 - acc: 0.9997 - val_loss: 0.1990 - val_acc: 0.9560
Epoch 32/35
- 2s - loss: 0.0352 - acc: 0.9994 - val_loss: 0.2087 - val_acc: 0.9553
Epoch 33/35
- 2s - loss: 0.1549 - acc: 0.9857 - val_loss: 0.2147 - val_acc: 0.9416
Epoch 34/35
- 2s - loss: 0.0503 - acc: 0.9979 - val_loss: 0.1681 - val_acc: 0.9589
Epoch 35/35
- 2s - loss: 0.0411 - acc: 0.9967 - val_loss: 0.2415 - val_acc: 0.9668
Train accuracy 0.9984779299847792 Test accuracy: 0.9668348954578226
-----
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
flatten_1 (Flatten)	(None, 1216)	0
dense_1 (Dense)	(None, 16)	19472
dense_2 (Dense)	(None, 3)	51

Total params: 28,771

Trainable params: 28,771

Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 39.1465 - acc: 0.4654 - val\_loss: 18.0663 - val\_acc: 0.5321

Epoch 2/35

- 2s - loss: 10.1946 - acc: 0.6874 - val\_loss: 5.3358 - val\_acc: 0.7152

Epoch 3/35

- 2s - loss: 3.1728 - acc: 0.8928 - val\_loss: 2.0494 - val\_acc: 0.8724

Epoch 4/35

- 2s - loss: 1.1925 - acc: 0.9671 - val\_loss: 1.0105 - val\_acc: 0.9214

Epoch 5/35

- 2s - loss: 0.5451 - acc: 0.9833 - val\_loss: 0.6764 - val\_acc: 0.9120

Epoch 6/35

- 2s - loss: 0.3432 - acc: 0.9851 - val\_loss: 0.5294 - val\_acc: 0.9322

Epoch 7/35

- 2s - loss: 0.2585 - acc: 0.9933 - val\_loss: 0.4750 - val\_acc: 0.9106

Epoch 8/35

- 2s - loss: 0.2275 - acc: 0.9906 - val\_loss: 0.4393 - val\_acc: 0.9193

Epoch 9/35

- 2s - loss: 0.2021 - acc: 0.9945 - val\_loss: 0.3771 - val\_acc: 0.9553

Epoch 10/35

- 2s - loss: 0.1991 - acc: 0.9924 - val\_loss: 0.4823 - val\_acc: 0.8565

Epoch 11/35

- 2s - loss: 0.1850 - acc: 0.9918 - val\_loss: 0.3742 - val\_acc: 0.9366

Epoch 12/35

- 2s - loss: 0.1797 - acc: 0.9903 - val\_loss: 0.3341 - val\_acc: 0.9560

Epoch 13/35

- 2s - loss: 0.1547 - acc: 0.9963 - val\_loss: 0.3230 - val\_acc: 0.9625

```

Epoch 14/35
- 2s - loss: 0.1397 - acc: 0.9982 - val_loss: 0.3145 - val_acc: 0.9553
Epoch 15/35
- 2s - loss: 0.1747 - acc: 0.9845 - val_loss: 0.2921 - val_acc: 0.9661
Epoch 16/35
- 2s - loss: 0.1467 - acc: 0.9933 - val_loss: 0.3013 - val_acc: 0.9459
Epoch 17/35
- 2s - loss: 0.1374 - acc: 0.9936 - val_loss: 0.2976 - val_acc: 0.9524
Epoch 18/35
- 2s - loss: 0.1393 - acc: 0.9930 - val_loss: 0.2777 - val_acc: 0.9632
Epoch 19/35
- 2s - loss: 0.1716 - acc: 0.9808 - val_loss: 0.3505 - val_acc: 0.9250
Epoch 20/35
- 2s - loss: 0.1450 - acc: 0.9939 - val_loss: 0.2802 - val_acc: 0.9596
Epoch 21/35
- 2s - loss: 0.1189 - acc: 0.9967 - val_loss: 0.2596 - val_acc: 0.9647
Epoch 22/35
- 2s - loss: 0.1119 - acc: 0.9970 - val_loss: 0.2791 - val_acc: 0.9445
Epoch 23/35
- 2s - loss: 0.1196 - acc: 0.9939 - val_loss: 0.2498 - val_acc: 0.9640
Epoch 24/35
- 2s - loss: 0.1233 - acc: 0.9918 - val_loss: 0.2644 - val_acc: 0.9488
Epoch 25/35
- 2s - loss: 0.1292 - acc: 0.9909 - val_loss: 0.2577 - val_acc: 0.9510
Epoch 26/35
- 2s - loss: 0.1017 - acc: 0.9982 - val_loss: 0.2476 - val_acc: 0.9575
Epoch 27/35
- 2s - loss: 0.1208 - acc: 0.9906 - val_loss: 0.1996 - val_acc: 0.9827
Epoch 28/35
- 2s - loss: 0.1460 - acc: 0.9854 - val_loss: 0.2308 - val_acc: 0.9697
Epoch 29/35
- 2s - loss: 0.1022 - acc: 0.9960 - val_loss: 0.2645 - val_acc: 0.9301
Epoch 30/35
- 2s - loss: 0.1039 - acc: 0.9945 - val_loss: 0.2193 - val_acc: 0.9683
Epoch 31/35
- 2s - loss: 0.0949 - acc: 0.9967 - val_loss: 0.2054 - val_acc: 0.9776
Epoch 32/35
- 2s - loss: 0.1408 - acc: 0.9811 - val_loss: 0.2089 - val_acc: 0.9769
Epoch 33/35
- 2s - loss: 0.0986 - acc: 0.9967 - val_loss: 0.2177 - val_acc: 0.9733
Epoch 34/35
- 2s - loss: 0.1107 - acc: 0.9936 - val_loss: 0.2339 - val_acc: 0.9539
Epoch 35/35
- 2s - loss: 0.0974 - acc: 0.9967 - val_loss: 0.1974 - val_acc: 0.9726
Train accuracy 1.0 Test accuracy: 0.9726027397260274

```

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Layer (type)	Output Shape	Param #
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```

=====
conv1d_1 (Conv1D)                (None, 122, 32)                2048
-----
conv1d_2 (Conv1D)                (None, 118, 32)                5152
-----
dropout_1 (Dropout)              (None, 118, 32)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 39, 32)                0
-----
flatten_1 (Flatten)              (None, 1248)                   0
-----
dense_1 (Dense)                  (None, 32)                     39968
-----
dense_2 (Dense)                  (None, 3)                      99
=====
Total params: 47,267
Trainable params: 47,267
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 3s - loss: 22.1495 - acc: 0.5577 - val_loss: 2.1420 - val_acc: 0.6943
Epoch 2/55
  - 2s - loss: 0.8020 - acc: 0.9102 - val_loss: 0.6961 - val_acc: 0.8688
Epoch 3/55
  - 2s - loss: 0.3743 - acc: 0.9559 - val_loss: 0.5399 - val_acc: 0.9315
Epoch 4/55
  - 2s - loss: 0.3439 - acc: 0.9589 - val_loss: 0.4918 - val_acc: 0.9315
Epoch 5/55
  - 2s - loss: 0.2748 - acc: 0.9735 - val_loss: 0.4317 - val_acc: 0.9560
Epoch 6/55
  - 2s - loss: 0.2586 - acc: 0.9723 - val_loss: 0.4849 - val_acc: 0.8846
Epoch 7/55
  - 2s - loss: 0.2445 - acc: 0.9760 - val_loss: 0.4234 - val_acc: 0.9452
Epoch 8/55
  - 2s - loss: 0.2442 - acc: 0.9708 - val_loss: 0.5394 - val_acc: 0.9027
Epoch 9/55
  - 2s - loss: 0.2842 - acc: 0.9638 - val_loss: 0.3635 - val_acc: 0.9625
Epoch 10/55
  - 2s - loss: 0.2495 - acc: 0.9726 - val_loss: 0.3865 - val_acc: 0.9539
Epoch 11/55
  - 2s - loss: 0.1852 - acc: 0.9881 - val_loss: 0.3612 - val_acc: 0.9366
Epoch 12/55
  - 2s - loss: 0.2320 - acc: 0.9689 - val_loss: 0.3922 - val_acc: 0.9387
Epoch 13/55
  - 2s - loss: 0.1959 - acc: 0.9839 - val_loss: 0.3711 - val_acc: 0.9474
Epoch 14/55

```



- 2s - loss: 0.1694 - acc: 0.9875 - val\_loss: 0.3649 - val\_acc: 0.9416  
 Epoch 15/55  
 - 2s - loss: 0.1704 - acc: 0.9839 - val\_loss: 0.3498 - val\_acc: 0.9344  
 Epoch 16/55  
 - 2s - loss: 0.2056 - acc: 0.9769 - val\_loss: 0.5219 - val\_acc: 0.8529  
 Epoch 17/55  
 - 2s - loss: 0.1812 - acc: 0.9839 - val\_loss: 0.3210 - val\_acc: 0.9430  
 Epoch 18/55  
 - 2s - loss: 0.1727 - acc: 0.9814 - val\_loss: 0.3783 - val\_acc: 0.9056  
 Epoch 19/55  
 - 2s - loss: 0.1764 - acc: 0.9766 - val\_loss: 0.4081 - val\_acc: 0.9113  
 Epoch 20/55  
 - 2s - loss: 0.1787 - acc: 0.9836 - val\_loss: 0.3292 - val\_acc: 0.9351  
 Epoch 21/55  
 - 2s - loss: 0.1888 - acc: 0.9766 - val\_loss: 0.3683 - val\_acc: 0.9380  
 Epoch 22/55  
 - 2s - loss: 0.1543 - acc: 0.9857 - val\_loss: 0.3306 - val\_acc: 0.9430  
 Epoch 23/55  
 - 2s - loss: 0.1845 - acc: 0.9747 - val\_loss: 0.3594 - val\_acc: 0.9387  
 Epoch 24/55  
 - 2s - loss: 0.1829 - acc: 0.9811 - val\_loss: 0.3234 - val\_acc: 0.9358  
 Epoch 25/55  
 - 2s - loss: 0.1491 - acc: 0.9872 - val\_loss: 0.2876 - val\_acc: 0.9430  
 Epoch 26/55  
 - 2s - loss: 0.1616 - acc: 0.9802 - val\_loss: 0.3114 - val\_acc: 0.9337  
 Epoch 27/55  
 - 2s - loss: 0.1488 - acc: 0.9863 - val\_loss: 0.3248 - val\_acc: 0.9503  
 Epoch 28/55  
 - 2s - loss: 0.1865 - acc: 0.9760 - val\_loss: 0.4330 - val\_acc: 0.9005  
 Epoch 29/55  
 - 2s - loss: 0.1404 - acc: 0.9909 - val\_loss: 0.3247 - val\_acc: 0.9351  
 Epoch 30/55  
 - 2s - loss: 0.1619 - acc: 0.9802 - val\_loss: 0.3820 - val\_acc: 0.9308  
 Epoch 31/55  
 - 2s - loss: 0.1287 - acc: 0.9893 - val\_loss: 0.2627 - val\_acc: 0.9567  
 Epoch 32/55  
 - 2s - loss: 0.2424 - acc: 0.9650 - val\_loss: 0.3321 - val\_acc: 0.9416  
 Epoch 33/55  
 - 2s - loss: 0.1536 - acc: 0.9884 - val\_loss: 0.3908 - val\_acc: 0.9200  
 Epoch 34/55  
 - 2s - loss: 0.1511 - acc: 0.9842 - val\_loss: 0.4770 - val\_acc: 0.8234  
 Epoch 35/55  
 - 2s - loss: 0.2029 - acc: 0.9717 - val\_loss: 0.3288 - val\_acc: 0.9438  
 Epoch 36/55  
 - 2s - loss: 0.1294 - acc: 0.9906 - val\_loss: 0.2352 - val\_acc: 0.9632  
 Epoch 37/55  
 - 2s - loss: 0.1608 - acc: 0.9823 - val\_loss: 0.3602 - val\_acc: 0.9337  
 Epoch 38/55

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- 2s - loss: 0.1375 - acc: 0.9863 - val_loss: 0.4090 - val_acc: 0.8745
Epoch 39/55
- 2s - loss: 0.1911 - acc: 0.9799 - val_loss: 0.3231 - val_acc: 0.9265
Epoch 40/55
- 2s - loss: 0.1633 - acc: 0.9793 - val_loss: 0.3094 - val_acc: 0.9618
Epoch 41/55
- 2s - loss: 0.2160 - acc: 0.9705 - val_loss: 0.3574 - val_acc: 0.9351
Epoch 42/55
- 2s - loss: 0.1516 - acc: 0.9854 - val_loss: 0.3479 - val_acc: 0.9048
Epoch 43/55
- 2s - loss: 0.2132 - acc: 0.9729 - val_loss: 0.2979 - val_acc: 0.9423
Epoch 44/55
- 2s - loss: 0.1272 - acc: 0.9924 - val_loss: 0.3241 - val_acc: 0.9193
Epoch 45/55
- 2s - loss: 0.1190 - acc: 0.9884 - val_loss: 0.2679 - val_acc: 0.9452
Epoch 46/55
- 2s - loss: 0.1570 - acc: 0.9778 - val_loss: 0.5182 - val_acc: 0.8810
Epoch 47/55
- 2s - loss: 0.2014 - acc: 0.9772 - val_loss: 0.4916 - val_acc: 0.9106
Epoch 48/55
- 2s - loss: 0.1585 - acc: 0.9860 - val_loss: 0.3940 - val_acc: 0.8911
Epoch 49/55
- 2s - loss: 0.1401 - acc: 0.9875 - val_loss: 0.3846 - val_acc: 0.9135
Epoch 50/55
- 2s - loss: 0.1212 - acc: 0.9896 - val_loss: 0.4093 - val_acc: 0.8846
Epoch 51/55
- 2s - loss: 0.2201 - acc: 0.9705 - val_loss: 0.4886 - val_acc: 0.8976
Epoch 52/55
- 2s - loss: 0.1375 - acc: 0.9900 - val_loss: 0.4245 - val_acc: 0.8911
Epoch 53/55
- 2s - loss: 0.1229 - acc: 0.9878 - val_loss: 0.5579 - val_acc: 0.8378
Epoch 54/55
- 2s - loss: 0.1506 - acc: 0.9814 - val_loss: 0.3228 - val_acc: 0.9322
Epoch 55/55
- 2s - loss: 0.1859 - acc: 0.9763 - val_loss: 0.6605 - val_acc: 0.7830
Train accuracy 0.8700152207001522 Test accuracy: 0.7829848594087959

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
-----		
conv1d_2 (Conv1D)	(None, 116, 32)	6304
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
-----		

flatten_1 (Flatten)	(None, 1216)	0
-----		
dense_1 (Dense)	(None, 32)	38944
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 47,139  
 Trainable params: 47,139  
 Non-trainable params: 0

-----

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 2s - loss: 19.1088 - acc: 0.7172 - val\_loss: 8.3971 - val\_acc: 0.9207

Epoch 2/35

- 1s - loss: 4.4090 - acc: 0.9732 - val\_loss: 2.2830 - val\_acc: 0.9402

Epoch 3/35

- 1s - loss: 1.2143 - acc: 0.9896 - val\_loss: 0.8836 - val\_acc: 0.9416

Epoch 4/35

- 1s - loss: 0.4594 - acc: 0.9896 - val\_loss: 0.5111 - val\_acc: 0.9481

Epoch 5/35

- 1s - loss: 0.2520 - acc: 0.9900 - val\_loss: 0.4331 - val\_acc: 0.9156

Epoch 6/35

- 1s - loss: 0.1796 - acc: 0.9936 - val\_loss: 0.3207 - val\_acc: 0.9697

Epoch 7/35

- 1s - loss: 0.1579 - acc: 0.9927 - val\_loss: 0.3465 - val\_acc: 0.9286

Epoch 8/35

- 1s - loss: 0.1467 - acc: 0.9933 - val\_loss: 0.3164 - val\_acc: 0.9373

Epoch 9/35

- 1s - loss: 0.1261 - acc: 0.9963 - val\_loss: 0.2580 - val\_acc: 0.9553

Epoch 10/35

- 1s - loss: 0.1089 - acc: 0.9979 - val\_loss: 0.2981 - val\_acc: 0.9402

Epoch 11/35

- 1s - loss: 0.1109 - acc: 0.9948 - val\_loss: 0.2506 - val\_acc: 0.9503

Epoch 12/35

- 1s - loss: 0.1256 - acc: 0.9915 - val\_loss: 0.2510 - val\_acc: 0.9589

Epoch 13/35

- 1s - loss: 0.0899 - acc: 0.9988 - val\_loss: 0.2430 - val\_acc: 0.9697

Epoch 14/35

- 1s - loss: 0.0839 - acc: 0.9991 - val\_loss: 0.2567 - val\_acc: 0.9402

Epoch 15/35

- 1s - loss: 0.1086 - acc: 0.9903 - val\_loss: 0.2098 - val\_acc: 0.9632

Epoch 16/35

- 1s - loss: 0.0884 - acc: 0.9963 - val\_loss: 0.2337 - val\_acc: 0.9430

Epoch 17/35

- 1s - loss: 0.1030 - acc: 0.9909 - val\_loss: 0.2032 - val\_acc: 0.9611

Epoch 18/35

- 1s - loss: 0.0779 - acc: 0.9979 - val\_loss: 0.2353 - val\_acc: 0.9488

```

Epoch 19/35
- 1s - loss: 0.0848 - acc: 0.9936 - val_loss: 0.2139 - val_acc: 0.9524
Epoch 20/35
- 1s - loss: 0.1165 - acc: 0.9884 - val_loss: 0.2074 - val_acc: 0.9690
Epoch 21/35
- 1s - loss: 0.0665 - acc: 1.0000 - val_loss: 0.2353 - val_acc: 0.9661
Epoch 22/35
- 1s - loss: 0.0648 - acc: 0.9985 - val_loss: 0.2149 - val_acc: 0.9589
Epoch 23/35
- 1s - loss: 0.0655 - acc: 0.9988 - val_loss: 0.1877 - val_acc: 0.9748
Epoch 24/35
- 1s - loss: 0.1080 - acc: 0.9851 - val_loss: 0.3830 - val_acc: 0.9092
Epoch 25/35
- 1s - loss: 0.1191 - acc: 0.9936 - val_loss: 0.2155 - val_acc: 0.9625
Epoch 26/35
- 1s - loss: 0.0653 - acc: 0.9991 - val_loss: 0.2264 - val_acc: 0.9647
Epoch 27/35
- 1s - loss: 0.0615 - acc: 0.9988 - val_loss: 0.1887 - val_acc: 0.9740
Epoch 28/35
- 1s - loss: 0.0571 - acc: 0.9997 - val_loss: 0.1979 - val_acc: 0.9704
Epoch 29/35
- 1s - loss: 0.0751 - acc: 0.9936 - val_loss: 0.2034 - val_acc: 0.9704
Epoch 30/35
- 1s - loss: 0.1445 - acc: 0.9781 - val_loss: 0.2378 - val_acc: 0.9430
Epoch 31/35
- 1s - loss: 0.0728 - acc: 0.9988 - val_loss: 0.1998 - val_acc: 0.9618
Epoch 32/35
- 1s - loss: 0.0563 - acc: 0.9994 - val_loss: 0.1761 - val_acc: 0.9661
Epoch 33/35
- 1s - loss: 0.0506 - acc: 0.9994 - val_loss: 0.1966 - val_acc: 0.9697
Epoch 34/35
- 1s - loss: 0.0573 - acc: 0.9982 - val_loss: 0.2645 - val_acc: 0.9582
Epoch 35/35
- 1s - loss: 0.1006 - acc: 0.9848 - val_loss: 0.2936 - val_acc: 0.9394
Train accuracy 0.9500761035189055 Test accuracy: 0.9394376353987189

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 120, 16)	3600
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0

---

```

-----
dense_1 (Dense)                (None, 64)                41024
-----
dense_2 (Dense)                (None, 3)                  195
=====
Total params: 45,715
Trainable params: 45,715
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
  - 3s - loss: 24.8907 - acc: 0.7166 - val_loss: 7.7521 - val_acc: 0.7700
Epoch 2/35
  - 2s - loss: 3.4306 - acc: 0.9583 - val_loss: 1.4761 - val_acc: 0.8709
Epoch 3/35
  - 2s - loss: 0.7040 - acc: 0.9653 - val_loss: 0.5831 - val_acc: 0.9524
Epoch 4/35
  - 2s - loss: 0.3330 - acc: 0.9766 - val_loss: 0.4911 - val_acc: 0.9279
Epoch 5/35
  - 2s - loss: 0.3146 - acc: 0.9665 - val_loss: 0.4411 - val_acc: 0.9380
Epoch 6/35
  - 2s - loss: 0.2373 - acc: 0.9863 - val_loss: 0.3714 - val_acc: 0.9503
Epoch 7/35
  - 2s - loss: 0.2384 - acc: 0.9781 - val_loss: 0.3979 - val_acc: 0.9286
Epoch 8/35
  - 2s - loss: 0.2134 - acc: 0.9808 - val_loss: 0.3545 - val_acc: 0.9539
Epoch 9/35
  - 2s - loss: 0.2168 - acc: 0.9860 - val_loss: 0.3197 - val_acc: 0.9503
Epoch 10/35
  - 2s - loss: 0.1984 - acc: 0.9848 - val_loss: 0.3826 - val_acc: 0.9193
Epoch 11/35
  - 2s - loss: 0.2633 - acc: 0.9641 - val_loss: 0.4197 - val_acc: 0.9135
Epoch 12/35
  - 2s - loss: 0.1867 - acc: 0.9896 - val_loss: 0.3654 - val_acc: 0.9178
Epoch 13/35
  - 2s - loss: 0.1626 - acc: 0.9878 - val_loss: 0.3004 - val_acc: 0.9582
Epoch 14/35
  - 2s - loss: 0.1822 - acc: 0.9790 - val_loss: 0.3893 - val_acc: 0.9329
Epoch 15/35
  - 2s - loss: 0.1494 - acc: 0.9957 - val_loss: 0.2848 - val_acc: 0.9394
Epoch 16/35
  - 2s - loss: 0.1384 - acc: 0.9900 - val_loss: 0.2924 - val_acc: 0.9243
Epoch 17/35
  - 2s - loss: 0.1683 - acc: 0.9833 - val_loss: 0.2854 - val_acc: 0.9351
Epoch 18/35
  - 2s - loss: 0.1176 - acc: 0.9945 - val_loss: 0.2596 - val_acc: 0.9474
Epoch 19/35

```

```

- 2s - loss: 0.1460 - acc: 0.9875 - val_loss: 0.2867 - val_acc: 0.9394
Epoch 20/35
- 2s - loss: 0.1363 - acc: 0.9890 - val_loss: 0.4354 - val_acc: 0.8472
Epoch 21/35
- 2s - loss: 0.1215 - acc: 0.9951 - val_loss: 0.2927 - val_acc: 0.9452
Epoch 22/35
- 2s - loss: 0.1046 - acc: 0.9954 - val_loss: 0.2569 - val_acc: 0.9293
Epoch 23/35
- 2s - loss: 0.1071 - acc: 0.9942 - val_loss: 0.2517 - val_acc: 0.9416
Epoch 24/35
- 2s - loss: 0.1317 - acc: 0.9866 - val_loss: 0.3348 - val_acc: 0.9019
Epoch 25/35
- 2s - loss: 0.1526 - acc: 0.9848 - val_loss: 0.2568 - val_acc: 0.9560
Epoch 26/35
- 2s - loss: 0.1257 - acc: 0.9881 - val_loss: 0.2863 - val_acc: 0.9236
Epoch 27/35
- 2s - loss: 0.1237 - acc: 0.9896 - val_loss: 0.2806 - val_acc: 0.9322
Epoch 28/35
- 2s - loss: 0.1429 - acc: 0.9851 - val_loss: 0.2710 - val_acc: 0.9337
Epoch 29/35
- 2s - loss: 0.1240 - acc: 0.9890 - val_loss: 0.3995 - val_acc: 0.9171
Epoch 30/35
- 2s - loss: 0.1126 - acc: 0.9930 - val_loss: 0.2584 - val_acc: 0.9380
Epoch 31/35
- 2s - loss: 0.1573 - acc: 0.9796 - val_loss: 0.3229 - val_acc: 0.9286
Epoch 32/35
- 2s - loss: 0.1144 - acc: 0.9909 - val_loss: 0.3109 - val_acc: 0.9120
Epoch 33/35
- 2s - loss: 0.1456 - acc: 0.9830 - val_loss: 0.2734 - val_acc: 0.9293
Epoch 34/35
- 2s - loss: 0.1376 - acc: 0.9848 - val_loss: 0.3992 - val_acc: 0.9048
Epoch 35/35
- 2s - loss: 0.1219 - acc: 0.9893 - val_loss: 0.2666 - val_acc: 0.9358
Train accuracy 0.9993911719939117 Test accuracy: 0.935832732516222

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 116, 32)	9440
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
flatten_1 (Flatten)	(None, 1216)	0

dense_1 (Dense)	(None, 32)	38944
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dense_2 (Dense)	(None, 3)	99
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Total params: 51,171  
 Trainable params: 51,171  
 Non-trainable params: 0

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None

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 3s - loss: 42.0609 - acc: 0.7394 - val\_loss: 1.2721 - val\_acc: 0.7549

Epoch 2/55

- 2s - loss: 0.5984 - acc: 0.9059 - val\_loss: 0.7206 - val\_acc: 0.8176

Epoch 3/55

- 2s - loss: 0.4322 - acc: 0.9263 - val\_loss: 0.7502 - val\_acc: 0.8161

Epoch 4/55

- 2s - loss: 0.4315 - acc: 0.9196 - val\_loss: 0.5608 - val\_acc: 0.8962

Epoch 5/55

- 2s - loss: 0.3550 - acc: 0.9409 - val\_loss: 0.4886 - val\_acc: 0.9214

Epoch 6/55

- 2s - loss: 0.3515 - acc: 0.9397 - val\_loss: 0.6397 - val\_acc: 0.8125

Epoch 7/55

- 2s - loss: 0.3621 - acc: 0.9397 - val\_loss: 0.5487 - val\_acc: 0.8594

Epoch 8/55

- 2s - loss: 0.3102 - acc: 0.9467 - val\_loss: 0.5749 - val\_acc: 0.8897

Epoch 9/55

- 2s - loss: 0.3106 - acc: 0.9476 - val\_loss: 0.4982 - val\_acc: 0.8947

Epoch 10/55

- 2s - loss: 0.2942 - acc: 0.9513 - val\_loss: 0.4938 - val\_acc: 0.8983

Epoch 11/55

- 2s - loss: 0.2920 - acc: 0.9553 - val\_loss: 0.4148 - val\_acc: 0.9120

Epoch 12/55

- 2s - loss: 0.3007 - acc: 0.9498 - val\_loss: 0.5185 - val\_acc: 0.9156

Epoch 13/55

- 2s - loss: 0.2865 - acc: 0.9562 - val\_loss: 0.4809 - val\_acc: 0.9041

Epoch 14/55

- 2s - loss: 0.2779 - acc: 0.9549 - val\_loss: 0.5107 - val\_acc: 0.8940

Epoch 15/55

- 2s - loss: 0.3022 - acc: 0.9507 - val\_loss: 0.5769 - val\_acc: 0.8529

Epoch 16/55

- 2s - loss: 0.2847 - acc: 0.9525 - val\_loss: 0.4970 - val\_acc: 0.8544

Epoch 17/55

- 2s - loss: 0.2568 - acc: 0.9616 - val\_loss: 0.4449 - val\_acc: 0.8911

Epoch 18/55

- 2s - loss: 0.2743 - acc: 0.9549 - val\_loss: 0.4363 - val\_acc: 0.9092

Epoch 19/55

- 2s - loss: 0.2567 - acc: 0.9565 - val\_loss: 0.5197 - val\_acc: 0.9019

Epoch 20/55  
- 2s - loss: 0.2920 - acc: 0.9504 - val\_loss: 0.4682 - val\_acc: 0.8825

Epoch 21/55  
- 2s - loss: 0.2651 - acc: 0.9501 - val\_loss: 0.4713 - val\_acc: 0.8882

Epoch 22/55  
- 2s - loss: 0.2711 - acc: 0.9589 - val\_loss: 0.4870 - val\_acc: 0.8789

Epoch 23/55  
- 2s - loss: 0.2519 - acc: 0.9595 - val\_loss: 0.4988 - val\_acc: 0.8327

Epoch 24/55  
- 2s - loss: 0.2461 - acc: 0.9604 - val\_loss: 0.4447 - val\_acc: 0.8875

Epoch 25/55  
- 2s - loss: 0.2879 - acc: 0.9513 - val\_loss: 0.5453 - val\_acc: 0.8594

Epoch 26/55  
- 2s - loss: 0.2900 - acc: 0.9419 - val\_loss: 0.5774 - val\_acc: 0.8356

Epoch 27/55  
- 2s - loss: 0.2631 - acc: 0.9510 - val\_loss: 0.5451 - val\_acc: 0.8558

Epoch 28/55  
- 2s - loss: 0.2833 - acc: 0.9510 - val\_loss: 0.5554 - val\_acc: 0.8147

Epoch 29/55  
- 2s - loss: 0.2579 - acc: 0.9592 - val\_loss: 0.4405 - val\_acc: 0.8882

Epoch 30/55  
- 2s - loss: 0.2638 - acc: 0.9549 - val\_loss: 0.5211 - val\_acc: 0.8464

Epoch 31/55  
- 2s - loss: 0.2626 - acc: 0.9574 - val\_loss: 0.5684 - val\_acc: 0.8349

Epoch 32/55  
- 2s - loss: 0.2541 - acc: 0.9559 - val\_loss: 0.4862 - val\_acc: 0.8609

Epoch 33/55  
- 2s - loss: 0.2841 - acc: 0.9519 - val\_loss: 0.5745 - val\_acc: 0.8565

Epoch 34/55  
- 2s - loss: 0.2451 - acc: 0.9571 - val\_loss: 0.4676 - val\_acc: 0.8818

Epoch 35/55  
- 2s - loss: 0.2505 - acc: 0.9592 - val\_loss: 0.5952 - val\_acc: 0.8529

Epoch 36/55  
- 2s - loss: 0.2515 - acc: 0.9568 - val\_loss: 0.7347 - val\_acc: 0.7714

Epoch 37/55  
- 2s - loss: 0.2508 - acc: 0.9553 - val\_loss: 0.6065 - val\_acc: 0.7931

Epoch 38/55  
- 2s - loss: 0.2689 - acc: 0.9577 - val\_loss: 0.4935 - val\_acc: 0.8544

Epoch 39/55  
- 2s - loss: 0.2797 - acc: 0.9513 - val\_loss: 0.5644 - val\_acc: 0.8695

Epoch 40/55  
- 2s - loss: 0.2590 - acc: 0.9568 - val\_loss: 0.5554 - val\_acc: 0.8630

Epoch 41/55  
- 2s - loss: 0.2479 - acc: 0.9589 - val\_loss: 0.5949 - val\_acc: 0.8205

Epoch 42/55  
- 2s - loss: 0.2791 - acc: 0.9507 - val\_loss: 0.5851 - val\_acc: 0.8508

Epoch 43/55  
- 2s - loss: 0.2221 - acc: 0.9683 - val\_loss: 0.5097 - val\_acc: 0.8551



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Epoch 44/55
  - 2s - loss: 0.2587 - acc: 0.9556 - val_loss: 0.5335 - val_acc: 0.8097
Epoch 45/55
  - 2s - loss: 0.2631 - acc: 0.9501 - val_loss: 0.4630 - val_acc: 0.9012
Epoch 46/55
  - 2s - loss: 0.2632 - acc: 0.9546 - val_loss: 1.1790 - val_acc: 0.6013
Epoch 47/55
  - 2s - loss: 0.2602 - acc: 0.9574 - val_loss: 0.8425 - val_acc: 0.7678
Epoch 48/55
  - 2s - loss: 0.2681 - acc: 0.9543 - val_loss: 0.5152 - val_acc: 0.8681
Epoch 49/55
  - 2s - loss: 0.2396 - acc: 0.9647 - val_loss: 0.5595 - val_acc: 0.8435
Epoch 50/55
  - 2s - loss: 0.3118 - acc: 0.9431 - val_loss: 0.5410 - val_acc: 0.8472
Epoch 51/55
  - 2s - loss: 0.2242 - acc: 0.9662 - val_loss: 0.3938 - val_acc: 0.9099
Epoch 52/55
  - 2s - loss: 0.2492 - acc: 0.9586 - val_loss: 0.4097 - val_acc: 0.8976
Epoch 53/55
  - 2s - loss: 0.2464 - acc: 0.9586 - val_loss: 0.3959 - val_acc: 0.8983
Epoch 54/55
  - 2s - loss: 0.2529 - acc: 0.9580 - val_loss: 0.6173 - val_acc: 0.8861
Epoch 55/55
  - 2s - loss: 0.2475 - acc: 0.9577 - val_loss: 0.6052 - val_acc: 0.8565
Train accuracy 0.95220700152207 Test accuracy: 0.8565248737854328

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 118, 32)	5152
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 39, 32)	0
flatten_1 (Flatten)	(None, 1248)	0
dense_1 (Dense)	(None, 16)	19984
dense_2 (Dense)	(None, 3)	51

```

Total params: 27,235
Trainable params: 27,235
Non-trainable params: 0

```

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 44.5745 - acc: 0.4469 - val\_loss: 5.9368 - val\_acc: 0.4859

Epoch 2/35

- 2s - loss: 2.3378 - acc: 0.6180 - val\_loss: 1.1436 - val\_acc: 0.6460

Epoch 3/35

- 2s - loss: 0.8321 - acc: 0.7495 - val\_loss: 0.8675 - val\_acc: 0.7693

Epoch 4/35

- 2s - loss: 0.6828 - acc: 0.8222 - val\_loss: 0.8743 - val\_acc: 0.6965

Epoch 5/35

- 2s - loss: 0.6380 - acc: 0.8417 - val\_loss: 0.7682 - val\_acc: 0.7837

Epoch 6/35

- 2s - loss: 0.5675 - acc: 0.8855 - val\_loss: 0.7538 - val\_acc: 0.8161

Epoch 7/35

- 2s - loss: 0.5242 - acc: 0.9081 - val\_loss: 0.6852 - val\_acc: 0.8313

Epoch 8/35

- 2s - loss: 0.4746 - acc: 0.9269 - val\_loss: 0.6533 - val\_acc: 0.8572

Epoch 9/35

- 2s - loss: 0.4276 - acc: 0.9458 - val\_loss: 0.6063 - val\_acc: 0.8926

Epoch 10/35

- 2s - loss: 0.3752 - acc: 0.9653 - val\_loss: 0.5708 - val\_acc: 0.9056

Epoch 11/35

- 2s - loss: 0.3278 - acc: 0.9793 - val\_loss: 0.5030 - val\_acc: 0.9474

Epoch 12/35

- 2s - loss: 0.3440 - acc: 0.9635 - val\_loss: 0.4776 - val\_acc: 0.9366

Epoch 13/35

- 2s - loss: 0.2837 - acc: 0.9833 - val\_loss: 0.5417 - val\_acc: 0.8955

Epoch 14/35

- 2s - loss: 0.2337 - acc: 0.9945 - val\_loss: 0.4183 - val\_acc: 0.9445

Epoch 15/35

- 2s - loss: 0.2400 - acc: 0.9823 - val\_loss: 0.4288 - val\_acc: 0.9229

Epoch 16/35

- 2s - loss: 0.2319 - acc: 0.9845 - val\_loss: 0.4064 - val\_acc: 0.9474

Epoch 17/35

- 2s - loss: 0.2153 - acc: 0.9872 - val\_loss: 0.3881 - val\_acc: 0.9337

Epoch 18/35

- 2s - loss: 0.2175 - acc: 0.9845 - val\_loss: 0.3497 - val\_acc: 0.9488

Epoch 19/35

- 2s - loss: 0.2311 - acc: 0.9793 - val\_loss: 0.5765 - val\_acc: 0.8731

Epoch 20/35

- 2s - loss: 0.2205 - acc: 0.9845 - val\_loss: 0.3430 - val\_acc: 0.9358

Epoch 21/35

- 2s - loss: 0.1913 - acc: 0.9860 - val\_loss: 0.3446 - val\_acc: 0.9445

Epoch 22/35

- 2s - loss: 0.1711 - acc: 0.9918 - val\_loss: 0.4034 - val\_acc: 0.9077

Epoch 23/35

- 2s - loss: 0.1662 - acc: 0.9915 - val\_loss: 0.3260 - val\_acc: 0.9495

Epoch 24/35

```

- 2s - loss: 0.1540 - acc: 0.9927 - val_loss: 0.2976 - val_acc: 0.9546
Epoch 25/35
- 2s - loss: 0.1529 - acc: 0.9918 - val_loss: 0.3278 - val_acc: 0.9466
Epoch 26/35
- 2s - loss: 0.1861 - acc: 0.9836 - val_loss: 0.4289 - val_acc: 0.8529
Epoch 27/35
- 2s - loss: 0.1603 - acc: 0.9906 - val_loss: 0.2515 - val_acc: 0.9776
Epoch 28/35
- 2s - loss: 0.1641 - acc: 0.9893 - val_loss: 0.3070 - val_acc: 0.9272
Epoch 29/35
- 2s - loss: 0.1283 - acc: 0.9970 - val_loss: 0.2490 - val_acc: 0.9654
Epoch 30/35
- 2s - loss: 0.1317 - acc: 0.9936 - val_loss: 0.2474 - val_acc: 0.9611
Epoch 31/35
- 2s - loss: 0.2225 - acc: 0.9744 - val_loss: 0.3883 - val_acc: 0.9387
Epoch 32/35
- 2s - loss: 0.2265 - acc: 0.9726 - val_loss: 0.3649 - val_acc: 0.9120
Epoch 33/35
- 2s - loss: 0.1340 - acc: 0.9948 - val_loss: 0.2802 - val_acc: 0.9366
Epoch 34/35
- 2s - loss: 0.1258 - acc: 0.9954 - val_loss: 0.2930 - val_acc: 0.9243
Epoch 35/35
- 2s - loss: 0.1464 - acc: 0.9854 - val_loss: 0.4581 - val_acc: 0.8825
Train accuracy 0.9780821917808219 Test accuracy: 0.882480173035328

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
flatten_1 (Flatten)	(None, 1216)	0
dense_1 (Dense)	(None, 32)	38944
dense_2 (Dense)	(None, 3)	99

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```

Total params: 48,291
Trainable params: 48,291
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples

```

Epoch 1/55  
- 3s - loss: 22.2866 - acc: 0.6737 - val\_loss: 2.5636 - val\_acc: 0.8111  
Epoch 2/55  
- 2s - loss: 1.0101 - acc: 0.9677 - val\_loss: 0.6582 - val\_acc: 0.9661  
Epoch 3/55  
- 2s - loss: 0.3418 - acc: 0.9890 - val\_loss: 0.4287 - val\_acc: 0.9495  
Epoch 4/55  
- 2s - loss: 0.2181 - acc: 0.9918 - val\_loss: 0.3490 - val\_acc: 0.9560  
Epoch 5/55  
- 2s - loss: 0.2198 - acc: 0.9802 - val\_loss: 0.3152 - val\_acc: 0.9539  
Epoch 6/55  
- 2s - loss: 0.1422 - acc: 0.9976 - val\_loss: 0.2934 - val\_acc: 0.9625  
Epoch 7/55  
- 2s - loss: 0.1405 - acc: 0.9924 - val\_loss: 0.3245 - val\_acc: 0.9128  
Epoch 8/55  
- 2s - loss: 0.2099 - acc: 0.9720 - val\_loss: 0.5047 - val\_acc: 0.8601  
Epoch 9/55  
- 2s - loss: 0.1453 - acc: 0.9909 - val\_loss: 0.2559 - val\_acc: 0.9510  
Epoch 10/55  
- 2s - loss: 0.1049 - acc: 0.9982 - val\_loss: 0.2597 - val\_acc: 0.9474  
Epoch 11/55  
- 2s - loss: 0.3044 - acc: 0.9601 - val\_loss: 0.4004 - val\_acc: 0.9452  
Epoch 12/55  
- 2s - loss: 0.1589 - acc: 0.9936 - val\_loss: 0.2284 - val\_acc: 0.9647  
Epoch 13/55  
- 2s - loss: 0.0974 - acc: 0.9985 - val\_loss: 0.2157 - val\_acc: 0.9704  
Epoch 14/55  
- 2s - loss: 0.0853 - acc: 0.9994 - val\_loss: 0.2105 - val\_acc: 0.9625  
Epoch 15/55  
- 2s - loss: 0.0912 - acc: 0.9957 - val\_loss: 0.1911 - val\_acc: 0.9784  
Epoch 16/55  
- 2s - loss: 0.0897 - acc: 0.9957 - val\_loss: 0.1854 - val\_acc: 0.9748  
Epoch 17/55  
- 2s - loss: 0.1282 - acc: 0.9866 - val\_loss: 0.1954 - val\_acc: 0.9582  
Epoch 18/55  
- 2s - loss: 0.0845 - acc: 0.9957 - val\_loss: 0.2238 - val\_acc: 0.9488  
Epoch 19/55  
- 2s - loss: 0.0842 - acc: 0.9954 - val\_loss: 0.2174 - val\_acc: 0.9495  
Epoch 20/55  
- 2s - loss: 0.0802 - acc: 0.9970 - val\_loss: 0.1724 - val\_acc: 0.9755  
Epoch 21/55  
- 2s - loss: 0.0785 - acc: 0.9951 - val\_loss: 0.3165 - val\_acc: 0.9337  
Epoch 22/55  
- 2s - loss: 0.1093 - acc: 0.9906 - val\_loss: 0.3111 - val\_acc: 0.8991  
Epoch 23/55  
- 2s - loss: 0.0845 - acc: 0.9954 - val\_loss: 0.1653 - val\_acc: 0.9748  
Epoch 24/55  
- 2s - loss: 0.1352 - acc: 0.9814 - val\_loss: 0.2242 - val\_acc: 0.9603

Epoch 25/55  
- 2s - loss: 0.1011 - acc: 0.9912 - val\_loss: 0.1757 - val\_acc: 0.9726  
Epoch 26/55  
- 2s - loss: 0.0672 - acc: 0.9973 - val\_loss: 0.2114 - val\_acc: 0.9589  
Epoch 27/55  
- 2s - loss: 0.0607 - acc: 0.9997 - val\_loss: 0.2289 - val\_acc: 0.9546  
Epoch 28/55  
- 2s - loss: 0.0676 - acc: 0.9973 - val\_loss: 0.1734 - val\_acc: 0.9704  
Epoch 29/55  
- 2s - loss: 0.0655 - acc: 0.9976 - val\_loss: 0.2064 - val\_acc: 0.9567  
Epoch 30/55  
- 2s - loss: 0.0619 - acc: 0.9973 - val\_loss: 0.1880 - val\_acc: 0.9560  
Epoch 31/55  
- 2s - loss: 0.0618 - acc: 0.9967 - val\_loss: 0.1844 - val\_acc: 0.9582  
Epoch 32/55  
- 2s - loss: 0.1743 - acc: 0.9714 - val\_loss: 0.2179 - val\_acc: 0.9704  
Epoch 33/55  
- 2s - loss: 0.1020 - acc: 0.9936 - val\_loss: 0.1873 - val\_acc: 0.9704  
Epoch 34/55  
- 2s - loss: 0.0618 - acc: 0.9985 - val\_loss: 0.1676 - val\_acc: 0.9726  
Epoch 35/55  
- 2s - loss: 0.0602 - acc: 0.9979 - val\_loss: 0.1672 - val\_acc: 0.9690  
Epoch 36/55  
- 2s - loss: 0.0519 - acc: 0.9991 - val\_loss: 0.1864 - val\_acc: 0.9704  
Epoch 37/55  
- 2s - loss: 0.0735 - acc: 0.9933 - val\_loss: 0.2079 - val\_acc: 0.9459  
Epoch 38/55  
- 2s - loss: 0.1666 - acc: 0.9790 - val\_loss: 0.2110 - val\_acc: 0.9632  
Epoch 39/55  
- 2s - loss: 0.0647 - acc: 0.9973 - val\_loss: 0.1628 - val\_acc: 0.9726  
Epoch 40/55  
- 2s - loss: 0.0517 - acc: 0.9997 - val\_loss: 0.1671 - val\_acc: 0.9733  
Epoch 41/55  
- 2s - loss: 0.0476 - acc: 1.0000 - val\_loss: 0.1654 - val\_acc: 0.9740  
Epoch 42/55  
- 2s - loss: 0.0653 - acc: 0.9963 - val\_loss: 0.1780 - val\_acc: 0.9603  
Epoch 43/55  
- 2s - loss: 0.0574 - acc: 0.9991 - val\_loss: 0.1573 - val\_acc: 0.9755  
Epoch 44/55  
- 2s - loss: 0.0475 - acc: 0.9991 - val\_loss: 0.2206 - val\_acc: 0.9495  
Epoch 45/55  
- 2s - loss: 0.0499 - acc: 0.9979 - val\_loss: 0.1880 - val\_acc: 0.9719  
Epoch 46/55  
- 2s - loss: 0.0889 - acc: 0.9884 - val\_loss: 0.4190 - val\_acc: 0.8738  
Epoch 47/55  
- 2s - loss: 0.0738 - acc: 0.9939 - val\_loss: 0.3316 - val\_acc: 0.9546  
Epoch 48/55  
- 2s - loss: 0.0768 - acc: 0.9939 - val\_loss: 0.1829 - val\_acc: 0.9546

```

Epoch 49/55
- 2s - loss: 0.0905 - acc: 0.9906 - val_loss: 0.3455 - val_acc: 0.9452
Epoch 50/55
- 2s - loss: 0.0835 - acc: 0.9939 - val_loss: 0.1262 - val_acc: 0.9827
Epoch 51/55
- 2s - loss: 0.0749 - acc: 0.9945 - val_loss: 0.2146 - val_acc: 0.9640
Epoch 52/55
- 2s - loss: 0.0577 - acc: 0.9973 - val_loss: 0.1836 - val_acc: 0.9733
Epoch 53/55
- 2s - loss: 0.0520 - acc: 0.9973 - val_loss: 0.1966 - val_acc: 0.9776
Epoch 54/55
- 2s - loss: 0.0459 - acc: 0.9994 - val_loss: 0.1592 - val_acc: 0.9805
Epoch 55/55
- 2s - loss: 0.0413 - acc: 0.9994 - val_loss: 0.1589 - val_acc: 0.9776
Train accuracy 1.0 Test accuracy: 0.9776496034607065

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 28)	1792
conv1d_2 (Conv1D)	(None, 116, 32)	6304
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
flatten_1 (Flatten)	(None, 1216)	0
dense_1 (Dense)	(None, 32)	38944
dense_2 (Dense)	(None, 3)	99

---

```

Total params: 47,139
Trainable params: 47,139
Non-trainable params: 0

```

---

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 34.2356 - acc: 0.6600 - val_loss: 6.4293 - val_acc: 0.8933
Epoch 2/35
- 1s - loss: 2.4324 - acc: 0.9638 - val_loss: 1.0693 - val_acc: 0.9120
Epoch 3/35
- 1s - loss: 0.5105 - acc: 0.9787 - val_loss: 0.5480 - val_acc: 0.9503
Epoch 4/35
- 1s - loss: 0.3032 - acc: 0.9817 - val_loss: 0.4452 - val_acc: 0.9488
Epoch 5/35

```

- 1s - loss: 0.2639 - acc: 0.9787 - val\_loss: 0.4190 - val\_acc: 0.9430  
Epoch 6/35  
- 1s - loss: 0.2202 - acc: 0.9860 - val\_loss: 0.4531 - val\_acc: 0.9056  
Epoch 7/35  
- 1s - loss: 0.1943 - acc: 0.9900 - val\_loss: 0.3805 - val\_acc: 0.9193  
Epoch 8/35  
- 1s - loss: 0.1957 - acc: 0.9851 - val\_loss: 0.3856 - val\_acc: 0.9322  
Epoch 9/35  
- 1s - loss: 0.1780 - acc: 0.9863 - val\_loss: 0.4134 - val\_acc: 0.9005  
Epoch 10/35  
- 1s - loss: 0.1874 - acc: 0.9814 - val\_loss: 0.5280 - val\_acc: 0.8846  
Epoch 11/35  
- 1s - loss: 0.1818 - acc: 0.9854 - val\_loss: 0.3168 - val\_acc: 0.9366  
Epoch 12/35  
- 1s - loss: 0.1818 - acc: 0.9848 - val\_loss: 0.3568 - val\_acc: 0.9445  
Epoch 13/35  
- 1s - loss: 0.1485 - acc: 0.9924 - val\_loss: 0.3397 - val\_acc: 0.9438  
Epoch 14/35  
- 1s - loss: 0.1303 - acc: 0.9939 - val\_loss: 0.3326 - val\_acc: 0.9315  
Epoch 15/35  
- 1s - loss: 0.1747 - acc: 0.9833 - val\_loss: 0.3255 - val\_acc: 0.9293  
Epoch 16/35  
- 1s - loss: 0.1310 - acc: 0.9945 - val\_loss: 0.3146 - val\_acc: 0.9200  
Epoch 17/35  
- 1s - loss: 0.1429 - acc: 0.9872 - val\_loss: 0.2779 - val\_acc: 0.9503  
Epoch 18/35  
- 1s - loss: 0.1056 - acc: 0.9985 - val\_loss: 0.3453 - val\_acc: 0.9019  
Epoch 19/35  
- 1s - loss: 0.1366 - acc: 0.9875 - val\_loss: 0.4263 - val\_acc: 0.9056  
Epoch 20/35  
- 1s - loss: 0.2136 - acc: 0.9705 - val\_loss: 0.2914 - val\_acc: 0.9553  
Epoch 21/35  
- 1s - loss: 0.1126 - acc: 0.9945 - val\_loss: 0.2975 - val\_acc: 0.9430  
Epoch 22/35  
- 1s - loss: 0.1088 - acc: 0.9960 - val\_loss: 0.2981 - val\_acc: 0.9373  
Epoch 23/35  
- 1s - loss: 0.1180 - acc: 0.9890 - val\_loss: 0.3526 - val\_acc: 0.9027  
Epoch 24/35  
- 1s - loss: 0.1664 - acc: 0.9799 - val\_loss: 0.2930 - val\_acc: 0.9402  
Epoch 25/35  
- 1s - loss: 0.0999 - acc: 0.9960 - val\_loss: 0.3478 - val\_acc: 0.9149  
Epoch 26/35  
- 1s - loss: 0.1048 - acc: 0.9930 - val\_loss: 0.2964 - val\_acc: 0.9481  
Epoch 27/35  
- 1s - loss: 0.1070 - acc: 0.9921 - val\_loss: 0.5227 - val\_acc: 0.8991  
Epoch 28/35  
- 1s - loss: 0.1140 - acc: 0.9924 - val\_loss: 0.3315 - val\_acc: 0.9185  
Epoch 29/35

```

- 1s - loss: 0.1167 - acc: 0.9884 - val_loss: 0.3498 - val_acc: 0.9056
Epoch 30/35
- 1s - loss: 0.1742 - acc: 0.9808 - val_loss: 0.3266 - val_acc: 0.9164
Epoch 31/35
- 1s - loss: 0.0914 - acc: 0.9973 - val_loss: 0.2560 - val_acc: 0.9640
Epoch 32/35
- 1s - loss: 0.0896 - acc: 0.9954 - val_loss: 0.2281 - val_acc: 0.9560
Epoch 33/35
- 1s - loss: 0.0855 - acc: 0.9963 - val_loss: 0.3827 - val_acc: 0.8947
Epoch 34/35
- 1s - loss: 0.0960 - acc: 0.9921 - val_loss: 0.2713 - val_acc: 0.9423
Epoch 35/35
- 1s - loss: 0.1830 - acc: 0.9702 - val_loss: 0.7350 - val_acc: 0.8580
Train accuracy 0.8885844749947117 Test accuracy: 0.8579668348954578
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 120, 16)	3600
dropout_1 (Dropout)	(None, 120, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 16)	0
flatten_1 (Flatten)	(None, 640)	0
dense_1 (Dense)	(None, 64)	41024
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 45,715
Trainable params: 45,715
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 3s - loss: 131.3500 - acc: 0.6137 - val_loss: 77.0016 - val_acc: 0.8385
Epoch 2/35
- 2s - loss: 50.0564 - acc: 0.9123 - val_loss: 30.1199 - val_acc: 0.8688
Epoch 3/35
- 2s - loss: 19.1553 - acc: 0.9416 - val_loss: 11.2891 - val_acc: 0.9265
Epoch 4/35
- 2s - loss: 6.9244 - acc: 0.9571 - val_loss: 4.1284 - val_acc: 0.9229
Epoch 5/35
- 2s - loss: 2.4509 - acc: 0.9650 - val_loss: 1.6827 - val_acc: 0.8897

```



Epoch 6/35  
- 2s - loss: 0.9956 - acc: 0.9626 - val\_loss: 0.9481 - val\_acc: 0.8681

Epoch 7/35  
- 2s - loss: 0.5852 - acc: 0.9607 - val\_loss: 0.6829 - val\_acc: 0.9257

Epoch 8/35  
- 2s - loss: 0.4323 - acc: 0.9677 - val\_loss: 0.6058 - val\_acc: 0.9221

Epoch 9/35  
- 2s - loss: 0.3907 - acc: 0.9641 - val\_loss: 0.5755 - val\_acc: 0.9156

Epoch 10/35  
- 2s - loss: 0.3385 - acc: 0.9778 - val\_loss: 0.5836 - val\_acc: 0.8882

Epoch 11/35  
- 2s - loss: 0.3359 - acc: 0.9650 - val\_loss: 0.4965 - val\_acc: 0.9293

Epoch 12/35  
- 2s - loss: 0.3401 - acc: 0.9659 - val\_loss: 0.4919 - val\_acc: 0.9250

Epoch 13/35  
- 2s - loss: 0.2967 - acc: 0.9720 - val\_loss: 0.4843 - val\_acc: 0.9236

Epoch 14/35  
- 2s - loss: 0.2690 - acc: 0.9808 - val\_loss: 0.4428 - val\_acc: 0.9466

Epoch 15/35  
- 2s - loss: 0.2658 - acc: 0.9805 - val\_loss: 0.4239 - val\_acc: 0.9524

Epoch 16/35  
- 2s - loss: 0.2444 - acc: 0.9863 - val\_loss: 0.4731 - val\_acc: 0.8983

Epoch 17/35  
- 2s - loss: 0.2522 - acc: 0.9760 - val\_loss: 0.4055 - val\_acc: 0.9524

Epoch 18/35  
- 2s - loss: 0.2354 - acc: 0.9836 - val\_loss: 0.3891 - val\_acc: 0.9546

Epoch 19/35  
- 2s - loss: 0.2301 - acc: 0.9839 - val\_loss: 0.4395 - val\_acc: 0.9019

Epoch 20/35  
- 2s - loss: 0.2443 - acc: 0.9760 - val\_loss: 0.5381 - val\_acc: 0.8529

Epoch 21/35  
- 2s - loss: 0.2094 - acc: 0.9884 - val\_loss: 0.4257 - val\_acc: 0.9229

Epoch 22/35  
- 2s - loss: 0.2163 - acc: 0.9833 - val\_loss: 0.5198 - val\_acc: 0.8479

Epoch 23/35  
- 2s - loss: 0.2125 - acc: 0.9839 - val\_loss: 0.3358 - val\_acc: 0.9575

Epoch 24/35  
- 2s - loss: 0.2109 - acc: 0.9808 - val\_loss: 0.3335 - val\_acc: 0.9510

Epoch 25/35  
- 2s - loss: 0.1907 - acc: 0.9863 - val\_loss: 0.4009 - val\_acc: 0.9113

Epoch 26/35  
- 2s - loss: 0.2200 - acc: 0.9802 - val\_loss: 0.3496 - val\_acc: 0.9286

Epoch 27/35  
- 2s - loss: 0.1880 - acc: 0.9860 - val\_loss: 0.3364 - val\_acc: 0.9445

Epoch 28/35  
- 2s - loss: 0.1910 - acc: 0.9811 - val\_loss: 0.3602 - val\_acc: 0.9366

Epoch 29/35  
- 2s - loss: 0.1828 - acc: 0.9884 - val\_loss: 0.3715 - val\_acc: 0.9301

Epoch 30/35  
 - 2s - loss: 0.1743 - acc: 0.9884 - val\_loss: 0.3609 - val\_acc: 0.9322  
 Epoch 31/35  
 - 2s - loss: 0.2023 - acc: 0.9817 - val\_loss: 0.2870 - val\_acc: 0.9560  
 Epoch 32/35  
 - 2s - loss: 0.2051 - acc: 0.9817 - val\_loss: 0.3014 - val\_acc: 0.9481  
 Epoch 33/35  
 - 2s - loss: 0.1590 - acc: 0.9903 - val\_loss: 0.3336 - val\_acc: 0.9387  
 Epoch 34/35  
 - 2s - loss: 0.1515 - acc: 0.9921 - val\_loss: 0.2981 - val\_acc: 0.9373  
 Epoch 35/35  
 - 2s - loss: 0.1675 - acc: 0.9857 - val\_loss: 0.2966 - val\_acc: 0.9495  
 Train accuracy 0.9969558599695586 Test accuracy: 0.9495313626532084

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 42)	2688
-----		
conv1d_2 (Conv1D)	(None, 116, 32)	9440
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 38, 32)	0
-----		
flatten_1 (Flatten)	(None, 1216)	0
-----		
dense_1 (Dense)	(None, 32)	38944
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 51,171  
 Trainable params: 51,171  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/55  
 - 3s - loss: 12.7213 - acc: 0.8040 - val\_loss: 0.7684 - val\_acc: 0.7851  
 Epoch 2/55  
 - 2s - loss: 0.4069 - acc: 0.9422 - val\_loss: 0.5022 - val\_acc: 0.9171  
 Epoch 3/55  
 - 2s - loss: 0.3085 - acc: 0.9635 - val\_loss: 0.5673 - val\_acc: 0.8623  
 Epoch 4/55  
 - 2s - loss: 0.2896 - acc: 0.9641 - val\_loss: 0.4374 - val\_acc: 0.9178  
 Epoch 5/55  
 - 2s - loss: 0.3032 - acc: 0.9607 - val\_loss: 0.5231 - val\_acc: 0.8904  
 Epoch 6/55

- 2s - loss: 0.2469 - acc: 0.9677 - val\_loss: 0.3854 - val\_acc: 0.9380  
 Epoch 7/55  
 - 2s - loss: 0.2470 - acc: 0.9708 - val\_loss: 0.4439 - val\_acc: 0.8919  
 Epoch 8/55  
 - 2s - loss: 0.2073 - acc: 0.9769 - val\_loss: 0.4602 - val\_acc: 0.9156  
 Epoch 9/55  
 - 2s - loss: 0.1978 - acc: 0.9772 - val\_loss: 0.4686 - val\_acc: 0.8969  
 Epoch 10/55  
 - 2s - loss: 0.2349 - acc: 0.9714 - val\_loss: 0.3687 - val\_acc: 0.9193  
 Epoch 11/55  
 - 2s - loss: 0.2504 - acc: 0.9635 - val\_loss: 0.5966 - val\_acc: 0.8767  
 Epoch 12/55  
 - 2s - loss: 0.1918 - acc: 0.9842 - val\_loss: 0.4016 - val\_acc: 0.9265  
 Epoch 13/55  
 - 2s - loss: 0.1966 - acc: 0.9766 - val\_loss: 0.4027 - val\_acc: 0.9092  
 Epoch 14/55  
 - 2s - loss: 0.2365 - acc: 0.9665 - val\_loss: 0.6304 - val\_acc: 0.8536  
 Epoch 15/55  
 - 2s - loss: 0.1963 - acc: 0.9823 - val\_loss: 0.3002 - val\_acc: 0.9301  
 Epoch 16/55  
 - 2s - loss: 0.1773 - acc: 0.9802 - val\_loss: 0.3484 - val\_acc: 0.9279  
 Epoch 17/55  
 - 2s - loss: 0.2345 - acc: 0.9686 - val\_loss: 0.3616 - val\_acc: 0.9402  
 Epoch 18/55  
 - 2s - loss: 0.1525 - acc: 0.9884 - val\_loss: 0.3164 - val\_acc: 0.9366  
 Epoch 19/55  
 - 2s - loss: 0.1681 - acc: 0.9817 - val\_loss: 0.5513 - val\_acc: 0.8472  
 Epoch 20/55  
 - 2s - loss: 0.2300 - acc: 0.9686 - val\_loss: 0.3968 - val\_acc: 0.9135  
 Epoch 21/55  
 - 2s - loss: 0.1709 - acc: 0.9793 - val\_loss: 0.4950 - val\_acc: 0.8810  
 Epoch 22/55  
 - 2s - loss: 0.1684 - acc: 0.9808 - val\_loss: 0.4034 - val\_acc: 0.8875  
 Epoch 23/55  
 - 2s - loss: 0.2030 - acc: 0.9723 - val\_loss: 0.3229 - val\_acc: 0.9366  
 Epoch 24/55  
 - 2s - loss: 0.1829 - acc: 0.9796 - val\_loss: 0.4640 - val\_acc: 0.9041  
 Epoch 25/55  
 - 2s - loss: 0.2014 - acc: 0.9738 - val\_loss: 0.5489 - val\_acc: 0.8767  
 Epoch 26/55  
 - 2s - loss: 0.1547 - acc: 0.9878 - val\_loss: 0.3786 - val\_acc: 0.9092  
 Epoch 27/55  
 - 2s - loss: 0.1998 - acc: 0.9708 - val\_loss: 0.4362 - val\_acc: 0.8947  
 Epoch 28/55  
 - 2s - loss: 0.2237 - acc: 0.9686 - val\_loss: 0.6271 - val\_acc: 0.8378  
 Epoch 29/55  
 - 2s - loss: 0.1547 - acc: 0.9881 - val\_loss: 0.3367 - val\_acc: 0.9185  
 Epoch 30/55

- 2s - loss: 0.1792 - acc: 0.9753 - val\_loss: 0.4615 - val\_acc: 0.9113  
 Epoch 31/55  
 - 2s - loss: 0.1787 - acc: 0.9796 - val\_loss: 0.4040 - val\_acc: 0.8940  
 Epoch 32/55  
 - 2s - loss: 0.1875 - acc: 0.9775 - val\_loss: 0.4023 - val\_acc: 0.9019  
 Epoch 33/55  
 - 2s - loss: 0.1777 - acc: 0.9802 - val\_loss: 0.3382 - val\_acc: 0.9257  
 Epoch 34/55  
 - 2s - loss: 0.1976 - acc: 0.9708 - val\_loss: 0.4286 - val\_acc: 0.8962  
 Epoch 35/55  
 - 2s - loss: 0.1677 - acc: 0.9802 - val\_loss: 0.6987 - val\_acc: 0.8212  
 Epoch 36/55  
 - 2s - loss: 0.2142 - acc: 0.9747 - val\_loss: 0.4448 - val\_acc: 0.9019  
 Epoch 37/55  
 - 2s - loss: 0.1861 - acc: 0.9790 - val\_loss: 0.3354 - val\_acc: 0.9308  
 Epoch 38/55  
 - 2s - loss: 0.1600 - acc: 0.9836 - val\_loss: 0.3623 - val\_acc: 0.9048  
 Epoch 39/55  
 - 2s - loss: 0.1405 - acc: 0.9836 - val\_loss: 0.3163 - val\_acc: 0.9214  
 Epoch 40/55  
 - 2s - loss: 0.1764 - acc: 0.9805 - val\_loss: 0.3097 - val\_acc: 0.9142  
 Epoch 41/55  
 - 2s - loss: 0.1963 - acc: 0.9689 - val\_loss: 0.4408 - val\_acc: 0.9149  
 Epoch 42/55  
 - 2s - loss: 0.1643 - acc: 0.9836 - val\_loss: 0.4159 - val\_acc: 0.8897  
 Epoch 43/55  
 - 2s - loss: 0.1840 - acc: 0.9756 - val\_loss: 0.2473 - val\_acc: 0.9567  
 Epoch 44/55  
 - 2s - loss: 0.2243 - acc: 0.9686 - val\_loss: 0.3618 - val\_acc: 0.9293  
 Epoch 45/55  
 - 2s - loss: 0.1461 - acc: 0.9830 - val\_loss: 0.3451 - val\_acc: 0.9366  
 Epoch 46/55  
 - 2s - loss: 0.1809 - acc: 0.9763 - val\_loss: 0.3364 - val\_acc: 0.9200  
 Epoch 47/55  
 - 2s - loss: 0.1531 - acc: 0.9793 - val\_loss: 0.6266 - val\_acc: 0.8371  
 Epoch 48/55  
 - 2s - loss: 0.1827 - acc: 0.9750 - val\_loss: 0.7392 - val\_acc: 0.8140  
 Epoch 49/55  
 - 2s - loss: 0.2107 - acc: 0.9723 - val\_loss: 0.4020 - val\_acc: 0.9019  
 Epoch 50/55  
 - 2s - loss: 0.1278 - acc: 0.9903 - val\_loss: 0.2453 - val\_acc: 0.9495  
 Epoch 51/55  
 - 2s - loss: 0.1341 - acc: 0.9826 - val\_loss: 0.2853 - val\_acc: 0.9380  
 Epoch 52/55  
 - 2s - loss: 0.1868 - acc: 0.9744 - val\_loss: 0.6705 - val\_acc: 0.8270  
 Epoch 53/55  
 - 2s - loss: 0.1649 - acc: 0.9811 - val\_loss: 0.3825 - val\_acc: 0.9106  
 Epoch 54/55

- 2s - loss: 0.2339 - acc: 0.9619 - val\_loss: 0.4136 - val\_acc: 0.9243  
Epoch 55/55  
- 2s - loss: 0.1484 - acc: 0.9860 - val\_loss: 0.5168 - val\_acc: 0.8782  
Train accuracy 0.978386605783866 Test accuracy: 0.8781542898341744

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_2 (Conv1D)	(None, 120, 32)	5152
-----		
dropout_1 (Dropout)	(None, 120, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 40, 32)	0
-----		
flatten_1 (Flatten)	(None, 1280)	0
-----		
dense_1 (Dense)	(None, 32)	40992
-----		
dense_2 (Dense)	(None, 3)	99
=====		

Total params: 47,715  
Trainable params: 47,715  
Non-trainable params: 0

---

None  
Train on 3285 samples, validate on 1387 samples  
Epoch 1/55  
- 3s - loss: 29.8451 - acc: 0.5160 - val\_loss: 2.5604 - val\_acc: 0.5400  
Epoch 2/55  
- 2s - loss: 1.1999 - acc: 0.8033 - val\_loss: 0.8535 - val\_acc: 0.7729  
Epoch 3/55  
- 2s - loss: 0.5354 - acc: 0.9041 - val\_loss: 0.7134 - val\_acc: 0.7758  
Epoch 4/55  
- 2s - loss: 0.4273 - acc: 0.9239 - val\_loss: 0.6622 - val\_acc: 0.8140  
Epoch 5/55  
- 2s - loss: 0.4018 - acc: 0.9181 - val\_loss: 0.6994 - val\_acc: 0.7823  
Epoch 6/55  
- 2s - loss: 0.3862 - acc: 0.9269 - val\_loss: 0.5448 - val\_acc: 0.8919  
Epoch 7/55  
- 2s - loss: 0.3534 - acc: 0.9358 - val\_loss: 0.5720 - val\_acc: 0.8421  
Epoch 8/55  
- 2s - loss: 0.3191 - acc: 0.9458 - val\_loss: 0.6439 - val\_acc: 0.7924  
Epoch 9/55  
- 2s - loss: 0.3211 - acc: 0.9358 - val\_loss: 0.5222 - val\_acc: 0.8868  
Epoch 10/55  
- 2s - loss: 0.3035 - acc: 0.9495 - val\_loss: 0.6848 - val\_acc: 0.7967

Epoch 11/55  
- 2s - loss: 0.3166 - acc: 0.9394 - val\_loss: 0.5226 - val\_acc: 0.8738

Epoch 12/55  
- 2s - loss: 0.2606 - acc: 0.9623 - val\_loss: 0.5105 - val\_acc: 0.8709

Epoch 13/55  
- 2s - loss: 0.2746 - acc: 0.9537 - val\_loss: 0.6600 - val\_acc: 0.7952

Epoch 14/55  
- 2s - loss: 0.2801 - acc: 0.9504 - val\_loss: 0.5695 - val\_acc: 0.8529

Epoch 15/55  
- 2s - loss: 0.2260 - acc: 0.9732 - val\_loss: 0.5540 - val\_acc: 0.8623

Epoch 16/55  
- 2s - loss: 0.2329 - acc: 0.9699 - val\_loss: 0.5734 - val\_acc: 0.8414

Epoch 17/55  
- 2s - loss: 0.2624 - acc: 0.9556 - val\_loss: 0.5536 - val\_acc: 0.8717

Epoch 18/55  
- 2s - loss: 0.2363 - acc: 0.9638 - val\_loss: 0.5665 - val\_acc: 0.8623

Epoch 19/55  
- 2s - loss: 0.2062 - acc: 0.9744 - val\_loss: 0.5498 - val\_acc: 0.8637

Epoch 20/55  
- 2s - loss: 0.2226 - acc: 0.9696 - val\_loss: 0.4968 - val\_acc: 0.9142

Epoch 21/55  
- 2s - loss: 0.2033 - acc: 0.9750 - val\_loss: 0.5875 - val\_acc: 0.8760

Epoch 22/55  
- 2s - loss: 0.2378 - acc: 0.9604 - val\_loss: 0.6212 - val\_acc: 0.8717

Epoch 23/55  
- 2s - loss: 0.1882 - acc: 0.9823 - val\_loss: 0.4958 - val\_acc: 0.8947

Epoch 24/55  
- 2s - loss: 0.2186 - acc: 0.9674 - val\_loss: 0.5509 - val\_acc: 0.8515

Epoch 25/55  
- 2s - loss: 0.2579 - acc: 0.9516 - val\_loss: 0.5386 - val\_acc: 0.8738

Epoch 26/55  
- 2s - loss: 0.1881 - acc: 0.9769 - val\_loss: 0.4782 - val\_acc: 0.8940

Epoch 27/55  
- 2s - loss: 0.1740 - acc: 0.9802 - val\_loss: 0.4922 - val\_acc: 0.8998

Epoch 28/55  
- 2s - loss: 0.1727 - acc: 0.9805 - val\_loss: 0.6470 - val\_acc: 0.8125

Epoch 29/55  
- 2s - loss: 0.1776 - acc: 0.9784 - val\_loss: 0.5964 - val\_acc: 0.8637

Epoch 30/55  
- 2s - loss: 0.1833 - acc: 0.9753 - val\_loss: 0.6061 - val\_acc: 0.8198

Epoch 31/55  
- 2s - loss: 0.1833 - acc: 0.9763 - val\_loss: 0.5341 - val\_acc: 0.8969

Epoch 32/55  
- 2s - loss: 0.2125 - acc: 0.9671 - val\_loss: 0.5104 - val\_acc: 0.8854

Epoch 33/55  
- 2s - loss: 0.1875 - acc: 0.9699 - val\_loss: 0.7438 - val\_acc: 0.8414

Epoch 34/55  
- 2s - loss: 0.1796 - acc: 0.9775 - val\_loss: 0.5685 - val\_acc: 0.8587

```

Epoch 35/55
- 2s - loss: 0.1752 - acc: 0.9756 - val_loss: 0.5923 - val_acc: 0.8738
Epoch 36/55
- 2s - loss: 0.1613 - acc: 0.9833 - val_loss: 0.7117 - val_acc: 0.8147
Epoch 37/55
- 2s - loss: 0.1621 - acc: 0.9808 - val_loss: 0.4736 - val_acc: 0.8897
Epoch 38/55
- 2s - loss: 0.1401 - acc: 0.9866 - val_loss: 0.6608 - val_acc: 0.8385
Epoch 39/55
- 2s - loss: 0.1532 - acc: 0.9784 - val_loss: 0.5569 - val_acc: 0.8753
Epoch 40/55
- 2s - loss: 0.1834 - acc: 0.9741 - val_loss: 0.7243 - val_acc: 0.8587
Epoch 41/55
- 2s - loss: 0.2598 - acc: 0.9507 - val_loss: 0.8677 - val_acc: 0.7686
Epoch 42/55
- 2s - loss: 0.1991 - acc: 0.9714 - val_loss: 0.5431 - val_acc: 0.8839
Epoch 43/55
- 2s - loss: 0.1388 - acc: 0.9896 - val_loss: 0.5139 - val_acc: 0.8832
Epoch 44/55
- 2s - loss: 0.1464 - acc: 0.9833 - val_loss: 0.5411 - val_acc: 0.8940
Epoch 45/55
- 2s - loss: 0.1899 - acc: 0.9677 - val_loss: 0.6997 - val_acc: 0.8472
Epoch 46/55
- 2s - loss: 0.1626 - acc: 0.9805 - val_loss: 0.5224 - val_acc: 0.8947
Epoch 47/55
- 2s - loss: 0.1395 - acc: 0.9863 - val_loss: 0.4547 - val_acc: 0.8882
Epoch 48/55
- 2s - loss: 0.1592 - acc: 0.9808 - val_loss: 0.7803 - val_acc: 0.8025
Epoch 49/55
- 2s - loss: 0.1648 - acc: 0.9799 - val_loss: 0.4998 - val_acc: 0.8911
Epoch 50/55
- 2s - loss: 0.1715 - acc: 0.9766 - val_loss: 0.5779 - val_acc: 0.8630
Epoch 51/55
- 2s - loss: 0.1714 - acc: 0.9726 - val_loss: 0.5017 - val_acc: 0.8976
Epoch 52/55
- 2s - loss: 0.1859 - acc: 0.9702 - val_loss: 0.7117 - val_acc: 0.8536
Epoch 53/55
- 2s - loss: 0.1537 - acc: 0.9817 - val_loss: 0.7039 - val_acc: 0.8385
Epoch 54/55
- 2s - loss: 0.1972 - acc: 0.9647 - val_loss: 0.6440 - val_acc: 0.8544
Epoch 55/55
- 2s - loss: 0.1436 - acc: 0.9878 - val_loss: 0.5237 - val_acc: 0.8976
Train accuracy 0.997869101978691 Test accuracy: 0.8976207642393655

```

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-----
Layer (type)                Output Shape                Param #
=====
conv1d_1 (Conv1D)           (None, 122, 32)            2048

```

```

-----
conv1d_2 (Conv1D)                (None, 116, 32)                7200
-----
dropout_1 (Dropout)              (None, 116, 32)                0
-----
max_pooling1d_1 (MaxPooling1D)   (None, 38, 32)                0
-----
flatten_1 (Flatten)              (None, 1216)                   0
-----
dense_1 (Dense)                  (None, 16)                     19472
-----
dense_2 (Dense)                  (None, 3)                      51
=====
Total params: 28,771
Trainable params: 28,771
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 3s - loss: 26.0287 - acc: 0.5729 - val_loss: 2.8879 - val_acc: 0.6763
Epoch 2/55
  - 2s - loss: 1.2910 - acc: 0.8405 - val_loss: 0.9808 - val_acc: 0.8039
Epoch 3/55
  - 2s - loss: 0.5843 - acc: 0.9245 - val_loss: 0.6569 - val_acc: 0.9034
Epoch 4/55
  - 2s - loss: 0.3963 - acc: 0.9671 - val_loss: 0.6266 - val_acc: 0.8861
Epoch 5/55
  - 2s - loss: 0.2859 - acc: 0.9836 - val_loss: 0.4709 - val_acc: 0.9149
Epoch 6/55
  - 2s - loss: 0.2090 - acc: 0.9878 - val_loss: 0.3683 - val_acc: 0.9452
Epoch 7/55
  - 2s - loss: 0.1635 - acc: 0.9960 - val_loss: 0.4013 - val_acc: 0.8782
Epoch 8/55
  - 2s - loss: 0.1502 - acc: 0.9930 - val_loss: 0.3197 - val_acc: 0.9524
Epoch 9/55
  - 2s - loss: 0.1427 - acc: 0.9921 - val_loss: 0.3031 - val_acc: 0.9416
Epoch 10/55
  - 2s - loss: 0.1392 - acc: 0.9896 - val_loss: 0.3528 - val_acc: 0.9185
Epoch 11/55
  - 2s - loss: 0.1409 - acc: 0.9890 - val_loss: 0.2892 - val_acc: 0.9438
Epoch 12/55
  - 2s - loss: 0.1093 - acc: 0.9957 - val_loss: 0.3237 - val_acc: 0.9394
Epoch 13/55
  - 2s - loss: 0.1084 - acc: 0.9960 - val_loss: 0.2874 - val_acc: 0.9488
Epoch 14/55
  - 2s - loss: 0.0947 - acc: 0.9982 - val_loss: 0.2563 - val_acc: 0.9632
Epoch 15/55

```



- 2s - loss: 0.1263 - acc: 0.9903 - val\_loss: 0.2952 - val\_acc: 0.9380  
 Epoch 16/55  
 - 2s - loss: 0.1182 - acc: 0.9915 - val\_loss: 0.4621 - val\_acc: 0.8601  
 Epoch 17/55  
 - 2s - loss: 0.1732 - acc: 0.9790 - val\_loss: 0.2939 - val\_acc: 0.9272  
 Epoch 18/55  
 - 2s - loss: 0.0906 - acc: 0.9976 - val\_loss: 0.2920 - val\_acc: 0.9229  
 Epoch 19/55  
 - 2s - loss: 0.1220 - acc: 0.9878 - val\_loss: 0.4338 - val\_acc: 0.8890  
 Epoch 20/55  
 - 2s - loss: 0.0996 - acc: 0.9951 - val\_loss: 0.2291 - val\_acc: 0.9560  
 Epoch 21/55  
 - 2s - loss: 0.0763 - acc: 0.9979 - val\_loss: 0.2328 - val\_acc: 0.9611  
 Epoch 22/55  
 - 2s - loss: 0.0872 - acc: 0.9960 - val\_loss: 0.2489 - val\_acc: 0.9387  
 Epoch 23/55  
 - 2s - loss: 0.0919 - acc: 0.9933 - val\_loss: 0.2750 - val\_acc: 0.9423  
 Epoch 24/55  
 - 2s - loss: 0.1185 - acc: 0.9860 - val\_loss: 0.5264 - val\_acc: 0.8782  
 Epoch 25/55  
 - 2s - loss: 0.1141 - acc: 0.9893 - val\_loss: 0.2701 - val\_acc: 0.9322  
 Epoch 26/55  
 - 2s - loss: 0.0769 - acc: 0.9970 - val\_loss: 0.3014 - val\_acc: 0.9315  
 Epoch 27/55  
 - 2s - loss: 0.0844 - acc: 0.9948 - val\_loss: 0.2384 - val\_acc: 0.9582  
 Epoch 28/55  
 - 2s - loss: 0.0849 - acc: 0.9942 - val\_loss: 0.2194 - val\_acc: 0.9647  
 Epoch 29/55  
 - 2s - loss: 0.0629 - acc: 0.9994 - val\_loss: 0.2603 - val\_acc: 0.9438  
 Epoch 30/55  
 - 2s - loss: 0.0958 - acc: 0.9918 - val\_loss: 0.2702 - val\_acc: 0.9315  
 Epoch 31/55  
 - 2s - loss: 0.0624 - acc: 0.9991 - val\_loss: 0.2287 - val\_acc: 0.9553  
 Epoch 32/55  
 - 2s - loss: 0.1048 - acc: 0.9860 - val\_loss: 0.3792 - val\_acc: 0.8933  
 Epoch 33/55  
 - 2s - loss: 0.0806 - acc: 0.9963 - val\_loss: 0.2347 - val\_acc: 0.9488  
 Epoch 34/55  
 - 2s - loss: 0.0996 - acc: 0.9887 - val\_loss: 0.3910 - val\_acc: 0.9423  
 Epoch 35/55  
 - 2s - loss: 0.1470 - acc: 0.9826 - val\_loss: 0.3058 - val\_acc: 0.9128  
 Epoch 36/55  
 - 2s - loss: 0.0799 - acc: 0.9960 - val\_loss: 0.3268 - val\_acc: 0.9178  
 Epoch 37/55  
 - 2s - loss: 0.0734 - acc: 0.9954 - val\_loss: 0.2603 - val\_acc: 0.9279  
 Epoch 38/55  
 - 2s - loss: 0.1653 - acc: 0.9802 - val\_loss: 0.2464 - val\_acc: 0.9625  
 Epoch 39/55

```

- 2s - loss: 0.0691 - acc: 0.9985 - val_loss: 0.2237 - val_acc: 0.9575
Epoch 40/55
- 2s - loss: 0.0608 - acc: 0.9979 - val_loss: 0.2234 - val_acc: 0.9589
Epoch 41/55
- 2s - loss: 0.0567 - acc: 0.9988 - val_loss: 0.2230 - val_acc: 0.9611
Epoch 42/55
- 2s - loss: 0.0592 - acc: 0.9973 - val_loss: 0.2423 - val_acc: 0.9394
Epoch 43/55
- 2s - loss: 0.0670 - acc: 0.9967 - val_loss: 0.2273 - val_acc: 0.9560
Epoch 44/55
- 2s - loss: 0.0611 - acc: 0.9985 - val_loss: 0.2818 - val_acc: 0.9315
Epoch 45/55
- 2s - loss: 0.0780 - acc: 0.9933 - val_loss: 0.2420 - val_acc: 0.9438
Epoch 46/55
- 2s - loss: 0.0785 - acc: 0.9930 - val_loss: 0.2782 - val_acc: 0.9337
Epoch 47/55
- 2s - loss: 0.0756 - acc: 0.9945 - val_loss: 0.3651 - val_acc: 0.9286
Epoch 48/55
- 2s - loss: 0.0856 - acc: 0.9912 - val_loss: 0.2382 - val_acc: 0.9661
Epoch 49/55
- 2s - loss: 0.0508 - acc: 0.9997 - val_loss: 0.2021 - val_acc: 0.9654
Epoch 50/55
- 2s - loss: 0.0949 - acc: 0.9900 - val_loss: 0.3832 - val_acc: 0.9315
Epoch 51/55
- 2s - loss: 0.0784 - acc: 0.9948 - val_loss: 0.2721 - val_acc: 0.9402
Epoch 52/55
- 2s - loss: 0.0616 - acc: 0.9973 - val_loss: 0.2278 - val_acc: 0.9329
Epoch 53/55
- 2s - loss: 0.0512 - acc: 0.9988 - val_loss: 0.1992 - val_acc: 0.9503
Epoch 54/55
- 2s - loss: 0.0454 - acc: 0.9997 - val_loss: 0.1998 - val_acc: 0.9632
Epoch 55/55
- 2s - loss: 0.0651 - acc: 0.9948 - val_loss: 0.2485 - val_acc: 0.9445
Train accuracy 0.9917808219178083 Test accuracy: 0.9444844989185291
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 58, 32)	0
flatten_1 (Flatten)	(None, 1856)	0

dense_1 (Dense)	(None, 32)	59424
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dense_2 (Dense)	(None, 3)	99
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Total params: 68,771  
 Trainable params: 68,771  
 Non-trainable params: 0

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None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 42.5671 - acc: 0.4627 - val\_loss: 20.3896 - val\_acc: 0.6712

Epoch 2/35

- 2s - loss: 11.5550 - acc: 0.8460 - val\_loss: 6.0887 - val\_acc: 0.8486

Epoch 3/35

- 2s - loss: 3.5088 - acc: 0.9577 - val\_loss: 2.1941 - val\_acc: 0.8637

Epoch 4/35

- 2s - loss: 1.2233 - acc: 0.9784 - val\_loss: 0.9422 - val\_acc: 0.9445

Epoch 5/35

- 2s - loss: 0.5161 - acc: 0.9833 - val\_loss: 0.6032 - val\_acc: 0.9250

Epoch 6/35

- 2s - loss: 0.3141 - acc: 0.9820 - val\_loss: 0.4764 - val\_acc: 0.9373

Epoch 7/35

- 2s - loss: 0.2332 - acc: 0.9887 - val\_loss: 0.4282 - val\_acc: 0.9272

Epoch 8/35

- 2s - loss: 0.2176 - acc: 0.9872 - val\_loss: 0.3987 - val\_acc: 0.9394

Epoch 9/35

- 2s - loss: 0.1961 - acc: 0.9906 - val\_loss: 0.3700 - val\_acc: 0.9329

Epoch 10/35

- 2s - loss: 0.1919 - acc: 0.9869 - val\_loss: 0.3875 - val\_acc: 0.9135

Epoch 11/35

- 2s - loss: 0.1762 - acc: 0.9887 - val\_loss: 0.3160 - val\_acc: 0.9697

Epoch 12/35

- 2s - loss: 0.2040 - acc: 0.9796 - val\_loss: 0.2751 - val\_acc: 0.9776

Epoch 13/35

- 2s - loss: 0.1442 - acc: 0.9957 - val\_loss: 0.3157 - val\_acc: 0.9625

Epoch 14/35

- 2s - loss: 0.1337 - acc: 0.9970 - val\_loss: 0.2847 - val\_acc: 0.9661

Epoch 15/35

- 2s - loss: 0.1429 - acc: 0.9912 - val\_loss: 0.2955 - val\_acc: 0.9423

Epoch 16/35

- 2s - loss: 0.1392 - acc: 0.9933 - val\_loss: 0.2877 - val\_acc: 0.9618

Epoch 17/35

- 2s - loss: 0.1392 - acc: 0.9909 - val\_loss: 0.2632 - val\_acc: 0.9712

Epoch 18/35

- 2s - loss: 0.1298 - acc: 0.9942 - val\_loss: 0.2696 - val\_acc: 0.9567

Epoch 19/35

- 2s - loss: 0.1852 - acc: 0.9760 - val\_loss: 0.4149 - val\_acc: 0.9171

```

Epoch 20/35
- 2s - loss: 0.1584 - acc: 0.9933 - val_loss: 0.2368 - val_acc: 0.9798
Epoch 21/35
- 2s - loss: 0.1065 - acc: 0.9982 - val_loss: 0.2628 - val_acc: 0.9618
Epoch 22/35
- 2s - loss: 0.1096 - acc: 0.9970 - val_loss: 0.2490 - val_acc: 0.9618
Epoch 23/35
- 2s - loss: 0.1101 - acc: 0.9945 - val_loss: 0.2930 - val_acc: 0.9250
Epoch 24/35
- 2s - loss: 0.1183 - acc: 0.9918 - val_loss: 0.2872 - val_acc: 0.9373
Epoch 25/35
- 2s - loss: 0.1085 - acc: 0.9945 - val_loss: 0.2491 - val_acc: 0.9510
Epoch 26/35
- 2s - loss: 0.1003 - acc: 0.9970 - val_loss: 0.2179 - val_acc: 0.9719
Epoch 27/35
- 2s - loss: 0.1461 - acc: 0.9802 - val_loss: 0.2088 - val_acc: 0.9942
Epoch 28/35
- 2s - loss: 0.1290 - acc: 0.9951 - val_loss: 0.2194 - val_acc: 0.9683
Epoch 29/35
- 2s - loss: 0.0907 - acc: 0.9976 - val_loss: 0.2533 - val_acc: 0.9402
Epoch 30/35
- 2s - loss: 0.0956 - acc: 0.9945 - val_loss: 0.1947 - val_acc: 0.9740
Epoch 31/35
- 2s - loss: 0.0823 - acc: 0.9976 - val_loss: 0.2414 - val_acc: 0.9301
Epoch 32/35
- 2s - loss: 0.2003 - acc: 0.9702 - val_loss: 0.2938 - val_acc: 0.9495
Epoch 33/35
- 2s - loss: 0.1090 - acc: 0.9985 - val_loss: 0.2039 - val_acc: 0.9668
Epoch 34/35
- 2s - loss: 0.0833 - acc: 0.9979 - val_loss: 0.2130 - val_acc: 0.9575
Epoch 35/35
- 2s - loss: 0.0815 - acc: 0.9973 - val_loss: 0.1946 - val_acc: 0.9697
Train accuracy 0.9987823439878234 Test accuracy: 0.969718817591925

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 116, 16)	4720
dropout_1 (Dropout)	(None, 116, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 16)	0
flatten_1 (Flatten)	(None, 608)	0
dense_1 (Dense)	(None, 32)	19488

```

-----
dense_2 (Dense)                (None, 3)                99
=====
Total params: 26,995
Trainable params: 26,995
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 2s - loss: 36.5622 - acc: 0.6938 - val_loss: 7.7461 - val_acc: 0.7967
Epoch 2/55
  - 1s - loss: 2.9025 - acc: 0.9440 - val_loss: 1.0764 - val_acc: 0.8861
Epoch 3/55
  - 1s - loss: 0.5003 - acc: 0.9662 - val_loss: 0.5874 - val_acc: 0.9034
Epoch 4/55
  - 1s - loss: 0.3471 - acc: 0.9662 - val_loss: 0.5310 - val_acc: 0.9034
Epoch 5/55
  - 1s - loss: 0.3203 - acc: 0.9653 - val_loss: 0.4633 - val_acc: 0.9459
Epoch 6/55
  - 1s - loss: 0.2631 - acc: 0.9793 - val_loss: 0.4904 - val_acc: 0.8933
Epoch 7/55
  - 1s - loss: 0.2218 - acc: 0.9851 - val_loss: 0.5110 - val_acc: 0.8529
Epoch 8/55
  - 1s - loss: 0.2658 - acc: 0.9702 - val_loss: 0.4132 - val_acc: 0.9193
Epoch 9/55
  - 1s - loss: 0.1952 - acc: 0.9860 - val_loss: 0.3650 - val_acc: 0.9250
Epoch 10/55
  - 1s - loss: 0.2785 - acc: 0.9595 - val_loss: 0.6396 - val_acc: 0.8335
Epoch 11/55
  - 1s - loss: 0.2343 - acc: 0.9826 - val_loss: 0.3875 - val_acc: 0.9286
Epoch 12/55
  - 1s - loss: 0.2005 - acc: 0.9796 - val_loss: 0.4104 - val_acc: 0.8998
Epoch 13/55
  - 1s - loss: 0.2343 - acc: 0.9769 - val_loss: 0.3774 - val_acc: 0.9402
Epoch 14/55
  - 1s - loss: 0.1574 - acc: 0.9930 - val_loss: 0.3637 - val_acc: 0.9409
Epoch 15/55
  - 1s - loss: 0.1882 - acc: 0.9814 - val_loss: 0.3666 - val_acc: 0.9373
Epoch 16/55
  - 1s - loss: 0.1462 - acc: 0.9936 - val_loss: 0.2949 - val_acc: 0.9546
Epoch 17/55
  - 1s - loss: 0.1471 - acc: 0.9900 - val_loss: 0.2940 - val_acc: 0.9488
Epoch 18/55
  - 1s - loss: 0.1432 - acc: 0.9900 - val_loss: 0.3324 - val_acc: 0.9301
Epoch 19/55
  - 1s - loss: 0.1544 - acc: 0.9875 - val_loss: 0.4027 - val_acc: 0.8991
Epoch 20/55

```

- 1s - loss: 0.1973 - acc: 0.9781 - val\_loss: 0.3840 - val\_acc: 0.9416  
 Epoch 21/55  
 - 1s - loss: 0.1657 - acc: 0.9860 - val\_loss: 0.3232 - val\_acc: 0.9387  
 Epoch 22/55  
 - 1s - loss: 0.1359 - acc: 0.9893 - val\_loss: 0.3344 - val\_acc: 0.9337  
 Epoch 23/55  
 - 1s - loss: 0.1395 - acc: 0.9875 - val\_loss: 0.2956 - val\_acc: 0.9351  
 Epoch 24/55  
 - 1s - loss: 0.2107 - acc: 0.9756 - val\_loss: 0.3586 - val\_acc: 0.9373  
 Epoch 25/55  
 - 1s - loss: 0.1414 - acc: 0.9896 - val\_loss: 0.3294 - val\_acc: 0.9200  
 Epoch 26/55  
 - 1s - loss: 0.1360 - acc: 0.9884 - val\_loss: 0.3196 - val\_acc: 0.9387  
 Epoch 27/55  
 - 1s - loss: 0.1224 - acc: 0.9912 - val\_loss: 0.3720 - val\_acc: 0.9099  
 Epoch 28/55  
 - 1s - loss: 0.2700 - acc: 0.9619 - val\_loss: 0.4394 - val\_acc: 0.9416  
 Epoch 29/55  
 - 1s - loss: 0.1461 - acc: 0.9936 - val\_loss: 0.3698 - val\_acc: 0.8947  
 Epoch 30/55  
 - 1s - loss: 0.1671 - acc: 0.9808 - val\_loss: 0.3418 - val\_acc: 0.9344  
 Epoch 31/55  
 - 1s - loss: 0.1190 - acc: 0.9927 - val\_loss: 0.3360 - val\_acc: 0.9149  
 Epoch 32/55  
 - 1s - loss: 0.1180 - acc: 0.9921 - val\_loss: 0.2923 - val\_acc: 0.9524  
 Epoch 33/55  
 - 1s - loss: 0.1234 - acc: 0.9881 - val\_loss: 0.4145 - val\_acc: 0.8637  
 Epoch 34/55  
 - 1s - loss: 0.3605 - acc: 0.9501 - val\_loss: 0.3857 - val\_acc: 0.9171  
 Epoch 35/55  
 - 1s - loss: 0.1410 - acc: 0.9915 - val\_loss: 0.3261 - val\_acc: 0.9286  
 Epoch 36/55  
 - 1s - loss: 0.1351 - acc: 0.9881 - val\_loss: 0.3244 - val\_acc: 0.9193  
 Epoch 37/55  
 - 1s - loss: 0.1414 - acc: 0.9845 - val\_loss: 0.3245 - val\_acc: 0.9193  
 Epoch 38/55  
 - 1s - loss: 0.1310 - acc: 0.9860 - val\_loss: 0.6909 - val\_acc: 0.8046  
 Epoch 39/55  
 - 1s - loss: 0.2657 - acc: 0.9650 - val\_loss: 0.3848 - val\_acc: 0.9200  
 Epoch 40/55  
 - 1s - loss: 0.1528 - acc: 0.9900 - val\_loss: 0.4364 - val\_acc: 0.8738  
 Epoch 41/55  
 - 1s - loss: 0.1447 - acc: 0.9823 - val\_loss: 0.5141 - val\_acc: 0.8904  
 Epoch 42/55  
 - 1s - loss: 0.1434 - acc: 0.9884 - val\_loss: 0.3351 - val\_acc: 0.9149  
 Epoch 43/55  
 - 1s - loss: 0.1574 - acc: 0.9836 - val\_loss: 0.3167 - val\_acc: 0.9394  
 Epoch 44/55

```

- 1s - loss: 0.1316 - acc: 0.9890 - val_loss: 0.3009 - val_acc: 0.9503
Epoch 45/55
- 1s - loss: 0.0941 - acc: 0.9970 - val_loss: 0.3375 - val_acc: 0.9041
Epoch 46/55
- 1s - loss: 0.1452 - acc: 0.9826 - val_loss: 0.2971 - val_acc: 0.9214
Epoch 47/55
- 1s - loss: 0.2152 - acc: 0.9705 - val_loss: 0.4550 - val_acc: 0.9272
Epoch 48/55
- 1s - loss: 0.1151 - acc: 0.9954 - val_loss: 0.2880 - val_acc: 0.9560
Epoch 49/55
- 1s - loss: 0.0971 - acc: 0.9939 - val_loss: 0.3479 - val_acc: 0.9351
Epoch 50/55
- 1s - loss: 0.1586 - acc: 0.9766 - val_loss: 0.6053 - val_acc: 0.8702
Epoch 51/55
- 1s - loss: 0.1552 - acc: 0.9857 - val_loss: 0.2823 - val_acc: 0.9286
Epoch 52/55
- 1s - loss: 0.1031 - acc: 0.9967 - val_loss: 0.3154 - val_acc: 0.9193
Epoch 53/55
- 1s - loss: 0.1433 - acc: 0.9839 - val_loss: 0.3174 - val_acc: 0.9171
Epoch 54/55
- 1s - loss: 0.0995 - acc: 0.9918 - val_loss: 0.2748 - val_acc: 0.9416
Epoch 55/55
- 1s - loss: 0.0952 - acc: 0.9939 - val_loss: 0.2731 - val_acc: 0.9272
Train accuracy 0.9914764079147641 Test accuracy: 0.9271809661139149

```

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Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 28)	1288
conv1d_2 (Conv1D)	(None, 118, 32)	6304
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 64)	47168
dense_2 (Dense)	(None, 3)	195

---

```

Total params: 54,955
Trainable params: 54,955
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples

```

Epoch 1/35  
- 2s - loss: 34.2710 - acc: 0.7489 - val\_loss: 17.4761 - val\_acc: 0.9063  
Epoch 2/35  
- 2s - loss: 9.7622 - acc: 0.9665 - val\_loss: 4.9856 - val\_acc: 0.9452  
Epoch 3/35  
- 2s - loss: 2.6903 - acc: 0.9881 - val\_loss: 1.6250 - val\_acc: 0.9387  
Epoch 4/35  
- 2s - loss: 0.8841 - acc: 0.9896 - val\_loss: 0.8212 - val\_acc: 0.9272  
Epoch 5/35  
- 2s - loss: 0.4265 - acc: 0.9900 - val\_loss: 0.5368 - val\_acc: 0.9567  
Epoch 6/35  
- 2s - loss: 0.2736 - acc: 0.9933 - val\_loss: 0.4210 - val\_acc: 0.9567  
Epoch 7/35  
- 2s - loss: 0.2167 - acc: 0.9866 - val\_loss: 0.4253 - val\_acc: 0.9070  
Epoch 8/35  
- 2s - loss: 0.1782 - acc: 0.9912 - val\_loss: 0.3590 - val\_acc: 0.9459  
Epoch 9/35  
- 2s - loss: 0.1408 - acc: 0.9951 - val\_loss: 0.3169 - val\_acc: 0.9589  
Epoch 10/35  
- 2s - loss: 0.1216 - acc: 0.9963 - val\_loss: 0.2940 - val\_acc: 0.9539  
Epoch 11/35  
- 2s - loss: 0.1541 - acc: 0.9893 - val\_loss: 0.3461 - val\_acc: 0.9200  
Epoch 12/35  
- 2s - loss: 0.1249 - acc: 0.9918 - val\_loss: 0.3291 - val\_acc: 0.9402  
Epoch 13/35  
- 2s - loss: 0.1108 - acc: 0.9951 - val\_loss: 0.3326 - val\_acc: 0.9329  
Epoch 14/35  
- 2s - loss: 0.1291 - acc: 0.9887 - val\_loss: 0.3556 - val\_acc: 0.9322  
Epoch 15/35  
- 2s - loss: 0.0974 - acc: 0.9979 - val\_loss: 0.2681 - val\_acc: 0.9524  
Epoch 16/35  
- 2s - loss: 0.0898 - acc: 0.9963 - val\_loss: 0.2585 - val\_acc: 0.9445  
Epoch 17/35  
- 2s - loss: 0.1332 - acc: 0.9866 - val\_loss: 0.2370 - val\_acc: 0.9654  
Epoch 18/35  
- 2s - loss: 0.0820 - acc: 0.9979 - val\_loss: 0.2884 - val\_acc: 0.9409  
Epoch 19/35  
- 2s - loss: 0.0842 - acc: 0.9951 - val\_loss: 0.2578 - val\_acc: 0.9466  
Epoch 20/35  
- 2s - loss: 0.0814 - acc: 0.9960 - val\_loss: 0.2345 - val\_acc: 0.9539  
Epoch 21/35  
- 2s - loss: 0.0778 - acc: 0.9954 - val\_loss: 0.2683 - val\_acc: 0.9510  
Epoch 22/35  
- 2s - loss: 0.0785 - acc: 0.9954 - val\_loss: 0.4639 - val\_acc: 0.8414  
Epoch 23/35  
- 2s - loss: 0.0842 - acc: 0.9951 - val\_loss: 0.3294 - val\_acc: 0.9301  
Epoch 24/35  
- 2s - loss: 0.0704 - acc: 0.9963 - val\_loss: 0.2395 - val\_acc: 0.9481



Epoch 25/35  
 - 2s - loss: 0.0719 - acc: 0.9970 - val\_loss: 0.2429 - val\_acc: 0.9402  
 Epoch 26/35  
 - 2s - loss: 0.0533 - acc: 0.9994 - val\_loss: 0.2240 - val\_acc: 0.9459  
 Epoch 27/35  
 - 2s - loss: 0.0715 - acc: 0.9948 - val\_loss: 0.2221 - val\_acc: 0.9553  
 Epoch 28/35  
 - 2s - loss: 0.0859 - acc: 0.9906 - val\_loss: 0.2194 - val\_acc: 0.9632  
 Epoch 29/35  
 - 2s - loss: 0.0688 - acc: 0.9967 - val\_loss: 0.2364 - val\_acc: 0.9553  
 Epoch 30/35  
 - 2s - loss: 0.0510 - acc: 0.9997 - val\_loss: 0.1989 - val\_acc: 0.9632  
 Epoch 31/35  
 - 2s - loss: 0.0845 - acc: 0.9924 - val\_loss: 0.1831 - val\_acc: 0.9632  
 Epoch 32/35  
 - 2s - loss: 0.0461 - acc: 1.0000 - val\_loss: 0.1651 - val\_acc: 0.9690  
 Epoch 33/35  
 - 2s - loss: 0.0555 - acc: 0.9957 - val\_loss: 0.4642 - val\_acc: 0.8544  
 Epoch 34/35  
 - 2s - loss: 0.1397 - acc: 0.9860 - val\_loss: 0.2102 - val\_acc: 0.9575  
 Epoch 35/35  
 - 2s - loss: 0.0553 - acc: 0.9994 - val\_loss: 0.2101 - val\_acc: 0.9387  
 Train accuracy 0.9975646879756469 Test accuracy: 0.9387166546503244

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 122, 32)	5152
dropout_1 (Dropout)	(None, 122, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 32)	24608
dense_2 (Dense)	(None, 3)	99

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Total params: 30,755  
 Trainable params: 30,755  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/35

- 2s - loss: 40.6311 - acc: 0.6289 - val\_loss: 22.0869 - val\_acc: 0.7332  
 Epoch 2/35  
 - 2s - loss: 13.7671 - acc: 0.9035 - val\_loss: 8.4053 - val\_acc: 0.8846  
 Epoch 3/35  
 - 2s - loss: 5.3421 - acc: 0.9461 - val\_loss: 3.6136 - val\_acc: 0.7938  
 Epoch 4/35  
 - 2s - loss: 2.2098 - acc: 0.9574 - val\_loss: 1.6966 - val\_acc: 0.8673  
 Epoch 5/35  
 - 2s - loss: 0.9858 - acc: 0.9717 - val\_loss: 0.9733 - val\_acc: 0.9156  
 Epoch 6/35  
 - 2s - loss: 0.5453 - acc: 0.9753 - val\_loss: 0.6953 - val\_acc: 0.9358  
 Epoch 7/35  
 - 2s - loss: 0.3898 - acc: 0.9778 - val\_loss: 0.5939 - val\_acc: 0.9315  
 Epoch 8/35  
 - 2s - loss: 0.3317 - acc: 0.9756 - val\_loss: 0.6359 - val\_acc: 0.8111  
 Epoch 9/35  
 - 2s - loss: 0.3135 - acc: 0.9756 - val\_loss: 0.5357 - val\_acc: 0.9056  
 Epoch 10/35  
 - 2s - loss: 0.2581 - acc: 0.9893 - val\_loss: 0.5165 - val\_acc: 0.8947  
 Epoch 11/35  
 - 2s - loss: 0.2400 - acc: 0.9896 - val\_loss: 0.5078 - val\_acc: 0.8854  
 Epoch 12/35  
 - 2s - loss: 0.2305 - acc: 0.9878 - val\_loss: 0.4715 - val\_acc: 0.9077  
 Epoch 13/35  
 - 2s - loss: 0.2251 - acc: 0.9845 - val\_loss: 0.4466 - val\_acc: 0.9113  
 Epoch 14/35  
 - 2s - loss: 0.2025 - acc: 0.9887 - val\_loss: 0.4269 - val\_acc: 0.9416  
 Epoch 15/35  
 - 2s - loss: 0.1950 - acc: 0.9906 - val\_loss: 0.3938 - val\_acc: 0.9387  
 Epoch 16/35  
 - 2s - loss: 0.1863 - acc: 0.9890 - val\_loss: 0.5061 - val\_acc: 0.8277  
 Epoch 17/35  
 - 2s - loss: 0.2084 - acc: 0.9820 - val\_loss: 0.3632 - val\_acc: 0.9539  
 Epoch 18/35  
 - 2s - loss: 0.1716 - acc: 0.9912 - val\_loss: 0.3482 - val\_acc: 0.9575  
 Epoch 19/35  
 - 2s - loss: 0.2015 - acc: 0.9784 - val\_loss: 0.4376 - val\_acc: 0.9012  
 Epoch 20/35  
 - 2s - loss: 0.1661 - acc: 0.9948 - val\_loss: 0.3387 - val\_acc: 0.9517  
 Epoch 21/35  
 - 2s - loss: 0.1505 - acc: 0.9924 - val\_loss: 0.3897 - val\_acc: 0.9193  
 Epoch 22/35  
 - 2s - loss: 0.1680 - acc: 0.9836 - val\_loss: 0.3684 - val\_acc: 0.9344  
 Epoch 23/35  
 - 2s - loss: 0.1565 - acc: 0.9945 - val\_loss: 0.3828 - val\_acc: 0.9120  
 Epoch 24/35  
 - 2s - loss: 0.1609 - acc: 0.9893 - val\_loss: 0.3260 - val\_acc: 0.9387  
 Epoch 25/35

```

- 2s - loss: 0.1503 - acc: 0.9912 - val_loss: 0.3136 - val_acc: 0.9495
Epoch 26/35
- 2s - loss: 0.1470 - acc: 0.9921 - val_loss: 0.3199 - val_acc: 0.9445
Epoch 27/35
- 2s - loss: 0.1300 - acc: 0.9939 - val_loss: 0.3144 - val_acc: 0.9517
Epoch 28/35
- 2s - loss: 0.1318 - acc: 0.9939 - val_loss: 0.2866 - val_acc: 0.9603
Epoch 29/35
- 2s - loss: 0.1350 - acc: 0.9893 - val_loss: 0.3323 - val_acc: 0.9358
Epoch 30/35
- 2s - loss: 0.1309 - acc: 0.9924 - val_loss: 0.3132 - val_acc: 0.9430
Epoch 31/35
- 2s - loss: 0.1193 - acc: 0.9924 - val_loss: 0.2819 - val_acc: 0.9524
Epoch 32/35
- 2s - loss: 0.1417 - acc: 0.9881 - val_loss: 0.3448 - val_acc: 0.9221
Epoch 33/35
- 2s - loss: 0.1413 - acc: 0.9912 - val_loss: 0.2934 - val_acc: 0.9510
Epoch 34/35
- 2s - loss: 0.1125 - acc: 0.9954 - val_loss: 0.3602 - val_acc: 0.9214
Epoch 35/35
- 2s - loss: 0.1117 - acc: 0.9924 - val_loss: 0.3756 - val_acc: 0.8983
Train accuracy 0.9656012176560121 Test accuracy: 0.8983417447728911
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 58, 32)	0
flatten_1 (Flatten)	(None, 1856)	0
dense_1 (Dense)	(None, 32)	59424
dense_2 (Dense)	(None, 3)	99

Total params: 68,771

Trainable params: 68,771

Non-trainable params: 0

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

```

- 3s - loss: 68.4506 - acc: 0.4788 - val_loss: 13.4246 - val_acc: 0.4744

```

Epoch 2/40  
- 2s - loss: 4.6661 - acc: 0.7887 - val\_loss: 1.2823 - val\_acc: 0.7924  
Epoch 3/40  
- 2s - loss: 0.6683 - acc: 0.8971 - val\_loss: 0.6814 - val\_acc: 0.8882  
Epoch 4/40  
- 2s - loss: 0.4641 - acc: 0.9272 - val\_loss: 0.6150 - val\_acc: 0.8854  
Epoch 5/40  
- 2s - loss: 0.3940 - acc: 0.9495 - val\_loss: 0.5454 - val\_acc: 0.9128  
Epoch 6/40  
- 2s - loss: 0.3439 - acc: 0.9595 - val\_loss: 0.5015 - val\_acc: 0.9200  
Epoch 7/40  
- 2s - loss: 0.3095 - acc: 0.9656 - val\_loss: 0.6085 - val\_acc: 0.8363  
Epoch 8/40  
- 2s - loss: 0.3100 - acc: 0.9647 - val\_loss: 0.4668 - val\_acc: 0.9474  
Epoch 9/40  
- 2s - loss: 0.3880 - acc: 0.9492 - val\_loss: 0.4723 - val\_acc: 0.9164  
Epoch 10/40  
- 2s - loss: 0.2655 - acc: 0.9760 - val\_loss: 0.4773 - val\_acc: 0.9120  
Epoch 11/40  
- 2s - loss: 0.2754 - acc: 0.9723 - val\_loss: 0.4182 - val\_acc: 0.9293  
Epoch 12/40  
- 2s - loss: 0.3107 - acc: 0.9568 - val\_loss: 0.4218 - val\_acc: 0.9510  
Epoch 13/40  
- 2s - loss: 0.2616 - acc: 0.9753 - val\_loss: 0.4383 - val\_acc: 0.9308  
Epoch 14/40  
- 2s - loss: 0.2149 - acc: 0.9802 - val\_loss: 0.4033 - val\_acc: 0.9084  
Epoch 15/40  
- 2s - loss: 0.2333 - acc: 0.9705 - val\_loss: 0.3532 - val\_acc: 0.9402  
Epoch 16/40  
- 2s - loss: 0.2157 - acc: 0.9787 - val\_loss: 0.3658 - val\_acc: 0.9337  
Epoch 17/40  
- 2s - loss: 0.2133 - acc: 0.9784 - val\_loss: 0.3835 - val\_acc: 0.9459  
Epoch 18/40  
- 2s - loss: 0.2042 - acc: 0.9823 - val\_loss: 0.3791 - val\_acc: 0.9229  
Epoch 19/40  
- 2s - loss: 0.2755 - acc: 0.9623 - val\_loss: 0.6711 - val\_acc: 0.8277  
Epoch 20/40  
- 2s - loss: 0.2916 - acc: 0.9656 - val\_loss: 0.3567 - val\_acc: 0.9539  
Epoch 21/40  
- 2s - loss: 0.2319 - acc: 0.9735 - val\_loss: 0.5258 - val\_acc: 0.9106  
Epoch 22/40  
- 2s - loss: 0.1993 - acc: 0.9799 - val\_loss: 0.4885 - val\_acc: 0.8825  
Epoch 23/40  
- 2s - loss: 0.2041 - acc: 0.9741 - val\_loss: 0.3549 - val\_acc: 0.9373  
Epoch 24/40  
- 2s - loss: 0.2362 - acc: 0.9680 - val\_loss: 0.4294 - val\_acc: 0.9048  
Epoch 25/40  
- 2s - loss: 0.1877 - acc: 0.9836 - val\_loss: 0.3676 - val\_acc: 0.9156

Epoch 26/40  
 - 2s - loss: 0.2316 - acc: 0.9720 - val\_loss: 0.4527 - val\_acc: 0.8616  
 Epoch 27/40  
 - 2s - loss: 0.2256 - acc: 0.9693 - val\_loss: 0.4042 - val\_acc: 0.9301  
 Epoch 28/40  
 - 2s - loss: 0.1946 - acc: 0.9805 - val\_loss: 0.6861 - val\_acc: 0.7765  
 Epoch 29/40  
 - 2s - loss: 0.2048 - acc: 0.9766 - val\_loss: 0.3131 - val\_acc: 0.9366  
 Epoch 30/40  
 - 2s - loss: 0.1652 - acc: 0.9839 - val\_loss: 0.3526 - val\_acc: 0.9272  
 Epoch 31/40  
 - 2s - loss: 0.2895 - acc: 0.9589 - val\_loss: 0.3582 - val\_acc: 0.9221  
 Epoch 32/40  
 - 2s - loss: 0.2608 - acc: 0.9635 - val\_loss: 0.3533 - val\_acc: 0.9503  
 Epoch 33/40  
 - 2s - loss: 0.1756 - acc: 0.9854 - val\_loss: 0.5115 - val\_acc: 0.8760  
 Epoch 34/40  
 - 2s - loss: 0.2333 - acc: 0.9686 - val\_loss: 0.5419 - val\_acc: 0.8421  
 Epoch 35/40  
 - 2s - loss: 0.2173 - acc: 0.9689 - val\_loss: 0.5006 - val\_acc: 0.8991  
 Epoch 36/40  
 - 2s - loss: 0.2132 - acc: 0.9787 - val\_loss: 0.4357 - val\_acc: 0.8969  
 Epoch 37/40  
 - 2s - loss: 0.1865 - acc: 0.9805 - val\_loss: 0.3590 - val\_acc: 0.9200  
 Epoch 38/40  
 - 2s - loss: 0.1907 - acc: 0.9769 - val\_loss: 0.3284 - val\_acc: 0.9229  
 Epoch 39/40  
 - 2s - loss: 0.1879 - acc: 0.9784 - val\_loss: 0.3877 - val\_acc: 0.8955  
 Epoch 40/40  
 - 2s - loss: 0.1803 - acc: 0.9793 - val\_loss: 0.4176 - val\_acc: 0.8976  
 Train accuracy 0.980517503805175 Test accuracy: 0.8976207642393655

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 16)	11792
dense_2 (Dense)	(None, 3)	51

```

=====
Total params: 21,091
Trainable params: 21,091
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
  - 3s - loss: 23.0997 - acc: 0.4919 - val_loss: 12.9703 - val_acc: 0.5725
Epoch 2/35
  - 2s - loss: 7.9639 - acc: 0.8033 - val_loss: 4.7915 - val_acc: 0.8349
Epoch 3/35
  - 2s - loss: 2.8474 - acc: 0.9632 - val_loss: 2.0515 - val_acc: 0.8435
Epoch 4/35
  - 2s - loss: 1.1397 - acc: 0.9784 - val_loss: 1.0259 - val_acc: 0.9366
Epoch 5/35
  - 2s - loss: 0.5190 - acc: 0.9942 - val_loss: 0.6745 - val_acc: 0.9459
Epoch 6/35
  - 2s - loss: 0.3058 - acc: 0.9921 - val_loss: 0.5255 - val_acc: 0.9546
Epoch 7/35
  - 2s - loss: 0.2250 - acc: 0.9924 - val_loss: 0.4733 - val_acc: 0.9329
Epoch 8/35
  - 2s - loss: 0.1909 - acc: 0.9948 - val_loss: 0.4741 - val_acc: 0.9041
Epoch 9/35
  - 2s - loss: 0.1681 - acc: 0.9960 - val_loss: 0.3995 - val_acc: 0.9445
Epoch 10/35
  - 2s - loss: 0.1491 - acc: 0.9982 - val_loss: 0.4452 - val_acc: 0.8919
Epoch 11/35
  - 2s - loss: 0.1349 - acc: 0.9976 - val_loss: 0.3635 - val_acc: 0.9589
Epoch 12/35
  - 2s - loss: 0.1366 - acc: 0.9948 - val_loss: 0.3224 - val_acc: 0.9784
Epoch 13/35
  - 2s - loss: 0.1188 - acc: 0.9979 - val_loss: 0.3289 - val_acc: 0.9661
Epoch 14/35
  - 2s - loss: 0.1085 - acc: 0.9997 - val_loss: 0.3135 - val_acc: 0.9769
Epoch 15/35
  - 2s - loss: 0.1079 - acc: 0.9979 - val_loss: 0.3330 - val_acc: 0.9481
Epoch 16/35
  - 2s - loss: 0.1068 - acc: 0.9963 - val_loss: 0.2971 - val_acc: 0.9740
Epoch 17/35
  - 2s - loss: 0.1225 - acc: 0.9912 - val_loss: 0.3029 - val_acc: 0.9575
Epoch 18/35
  - 2s - loss: 0.0914 - acc: 0.9994 - val_loss: 0.2811 - val_acc: 0.9712
Epoch 19/35
  - 2s - loss: 0.1554 - acc: 0.9778 - val_loss: 0.2811 - val_acc: 0.9661
Epoch 20/35
  - 2s - loss: 0.1114 - acc: 0.9979 - val_loss: 0.2667 - val_acc: 0.9704
Epoch 21/35

```

```

- 2s - loss: 0.0839 - acc: 0.9991 - val_loss: 0.2769 - val_acc: 0.9625
Epoch 22/35
- 2s - loss: 0.0800 - acc: 0.9994 - val_loss: 0.2766 - val_acc: 0.9575
Epoch 23/35
- 2s - loss: 0.0834 - acc: 0.9973 - val_loss: 0.2577 - val_acc: 0.9654
Epoch 24/35
- 2s - loss: 0.0848 - acc: 0.9970 - val_loss: 0.2520 - val_acc: 0.9813
Epoch 25/35
- 2s - loss: 0.0743 - acc: 0.9994 - val_loss: 0.2484 - val_acc: 0.9726
Epoch 26/35
- 2s - loss: 0.0737 - acc: 0.9991 - val_loss: 0.2656 - val_acc: 0.9510
Epoch 27/35
- 2s - loss: 0.0892 - acc: 0.9939 - val_loss: 0.2361 - val_acc: 0.9690
Epoch 28/35
- 2s - loss: 0.0712 - acc: 0.9991 - val_loss: 0.2424 - val_acc: 0.9712
Epoch 29/35
- 2s - loss: 0.0961 - acc: 0.9906 - val_loss: 0.1938 - val_acc: 0.9813
Epoch 30/35
- 2s - loss: 0.0691 - acc: 1.0000 - val_loss: 0.2356 - val_acc: 0.9668
Epoch 31/35
- 2s - loss: 0.0632 - acc: 0.9991 - val_loss: 0.2272 - val_acc: 0.9798
Epoch 32/35
- 2s - loss: 0.0779 - acc: 0.9912 - val_loss: 0.2241 - val_acc: 0.9625
Epoch 33/35
- 2s - loss: 0.1114 - acc: 0.9903 - val_loss: 0.2077 - val_acc: 0.9661
Epoch 34/35
- 2s - loss: 0.0643 - acc: 0.9994 - val_loss: 0.2208 - val_acc: 0.9690
Epoch 35/35
- 2s - loss: 0.0580 - acc: 0.9997 - val_loss: 0.2195 - val_acc: 0.9784
Train accuracy 1.0 Test accuracy: 0.9783705839942322

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 24)	5400
dropout_1 (Dropout)	(None, 116, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 24)	0
flatten_1 (Flatten)	(None, 552)	0
dense_1 (Dense)	(None, 16)	8848
dense_2 (Dense)	(None, 3)	51

Total params: 16,347  
Trainable params: 16,347  
Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 2s - loss: 104.8181 - acc: 0.5075 - val\_loss: 60.5449 - val\_acc: 0.5580

Epoch 2/35

- 1s - loss: 38.1838 - acc: 0.6463 - val\_loss: 21.9688 - val\_acc: 0.5797

Epoch 3/35

- 1s - loss: 13.6180 - acc: 0.8408 - val\_loss: 7.9362 - val\_acc: 0.7859

Epoch 4/35

- 1s - loss: 4.7102 - acc: 0.9245 - val\_loss: 2.9717 - val\_acc: 0.8702

Epoch 5/35

- 1s - loss: 1.7033 - acc: 0.9452 - val\_loss: 1.3923 - val\_acc: 0.9084

Epoch 6/35

- 1s - loss: 0.7662 - acc: 0.9619 - val\_loss: 0.9169 - val\_acc: 0.9250

Epoch 7/35

- 1s - loss: 0.4747 - acc: 0.9756 - val\_loss: 0.7678 - val\_acc: 0.9178

Epoch 8/35

- 1s - loss: 0.3902 - acc: 0.9738 - val\_loss: 0.7131 - val\_acc: 0.8861

Epoch 9/35

- 1s - loss: 0.3416 - acc: 0.9833 - val\_loss: 0.6343 - val\_acc: 0.9582

Epoch 10/35

- 1s - loss: 0.3352 - acc: 0.9735 - val\_loss: 0.6599 - val\_acc: 0.8955

Epoch 11/35

- 1s - loss: 0.2980 - acc: 0.9826 - val\_loss: 0.5956 - val\_acc: 0.9495

Epoch 12/35

- 1s - loss: 0.2856 - acc: 0.9814 - val\_loss: 0.5751 - val\_acc: 0.9452

Epoch 13/35

- 1s - loss: 0.2601 - acc: 0.9890 - val\_loss: 0.5868 - val\_acc: 0.9322

Epoch 14/35

- 1s - loss: 0.2442 - acc: 0.9896 - val\_loss: 0.5542 - val\_acc: 0.9495

Epoch 15/35

- 1s - loss: 0.2540 - acc: 0.9839 - val\_loss: 0.5381 - val\_acc: 0.9207

Epoch 16/35

- 1s - loss: 0.2331 - acc: 0.9881 - val\_loss: 0.4996 - val\_acc: 0.9704

Epoch 17/35

- 1s - loss: 0.2401 - acc: 0.9814 - val\_loss: 0.4772 - val\_acc: 0.9690

Epoch 18/35

- 1s - loss: 0.2084 - acc: 0.9909 - val\_loss: 0.4981 - val\_acc: 0.9329

Epoch 19/35

- 1s - loss: 0.2211 - acc: 0.9814 - val\_loss: 0.4761 - val\_acc: 0.9553

Epoch 20/35

- 1s - loss: 0.2198 - acc: 0.9805 - val\_loss: 0.5105 - val\_acc: 0.9019

Epoch 21/35

- 1s - loss: 0.2164 - acc: 0.9863 - val\_loss: 0.4493 - val\_acc: 0.9603



```

Epoch 22/35
- 1s - loss: 0.1912 - acc: 0.9878 - val_loss: 0.4812 - val_acc: 0.9503
Epoch 23/35
- 1s - loss: 0.1864 - acc: 0.9878 - val_loss: 0.4365 - val_acc: 0.9654
Epoch 24/35
- 1s - loss: 0.2026 - acc: 0.9830 - val_loss: 0.4079 - val_acc: 0.9690
Epoch 25/35
- 1s - loss: 0.1782 - acc: 0.9884 - val_loss: 0.4029 - val_acc: 0.9546
Epoch 26/35
- 1s - loss: 0.1865 - acc: 0.9820 - val_loss: 0.4020 - val_acc: 0.9733
Epoch 27/35
- 1s - loss: 0.1843 - acc: 0.9830 - val_loss: 0.4260 - val_acc: 0.9430
Epoch 28/35
- 1s - loss: 0.1824 - acc: 0.9884 - val_loss: 0.4218 - val_acc: 0.9531
Epoch 29/35
- 1s - loss: 0.1659 - acc: 0.9896 - val_loss: 0.4117 - val_acc: 0.9430
Epoch 30/35
- 1s - loss: 0.1610 - acc: 0.9906 - val_loss: 0.3714 - val_acc: 0.9740
Epoch 31/35
- 1s - loss: 0.1459 - acc: 0.9945 - val_loss: 0.3801 - val_acc: 0.9589
Epoch 32/35
- 1s - loss: 0.1745 - acc: 0.9833 - val_loss: 0.3788 - val_acc: 0.9603
Epoch 33/35
- 1s - loss: 0.1523 - acc: 0.9903 - val_loss: 0.3852 - val_acc: 0.9539
Epoch 34/35
- 1s - loss: 0.1462 - acc: 0.9915 - val_loss: 0.3626 - val_acc: 0.9539
Epoch 35/35
- 1s - loss: 0.1388 - acc: 0.9948 - val_loss: 0.3725 - val_acc: 0.9589
Train accuracy 0.9963470319634703 Test accuracy: 0.958904109589041

```

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Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 42)	1932
-----		
conv1d_2 (Conv1D)	(None, 118, 32)	9440
-----		
dropout_1 (Dropout)	(None, 118, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 39, 32)	0
-----		
flatten_1 (Flatten)	(None, 1248)	0
-----		
dense_1 (Dense)	(None, 16)	19984
-----		
dense_2 (Dense)	(None, 3)	51
=====		

Total params: 31,407

Trainable params: 31,407

Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 29.1221 - acc: 0.4618 - val\_loss: 19.5991 - val\_acc: 0.5934

Epoch 2/40

- 1s - loss: 14.2418 - acc: 0.7677 - val\_loss: 10.2271 - val\_acc: 0.8190

Epoch 3/40

- 1s - loss: 7.6386 - acc: 0.9035 - val\_loss: 5.8862 - val\_acc: 0.8724

Epoch 4/40

- 1s - loss: 4.3480 - acc: 0.9616 - val\_loss: 3.5301 - val\_acc: 0.9286

Epoch 5/40

- 1s - loss: 2.5365 - acc: 0.9784 - val\_loss: 2.2112 - val\_acc: 0.9084

Epoch 6/40

- 1s - loss: 1.5134 - acc: 0.9820 - val\_loss: 1.4243 - val\_acc: 0.9445

Epoch 7/40

- 1s - loss: 0.9189 - acc: 0.9875 - val\_loss: 0.9804 - val\_acc: 0.9553

Epoch 8/40

- 1s - loss: 0.5833 - acc: 0.9924 - val\_loss: 0.7425 - val\_acc: 0.9539

Epoch 9/40

- 1s - loss: 0.4200 - acc: 0.9839 - val\_loss: 0.6252 - val\_acc: 0.9366

Epoch 10/40

- 1s - loss: 0.3159 - acc: 0.9903 - val\_loss: 0.5192 - val\_acc: 0.9603

Epoch 11/40

- 1s - loss: 0.2496 - acc: 0.9945 - val\_loss: 0.4941 - val\_acc: 0.9387

Epoch 12/40

- 1s - loss: 0.2148 - acc: 0.9936 - val\_loss: 0.4322 - val\_acc: 0.9647

Epoch 13/40

- 1s - loss: 0.1983 - acc: 0.9912 - val\_loss: 0.4186 - val\_acc: 0.9524

Epoch 14/40

- 1s - loss: 0.1892 - acc: 0.9896 - val\_loss: 0.4008 - val\_acc: 0.9380

Epoch 15/40

- 1s - loss: 0.1714 - acc: 0.9942 - val\_loss: 0.3835 - val\_acc: 0.9488

Epoch 16/40

- 1s - loss: 0.1507 - acc: 0.9982 - val\_loss: 0.3626 - val\_acc: 0.9553

Epoch 17/40

- 1s - loss: 0.1545 - acc: 0.9930 - val\_loss: 0.3534 - val\_acc: 0.9553

Epoch 18/40

- 1s - loss: 0.1433 - acc: 0.9957 - val\_loss: 0.3508 - val\_acc: 0.9560

Epoch 19/40

- 1s - loss: 0.1315 - acc: 0.9976 - val\_loss: 0.3222 - val\_acc: 0.9618

Epoch 20/40

- 1s - loss: 0.1260 - acc: 0.9976 - val\_loss: 0.3344 - val\_acc: 0.9546

Epoch 21/40

- 1s - loss: 0.1376 - acc: 0.9921 - val\_loss: 0.3354 - val\_acc: 0.9531

Epoch 22/40

```

- 1s - loss: 0.1267 - acc: 0.9951 - val_loss: 0.3111 - val_acc: 0.9625
Epoch 23/40
- 1s - loss: 0.1246 - acc: 0.9951 - val_loss: 0.3039 - val_acc: 0.9596
Epoch 24/40
- 1s - loss: 0.1277 - acc: 0.9927 - val_loss: 0.3375 - val_acc: 0.9243
Epoch 25/40
- 1s - loss: 0.1344 - acc: 0.9927 - val_loss: 0.2861 - val_acc: 0.9704
Epoch 26/40
- 1s - loss: 0.1115 - acc: 0.9976 - val_loss: 0.2918 - val_acc: 0.9625
Epoch 27/40
- 1s - loss: 0.1025 - acc: 0.9985 - val_loss: 0.2790 - val_acc: 0.9676
Epoch 28/40
- 1s - loss: 0.0999 - acc: 0.9991 - val_loss: 0.2858 - val_acc: 0.9683
Epoch 29/40
- 1s - loss: 0.1320 - acc: 0.9860 - val_loss: 0.2688 - val_acc: 0.9567
Epoch 30/40
- 1s - loss: 0.1075 - acc: 0.9960 - val_loss: 0.2536 - val_acc: 0.9704
Epoch 31/40
- 1s - loss: 0.0993 - acc: 0.9979 - val_loss: 0.2493 - val_acc: 0.9719
Epoch 32/40
- 1s - loss: 0.1262 - acc: 0.9854 - val_loss: 0.3293 - val_acc: 0.9207
Epoch 33/40
- 1s - loss: 0.1178 - acc: 0.9936 - val_loss: 0.2989 - val_acc: 0.9387
Epoch 34/40
- 1s - loss: 0.1031 - acc: 0.9957 - val_loss: 0.2575 - val_acc: 0.9668
Epoch 35/40
- 1s - loss: 0.0889 - acc: 0.9976 - val_loss: 0.2480 - val_acc: 0.9676
Epoch 36/40
- 1s - loss: 0.0866 - acc: 0.9997 - val_loss: 0.2586 - val_acc: 0.9603
Epoch 37/40
- 1s - loss: 0.0977 - acc: 0.9942 - val_loss: 0.2555 - val_acc: 0.9625
Epoch 38/40
- 1s - loss: 0.0868 - acc: 0.9994 - val_loss: 0.2341 - val_acc: 0.9719
Epoch 39/40
- 1s - loss: 0.0825 - acc: 0.9994 - val_loss: 0.2262 - val_acc: 0.9733
Epoch 40/40
- 1s - loss: 0.0812 - acc: 0.9982 - val_loss: 0.2445 - val_acc: 0.9603
Train accuracy 0.9990867579908675 Test accuracy: 0.9603460706560922

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 16)	3600
dropout_1 (Dropout)	(None, 116, 16)	0

```

max_pooling1d_1 (MaxPooling1 (None, 23, 16)          0
-----
flatten_1 (Flatten)          (None, 368)          0
-----
dense_1 (Dense)              (None, 16)          5904
-----
dense_2 (Dense)              (None, 3)           51
=====
Total params: 11,603
Trainable params: 11,603
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
  - 2s - loss: 49.9272 - acc: 0.4094 - val_loss: 20.7428 - val_acc: 0.5386
Epoch 2/35
  - 1s - loss: 10.1104 - acc: 0.7598 - val_loss: 3.9770 - val_acc: 0.8832
Epoch 3/35
  - 1s - loss: 1.7959 - acc: 0.9556 - val_loss: 1.0558 - val_acc: 0.9142
Epoch 4/35
  - 1s - loss: 0.5014 - acc: 0.9732 - val_loss: 0.6415 - val_acc: 0.9236
Epoch 5/35
  - 1s - loss: 0.2948 - acc: 0.9854 - val_loss: 0.5471 - val_acc: 0.9423
Epoch 6/35
  - 1s - loss: 0.2485 - acc: 0.9851 - val_loss: 0.5157 - val_acc: 0.9452
Epoch 7/35
  - 1s - loss: 0.2257 - acc: 0.9857 - val_loss: 0.5077 - val_acc: 0.9077
Epoch 8/35
  - 1s - loss: 0.2126 - acc: 0.9823 - val_loss: 0.4304 - val_acc: 0.9603
Epoch 9/35
  - 1s - loss: 0.1860 - acc: 0.9887 - val_loss: 0.4385 - val_acc: 0.9257
Epoch 10/35
  - 1s - loss: 0.2331 - acc: 0.9760 - val_loss: 0.4543 - val_acc: 0.9164
Epoch 11/35
  - 1s - loss: 0.1769 - acc: 0.9887 - val_loss: 0.4008 - val_acc: 0.9481
Epoch 12/35
  - 1s - loss: 0.1929 - acc: 0.9820 - val_loss: 0.3687 - val_acc: 0.9524
Epoch 13/35
  - 1s - loss: 0.1643 - acc: 0.9875 - val_loss: 0.3865 - val_acc: 0.9423
Epoch 14/35
  - 1s - loss: 0.1385 - acc: 0.9942 - val_loss: 0.3583 - val_acc: 0.9481
Epoch 15/35
  - 1s - loss: 0.1447 - acc: 0.9912 - val_loss: 0.3463 - val_acc: 0.9611
Epoch 16/35
  - 1s - loss: 0.1692 - acc: 0.9836 - val_loss: 0.3394 - val_acc: 0.9647
Epoch 17/35
  - 1s - loss: 0.1712 - acc: 0.9845 - val_loss: 0.3449 - val_acc: 0.9596

```

```

Epoch 18/35
- 1s - loss: 0.1509 - acc: 0.9890 - val_loss: 0.3523 - val_acc: 0.9553
Epoch 19/35
- 1s - loss: 0.1440 - acc: 0.9881 - val_loss: 0.2919 - val_acc: 0.9877
Epoch 20/35
- 1s - loss: 0.1186 - acc: 0.9963 - val_loss: 0.3095 - val_acc: 0.9575
Epoch 21/35
- 1s - loss: 0.1555 - acc: 0.9848 - val_loss: 0.3323 - val_acc: 0.9567
Epoch 22/35
- 1s - loss: 0.1087 - acc: 0.9970 - val_loss: 0.3030 - val_acc: 0.9719
Epoch 23/35
- 1s - loss: 0.1475 - acc: 0.9860 - val_loss: 0.3152 - val_acc: 0.9531
Epoch 24/35
- 1s - loss: 0.1861 - acc: 0.9790 - val_loss: 0.3033 - val_acc: 0.9582
Epoch 25/35
- 1s - loss: 0.1333 - acc: 0.9851 - val_loss: 0.3348 - val_acc: 0.9495
Epoch 26/35
- 1s - loss: 0.1736 - acc: 0.9826 - val_loss: 0.3213 - val_acc: 0.9567
Epoch 27/35
- 1s - loss: 0.1051 - acc: 0.9945 - val_loss: 0.2816 - val_acc: 0.9784
Epoch 28/35
- 1s - loss: 0.1037 - acc: 0.9957 - val_loss: 0.3041 - val_acc: 0.9445
Epoch 29/35
- 1s - loss: 0.1147 - acc: 0.9918 - val_loss: 0.2707 - val_acc: 0.9733
Epoch 30/35
- 1s - loss: 0.1197 - acc: 0.9915 - val_loss: 0.2486 - val_acc: 0.9726
Epoch 31/35
- 1s - loss: 0.0895 - acc: 0.9970 - val_loss: 0.2463 - val_acc: 0.9776
Epoch 32/35
- 1s - loss: 0.1253 - acc: 0.9863 - val_loss: 0.2742 - val_acc: 0.9517
Epoch 33/35
- 1s - loss: 0.1093 - acc: 0.9918 - val_loss: 0.3344 - val_acc: 0.9387
Epoch 34/35
- 1s - loss: 0.2112 - acc: 0.9766 - val_loss: 0.2539 - val_acc: 0.9704
Epoch 35/35
- 1s - loss: 0.1013 - acc: 0.9960 - val_loss: 0.2499 - val_acc: 0.9762
Train accuracy 0.9990867579908675 Test accuracy: 0.9762076423936553

```

---

Layer (type)	Output Shape	Param #
<hr/>		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
<hr/>		
conv1d_2 (Conv1D)	(None, 118, 32)	4512
<hr/>		
dropout_1 (Dropout)	(None, 118, 32)	0
<hr/>		
max_pooling1d_1 (MaxPooling1	(None, 59, 32)	0

```

-----
flatten_1 (Flatten)                (None, 1888)                0
-----
dense_1 (Dense)                    (None, 16)                   30224
-----
dense_2 (Dense)                    (None, 3)                    51
=====
Total params: 36,579
Trainable params: 36,579
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 2s - loss: 19.5358 - acc: 0.3799 - val_loss: 1.8626 - val_acc: 0.4629
Epoch 2/55
  - 2s - loss: 1.0296 - acc: 0.6170 - val_loss: 0.7845 - val_acc: 0.8147
Epoch 3/55
  - 2s - loss: 0.5333 - acc: 0.8895 - val_loss: 0.9670 - val_acc: 0.6864
Epoch 4/55
  - 2s - loss: 0.4538 - acc: 0.9199 - val_loss: 0.5835 - val_acc: 0.8486
Epoch 5/55
  - 2s - loss: 0.4003 - acc: 0.9336 - val_loss: 0.6024 - val_acc: 0.8673
Epoch 6/55
  - 2s - loss: 0.3606 - acc: 0.9473 - val_loss: 0.5956 - val_acc: 0.8688
Epoch 7/55
  - 2s - loss: 0.3238 - acc: 0.9595 - val_loss: 0.5001 - val_acc: 0.8616
Epoch 8/55
  - 2s - loss: 0.3353 - acc: 0.9440 - val_loss: 0.5423 - val_acc: 0.8911
Epoch 9/55
  - 2s - loss: 0.2950 - acc: 0.9619 - val_loss: 0.5656 - val_acc: 0.8558
Epoch 10/55
  - 2s - loss: 0.3091 - acc: 0.9571 - val_loss: 0.4094 - val_acc: 0.9041
Epoch 11/55
  - 2s - loss: 0.2954 - acc: 0.9595 - val_loss: 0.4167 - val_acc: 0.9005
Epoch 12/55
  - 2s - loss: 0.2550 - acc: 0.9686 - val_loss: 0.8916 - val_acc: 0.6402
Epoch 13/55
  - 2s - loss: 0.2943 - acc: 0.9540 - val_loss: 0.4595 - val_acc: 0.9207
Epoch 14/55
  - 2s - loss: 0.2450 - acc: 0.9735 - val_loss: 0.4925 - val_acc: 0.8940
Epoch 15/55
  - 2s - loss: 0.2795 - acc: 0.9568 - val_loss: 0.3741 - val_acc: 0.9128
Epoch 16/55
  - 2s - loss: 0.2550 - acc: 0.9635 - val_loss: 0.4501 - val_acc: 0.8875
Epoch 17/55
  - 2s - loss: 0.2708 - acc: 0.9604 - val_loss: 0.4031 - val_acc: 0.8955
Epoch 18/55

```

- 2s - loss: 0.2060 - acc: 0.9799 - val\_loss: 0.3848 - val\_acc: 0.8911  
 Epoch 19/55  
 - 2s - loss: 0.2641 - acc: 0.9626 - val\_loss: 0.4675 - val\_acc: 0.8580  
 Epoch 20/55  
 - 2s - loss: 0.2320 - acc: 0.9683 - val\_loss: 0.6059 - val\_acc: 0.8882  
 Epoch 21/55  
 - 2s - loss: 0.2413 - acc: 0.9656 - val\_loss: 0.3524 - val\_acc: 0.9272  
 Epoch 22/55  
 - 2s - loss: 0.2138 - acc: 0.9747 - val\_loss: 0.4796 - val\_acc: 0.9019  
 Epoch 23/55  
 - 2s - loss: 0.2381 - acc: 0.9656 - val\_loss: 0.3494 - val\_acc: 0.9337  
 Epoch 24/55  
 - 2s - loss: 0.2135 - acc: 0.9726 - val\_loss: 0.4656 - val\_acc: 0.8904  
 Epoch 25/55  
 - 2s - loss: 0.2128 - acc: 0.9744 - val\_loss: 0.3173 - val\_acc: 0.9380  
 Epoch 26/55  
 - 2s - loss: 0.2481 - acc: 0.9629 - val\_loss: 0.4904 - val\_acc: 0.8630  
 Epoch 27/55  
 - 2s - loss: 0.2069 - acc: 0.9747 - val\_loss: 0.4553 - val\_acc: 0.9128  
 Epoch 28/55  
 - 2s - loss: 0.2423 - acc: 0.9629 - val\_loss: 0.3879 - val\_acc: 0.9257  
 Epoch 29/55  
 - 2s - loss: 0.2608 - acc: 0.9583 - val\_loss: 0.3438 - val\_acc: 0.9279  
 Epoch 30/55  
 - 2s - loss: 0.2052 - acc: 0.9735 - val\_loss: 0.4025 - val\_acc: 0.9012  
 Epoch 31/55  
 - 2s - loss: 0.2243 - acc: 0.9641 - val\_loss: 0.3928 - val\_acc: 0.9077  
 Epoch 32/55  
 - 2s - loss: 0.2665 - acc: 0.9571 - val\_loss: 0.4382 - val\_acc: 0.8976  
 Epoch 33/55  
 - 2s - loss: 0.2097 - acc: 0.9799 - val\_loss: 0.3907 - val\_acc: 0.8911  
 Epoch 34/55  
 - 2s - loss: 0.1692 - acc: 0.9811 - val\_loss: 0.4120 - val\_acc: 0.9048  
 Epoch 35/55  
 - 2s - loss: 0.2577 - acc: 0.9604 - val\_loss: 0.4248 - val\_acc: 0.9099  
 Epoch 36/55  
 - 2s - loss: 0.2214 - acc: 0.9750 - val\_loss: 0.4099 - val\_acc: 0.9034  
 Epoch 37/55  
 - 2s - loss: 0.1885 - acc: 0.9830 - val\_loss: 0.3188 - val\_acc: 0.9416  
 Epoch 38/55  
 - 2s - loss: 0.2078 - acc: 0.9717 - val\_loss: 0.3687 - val\_acc: 0.8868  
 Epoch 39/55  
 - 2s - loss: 0.2183 - acc: 0.9735 - val\_loss: 0.3494 - val\_acc: 0.9344  
 Epoch 40/55  
 - 2s - loss: 0.1721 - acc: 0.9820 - val\_loss: 0.3360 - val\_acc: 0.9257  
 Epoch 41/55  
 - 2s - loss: 0.1719 - acc: 0.9817 - val\_loss: 0.4524 - val\_acc: 0.9041  
 Epoch 42/55

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- 2s - loss: 0.1797 - acc: 0.9793 - val_loss: 0.2934 - val_acc: 0.9373
Epoch 43/55
- 2s - loss: 0.1622 - acc: 0.9845 - val_loss: 0.4720 - val_acc: 0.8587
Epoch 44/55
- 2s - loss: 0.2028 - acc: 0.9750 - val_loss: 0.3956 - val_acc: 0.9315
Epoch 45/55
- 2s - loss: 0.2426 - acc: 0.9686 - val_loss: 0.3383 - val_acc: 0.9366
Epoch 46/55
- 2s - loss: 0.1413 - acc: 0.9878 - val_loss: 0.4053 - val_acc: 0.9027
Epoch 47/55
- 2s - loss: 0.1708 - acc: 0.9808 - val_loss: 0.3622 - val_acc: 0.9128
Epoch 48/55
- 2s - loss: 0.1654 - acc: 0.9787 - val_loss: 0.4360 - val_acc: 0.8955
Epoch 49/55
- 2s - loss: 0.2318 - acc: 0.9693 - val_loss: 0.3967 - val_acc: 0.9171
Epoch 50/55
- 2s - loss: 0.1435 - acc: 0.9872 - val_loss: 0.2914 - val_acc: 0.9351
Epoch 51/55
- 2s - loss: 0.1467 - acc: 0.9848 - val_loss: 0.2997 - val_acc: 0.9394
Epoch 52/55
- 2s - loss: 0.1824 - acc: 0.9760 - val_loss: 0.4233 - val_acc: 0.8991
Epoch 53/55
- 2s - loss: 0.2113 - acc: 0.9702 - val_loss: 0.3128 - val_acc: 0.9366
Epoch 54/55
- 2s - loss: 0.1397 - acc: 0.9878 - val_loss: 0.5185 - val_acc: 0.9084
Epoch 55/55
- 2s - loss: 0.1291 - acc: 0.9881 - val_loss: 0.3796 - val_acc: 0.9092
Train accuracy 0.9823439878234399 Test accuracy: 0.9091564527757751

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 120, 32)	7200
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 16)	12304
dense_2 (Dense)	(None, 3)	51

```

Total params: 20,451
Trainable params: 20,451

```



Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 3s - loss: 39.9318 - acc: 0.5075 - val\_loss: 14.2388 - val\_acc: 0.5451

Epoch 2/35

- 2s - loss: 8.1567 - acc: 0.7994 - val\_loss: 4.7972 - val\_acc: 0.7945

Epoch 3/35

- 2s - loss: 2.9674 - acc: 0.9224 - val\_loss: 2.1537 - val\_acc: 0.8248

Epoch 4/35

- 2s - loss: 1.2865 - acc: 0.9489 - val\_loss: 1.1917 - val\_acc: 0.8983

Epoch 5/35

- 2s - loss: 0.7030 - acc: 0.9504 - val\_loss: 0.8658 - val\_acc: 0.8818

Epoch 6/35

- 2s - loss: 0.4736 - acc: 0.9644 - val\_loss: 0.7227 - val\_acc: 0.8825

Epoch 7/35

- 2s - loss: 0.4091 - acc: 0.9619 - val\_loss: 0.6452 - val\_acc: 0.9329

Epoch 8/35

- 2s - loss: 0.3748 - acc: 0.9626 - val\_loss: 0.6806 - val\_acc: 0.8277

Epoch 9/35

- 2s - loss: 0.3535 - acc: 0.9674 - val\_loss: 0.5845 - val\_acc: 0.9279

Epoch 10/35

- 2s - loss: 0.3225 - acc: 0.9744 - val\_loss: 0.6290 - val\_acc: 0.8414

Epoch 11/35

- 2s - loss: 0.2989 - acc: 0.9732 - val\_loss: 0.5835 - val\_acc: 0.9005

Epoch 12/35

- 2s - loss: 0.2882 - acc: 0.9778 - val\_loss: 0.5502 - val\_acc: 0.8868

Epoch 13/35

- 2s - loss: 0.2669 - acc: 0.9826 - val\_loss: 0.5099 - val\_acc: 0.9229

Epoch 14/35

- 2s - loss: 0.2432 - acc: 0.9869 - val\_loss: 0.4735 - val\_acc: 0.9452

Epoch 15/35

- 2s - loss: 0.2572 - acc: 0.9775 - val\_loss: 0.5402 - val\_acc: 0.9142

Epoch 16/35

- 2s - loss: 0.2432 - acc: 0.9878 - val\_loss: 0.5616 - val\_acc: 0.8169

Epoch 17/35

- 2s - loss: 0.2312 - acc: 0.9839 - val\_loss: 0.4245 - val\_acc: 0.9409

Epoch 18/35

- 2s - loss: 0.2066 - acc: 0.9896 - val\_loss: 0.4191 - val\_acc: 0.9466

Epoch 19/35

- 2s - loss: 0.1989 - acc: 0.9903 - val\_loss: 0.4569 - val\_acc: 0.9056

Epoch 20/35

- 2s - loss: 0.1909 - acc: 0.9909 - val\_loss: 0.3871 - val\_acc: 0.9618

Epoch 21/35

- 2s - loss: 0.1835 - acc: 0.9903 - val\_loss: 0.3966 - val\_acc: 0.9416

Epoch 22/35

- 2s - loss: 0.1995 - acc: 0.9851 - val\_loss: 0.3919 - val\_acc: 0.9438

```

Epoch 23/35
- 2s - loss: 0.1703 - acc: 0.9927 - val_loss: 0.3549 - val_acc: 0.9676
Epoch 24/35
- 2s - loss: 0.1770 - acc: 0.9903 - val_loss: 0.3598 - val_acc: 0.9539
Epoch 25/35
- 2s - loss: 0.1614 - acc: 0.9927 - val_loss: 0.3635 - val_acc: 0.9488
Epoch 26/35
- 2s - loss: 0.1782 - acc: 0.9875 - val_loss: 0.3761 - val_acc: 0.9373
Epoch 27/35
- 2s - loss: 0.1811 - acc: 0.9866 - val_loss: 0.3099 - val_acc: 0.9676
Epoch 28/35
- 2s - loss: 0.1793 - acc: 0.9857 - val_loss: 0.3599 - val_acc: 0.9445
Epoch 29/35
- 2s - loss: 0.1533 - acc: 0.9918 - val_loss: 0.4931 - val_acc: 0.8839
Epoch 30/35
- 2s - loss: 0.1569 - acc: 0.9912 - val_loss: 0.3236 - val_acc: 0.9575
Epoch 31/35
- 2s - loss: 0.1343 - acc: 0.9960 - val_loss: 0.3462 - val_acc: 0.9394
Epoch 32/35
- 2s - loss: 0.1633 - acc: 0.9863 - val_loss: 0.3575 - val_acc: 0.9531
Epoch 33/35
- 2s - loss: 0.1436 - acc: 0.9936 - val_loss: 0.3230 - val_acc: 0.9503
Epoch 34/35
- 2s - loss: 0.2067 - acc: 0.9747 - val_loss: 0.3447 - val_acc: 0.9625
Epoch 35/35
- 2s - loss: 0.1447 - acc: 0.9936 - val_loss: 0.3152 - val_acc: 0.9719
Train accuracy 1.0 Test accuracy: 0.9718817591925017

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 24)	5400
dropout_1 (Dropout)	(None, 116, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 38, 24)	0
flatten_1 (Flatten)	(None, 912)	0
dense_1 (Dense)	(None, 16)	14608
dense_2 (Dense)	(None, 3)	51

```

Total params: 22,107
Trainable params: 22,107
Non-trainable params: 0

```

```

-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 2s - loss: 75.2065 - acc: 0.4469 - val_loss: 41.6089 - val_acc: 0.5083
Epoch 2/55
  - 2s - loss: 25.3413 - acc: 0.6131 - val_loss: 13.8350 - val_acc: 0.6489
Epoch 3/55
  - 2s - loss: 8.1672 - acc: 0.8612 - val_loss: 4.4951 - val_acc: 0.8681
Epoch 4/55
  - 2s - loss: 2.5159 - acc: 0.9537 - val_loss: 1.6027 - val_acc: 0.9358
Epoch 5/55
  - 2s - loss: 0.8729 - acc: 0.9677 - val_loss: 0.8342 - val_acc: 0.9106
Epoch 6/55
  - 2s - loss: 0.4527 - acc: 0.9696 - val_loss: 0.6095 - val_acc: 0.9366
Epoch 7/55
  - 2s - loss: 0.3111 - acc: 0.9860 - val_loss: 0.5261 - val_acc: 0.9308
Epoch 8/55
  - 2s - loss: 0.2712 - acc: 0.9860 - val_loss: 0.5232 - val_acc: 0.9106
Epoch 9/55
  - 2s - loss: 0.2479 - acc: 0.9854 - val_loss: 0.4469 - val_acc: 0.9445
Epoch 10/55
  - 2s - loss: 0.2362 - acc: 0.9826 - val_loss: 0.5294 - val_acc: 0.8782
Epoch 11/55
  - 2s - loss: 0.2169 - acc: 0.9863 - val_loss: 0.4324 - val_acc: 0.9546
Epoch 12/55
  - 2s - loss: 0.2171 - acc: 0.9833 - val_loss: 0.4089 - val_acc: 0.9582
Epoch 13/55
  - 2s - loss: 0.1875 - acc: 0.9909 - val_loss: 0.4325 - val_acc: 0.9221
Epoch 14/55
  - 2s - loss: 0.1856 - acc: 0.9878 - val_loss: 0.4396 - val_acc: 0.9077
Epoch 15/55
  - 2s - loss: 0.1937 - acc: 0.9857 - val_loss: 0.3662 - val_acc: 0.9546
Epoch 16/55
  - 2s - loss: 0.1743 - acc: 0.9878 - val_loss: 0.3499 - val_acc: 0.9567
Epoch 17/55
  - 2s - loss: 0.1660 - acc: 0.9912 - val_loss: 0.3319 - val_acc: 0.9640
Epoch 18/55
  - 2s - loss: 0.1499 - acc: 0.9918 - val_loss: 0.3821 - val_acc: 0.9214
Epoch 19/55
  - 2s - loss: 0.1782 - acc: 0.9826 - val_loss: 0.3086 - val_acc: 0.9798
Epoch 20/55
  - 2s - loss: 0.1477 - acc: 0.9927 - val_loss: 0.3352 - val_acc: 0.9387
Epoch 21/55
  - 2s - loss: 0.1426 - acc: 0.9921 - val_loss: 0.3320 - val_acc: 0.9488
Epoch 22/55
  - 2s - loss: 0.1560 - acc: 0.9869 - val_loss: 0.3335 - val_acc: 0.9402
Epoch 23/55

```

- 2s - loss: 0.1614 - acc: 0.9836 - val\_loss: 0.2969 - val\_acc: 0.9510  
 Epoch 24/55  
 - 2s - loss: 0.1488 - acc: 0.9875 - val\_loss: 0.3378 - val\_acc: 0.9257  
 Epoch 25/55  
 - 2s - loss: 0.1594 - acc: 0.9860 - val\_loss: 0.3266 - val\_acc: 0.9495  
 Epoch 26/55  
 - 2s - loss: 0.1650 - acc: 0.9839 - val\_loss: 0.3295 - val\_acc: 0.9243  
 Epoch 27/55  
 - 2s - loss: 0.1577 - acc: 0.9805 - val\_loss: 0.3043 - val\_acc: 0.9632  
 Epoch 28/55  
 - 2s - loss: 0.1469 - acc: 0.9915 - val\_loss: 0.2842 - val\_acc: 0.9647  
 Epoch 29/55  
 - 2s - loss: 0.1165 - acc: 0.9945 - val\_loss: 0.2883 - val\_acc: 0.9546  
 Epoch 30/55  
 - 2s - loss: 0.1270 - acc: 0.9921 - val\_loss: 0.2611 - val\_acc: 0.9640  
 Epoch 31/55  
 - 2s - loss: 0.1081 - acc: 0.9963 - val\_loss: 0.2516 - val\_acc: 0.9654  
 Epoch 32/55  
 - 2s - loss: 0.1611 - acc: 0.9781 - val\_loss: 0.3549 - val\_acc: 0.9099  
 Epoch 33/55  
 - 2s - loss: 0.1171 - acc: 0.9936 - val\_loss: 0.3083 - val\_acc: 0.9272  
 Epoch 34/55  
 - 2s - loss: 0.1477 - acc: 0.9863 - val\_loss: 0.2706 - val\_acc: 0.9560  
 Epoch 35/55  
 - 2s - loss: 0.1137 - acc: 0.9939 - val\_loss: 0.2498 - val\_acc: 0.9690  
 Epoch 36/55  
 - 2s - loss: 0.1007 - acc: 0.9963 - val\_loss: 0.2597 - val\_acc: 0.9524  
 Epoch 37/55  
 - 2s - loss: 0.1088 - acc: 0.9915 - val\_loss: 0.2581 - val\_acc: 0.9416  
 Epoch 38/55  
 - 2s - loss: 0.1374 - acc: 0.9869 - val\_loss: 0.2853 - val\_acc: 0.9380  
 Epoch 39/55  
 - 2s - loss: 0.1458 - acc: 0.9796 - val\_loss: 0.4076 - val\_acc: 0.8861  
 Epoch 40/55  
 - 2s - loss: 0.1359 - acc: 0.9906 - val\_loss: 0.2528 - val\_acc: 0.9640  
 Epoch 41/55  
 - 2s - loss: 0.0930 - acc: 0.9963 - val\_loss: 0.2688 - val\_acc: 0.9539  
 Epoch 42/55  
 - 1s - loss: 0.1632 - acc: 0.9741 - val\_loss: 0.3988 - val\_acc: 0.9445  
 Epoch 43/55  
 - 2s - loss: 0.1665 - acc: 0.9866 - val\_loss: 0.2538 - val\_acc: 0.9697  
 Epoch 44/55  
 - 2s - loss: 0.0977 - acc: 0.9960 - val\_loss: 0.2397 - val\_acc: 0.9748  
 Epoch 45/55  
 - 2s - loss: 0.0929 - acc: 0.9970 - val\_loss: 0.2832 - val\_acc: 0.9366  
 Epoch 46/55  
 - 1s - loss: 0.1078 - acc: 0.9918 - val\_loss: 0.3236 - val\_acc: 0.9185  
 Epoch 47/55

```

- 2s - loss: 0.1023 - acc: 0.9924 - val_loss: 0.2288 - val_acc: 0.9690
Epoch 48/55
- 2s - loss: 0.1225 - acc: 0.9872 - val_loss: 0.2600 - val_acc: 0.9683
Epoch 49/55
- 2s - loss: 0.1073 - acc: 0.9945 - val_loss: 0.2595 - val_acc: 0.9676
Epoch 50/55
- 2s - loss: 0.1503 - acc: 0.9793 - val_loss: 0.3501 - val_acc: 0.9128
Epoch 51/55
- 1s - loss: 0.1021 - acc: 0.9967 - val_loss: 0.2480 - val_acc: 0.9640
Epoch 52/55
- 2s - loss: 0.0791 - acc: 0.9976 - val_loss: 0.2473 - val_acc: 0.9618
Epoch 53/55
- 1s - loss: 0.0878 - acc: 0.9930 - val_loss: 0.1963 - val_acc: 0.9755
Epoch 54/55
- 1s - loss: 0.0896 - acc: 0.9960 - val_loss: 0.2208 - val_acc: 0.9697
Epoch 55/55
- 2s - loss: 0.1051 - acc: 0.9903 - val_loss: 0.2129 - val_acc: 0.9632
Train accuracy 0.9993911719939117 Test accuracy: 0.9632299927901946

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 32)	3104
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 32)	0
flatten_1 (Flatten)	(None, 768)	0
dense_1 (Dense)	(None, 16)	12304
dense_2 (Dense)	(None, 3)	51

```

Total params: 17,507
Trainable params: 17,507
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 61.4919 - acc: 0.4606 - val_loss: 16.4711 - val_acc: 0.4059
Epoch 2/35
- 1s - loss: 5.7178 - acc: 0.5872 - val_loss: 1.3135 - val_acc: 0.6078
Epoch 3/35
- 1s - loss: 0.8733 - acc: 0.7519 - val_loss: 1.0984 - val_acc: 0.5350

```

Epoch 4/35  
- 1s - loss: 0.7006 - acc: 0.8033 - val\_loss: 0.8056 - val\_acc: 0.7844  
Epoch 5/35  
- 1s - loss: 0.6219 - acc: 0.8435 - val\_loss: 0.7070 - val\_acc: 0.8976  
Epoch 6/35  
- 1s - loss: 0.5731 - acc: 0.8630 - val\_loss: 0.7974 - val\_acc: 0.7859  
Epoch 7/35  
- 1s - loss: 0.5244 - acc: 0.8865 - val\_loss: 0.8215 - val\_acc: 0.6691  
Epoch 8/35  
- 1s - loss: 0.4982 - acc: 0.8989 - val\_loss: 0.6755 - val\_acc: 0.8392  
Epoch 9/35  
- 1s - loss: 0.5044 - acc: 0.8925 - val\_loss: 0.6529 - val\_acc: 0.8709  
Epoch 10/35  
- 1s - loss: 0.4666 - acc: 0.8998 - val\_loss: 0.8604 - val\_acc: 0.6720  
Epoch 11/35  
- 1s - loss: 0.4912 - acc: 0.8925 - val\_loss: 0.7170 - val\_acc: 0.8154  
Epoch 12/35  
- 1s - loss: 0.4610 - acc: 0.9081 - val\_loss: 0.6197 - val\_acc: 0.8032  
Epoch 13/35  
- 1s - loss: 0.4677 - acc: 0.8971 - val\_loss: 0.7363 - val\_acc: 0.7404  
Epoch 14/35  
- 1s - loss: 0.4452 - acc: 0.9120 - val\_loss: 0.5767 - val\_acc: 0.8890  
Epoch 15/35  
- 1s - loss: 0.4566 - acc: 0.9056 - val\_loss: 0.5787 - val\_acc: 0.8861  
Epoch 16/35  
- 1s - loss: 0.4208 - acc: 0.9151 - val\_loss: 0.8008 - val\_acc: 0.7304  
Epoch 17/35  
- 1s - loss: 0.4161 - acc: 0.9139 - val\_loss: 0.6994 - val\_acc: 0.7549  
Epoch 18/35  
- 1s - loss: 0.4314 - acc: 0.9142 - val\_loss: 0.8145 - val\_acc: 0.7116  
Epoch 19/35  
- 1s - loss: 0.4175 - acc: 0.9178 - val\_loss: 0.6752 - val\_acc: 0.8255  
Epoch 20/35  
- 1s - loss: 0.4182 - acc: 0.9224 - val\_loss: 0.5501 - val\_acc: 0.8745  
Epoch 21/35  
- 1s - loss: 0.4133 - acc: 0.9187 - val\_loss: 0.6178 - val\_acc: 0.8284  
Epoch 22/35  
- 1s - loss: 0.4188 - acc: 0.9181 - val\_loss: 0.7475 - val\_acc: 0.8032  
Epoch 23/35  
- 1s - loss: 0.3797 - acc: 0.9318 - val\_loss: 0.6183 - val\_acc: 0.8760  
Epoch 24/35  
- 1s - loss: 0.3891 - acc: 0.9309 - val\_loss: 0.5774 - val\_acc: 0.8717  
Epoch 25/35  
- 1s - loss: 0.4003 - acc: 0.9288 - val\_loss: 0.6413 - val\_acc: 0.8457  
Epoch 26/35  
- 1s - loss: 0.3730 - acc: 0.9409 - val\_loss: 0.5568 - val\_acc: 0.8601  
Epoch 27/35  
- 1s - loss: 0.3906 - acc: 0.9321 - val\_loss: 0.6088 - val\_acc: 0.8457

```

Epoch 28/35
  - 1s - loss: 0.3661 - acc: 0.9364 - val_loss: 0.4532 - val_acc: 0.9229
Epoch 29/35
  - 1s - loss: 0.3839 - acc: 0.9406 - val_loss: 0.6615 - val_acc: 0.8147
Epoch 30/35
  - 1s - loss: 0.3905 - acc: 0.9342 - val_loss: 0.4304 - val_acc: 0.8998
Epoch 31/35
  - 1s - loss: 0.3816 - acc: 0.9376 - val_loss: 0.5036 - val_acc: 0.8637
Epoch 32/35
  - 1s - loss: 0.3510 - acc: 0.9412 - val_loss: 0.4889 - val_acc: 0.8652
Epoch 33/35
  - 1s - loss: 0.4204 - acc: 0.9233 - val_loss: 0.6419 - val_acc: 0.8111
Epoch 34/35
  - 1s - loss: 0.3452 - acc: 0.9394 - val_loss: 0.4686 - val_acc: 0.8897
Epoch 35/35
  - 1s - loss: 0.3964 - acc: 0.9346 - val_loss: 0.4617 - val_acc: 0.8947
Train accuracy 0.9875190258751902 Test accuracy: 0.8947368421052632

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 124, 32)	1472
conv1d_2 (Conv1D)	(None, 118, 32)	7200
dropout_1 (Dropout)	(None, 118, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 16)	11792
dense_2 (Dense)	(None, 3)	51

```

Total params: 20,515
Trainable params: 20,515
Non-trainable params: 0

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/40
  - 3s - loss: 64.8438 - acc: 0.4703 - val_loss: 29.3459 - val_acc: 0.5299
Epoch 2/40
  - 2s - loss: 16.7505 - acc: 0.7260 - val_loss: 8.7259 - val_acc: 0.7751
Epoch 3/40
  - 2s - loss: 5.0129 - acc: 0.9072 - val_loss: 2.9108 - val_acc: 0.8688
Epoch 4/40

```

- 2s - loss: 1.6114 - acc: 0.9482 - val\_loss: 1.2433 - val\_acc: 0.9214  
 Epoch 5/40  
 - 2s - loss: 0.6938 - acc: 0.9559 - val\_loss: 0.8096 - val\_acc: 0.9128  
 Epoch 6/40  
 - 2s - loss: 0.4549 - acc: 0.9598 - val\_loss: 0.6997 - val\_acc: 0.9149  
 Epoch 7/40  
 - 2s - loss: 0.3748 - acc: 0.9729 - val\_loss: 0.6176 - val\_acc: 0.9430  
 Epoch 8/40  
 - 2s - loss: 0.3398 - acc: 0.9729 - val\_loss: 0.5853 - val\_acc: 0.9373  
 Epoch 9/40  
 - 2s - loss: 0.2992 - acc: 0.9811 - val\_loss: 0.5649 - val\_acc: 0.9250  
 Epoch 10/40  
 - 2s - loss: 0.2866 - acc: 0.9775 - val\_loss: 0.5443 - val\_acc: 0.9243  
 Epoch 11/40  
 - 2s - loss: 0.2679 - acc: 0.9817 - val\_loss: 0.5092 - val\_acc: 0.9344  
 Epoch 12/40  
 - 2s - loss: 0.2657 - acc: 0.9784 - val\_loss: 0.5219 - val\_acc: 0.8969  
 Epoch 13/40  
 - 2s - loss: 0.2711 - acc: 0.9763 - val\_loss: 0.4901 - val\_acc: 0.9293  
 Epoch 14/40  
 - 2s - loss: 0.2412 - acc: 0.9808 - val\_loss: 0.4706 - val\_acc: 0.9510  
 Epoch 15/40  
 - 2s - loss: 0.2170 - acc: 0.9893 - val\_loss: 0.4346 - val\_acc: 0.9474  
 Epoch 16/40  
 - 2s - loss: 0.2210 - acc: 0.9830 - val\_loss: 0.4476 - val\_acc: 0.9272  
 Epoch 17/40  
 - 2s - loss: 0.2097 - acc: 0.9875 - val\_loss: 0.3973 - val\_acc: 0.9683  
 Epoch 18/40  
 - 2s - loss: 0.1938 - acc: 0.9896 - val\_loss: 0.4473 - val\_acc: 0.9164  
 Epoch 19/40  
 - 2s - loss: 0.2281 - acc: 0.9729 - val\_loss: 0.3830 - val\_acc: 0.9697  
 Epoch 20/40  
 - 2s - loss: 0.2028 - acc: 0.9839 - val\_loss: 0.4016 - val\_acc: 0.9452  
 Epoch 21/40  
 - 2s - loss: 0.1824 - acc: 0.9896 - val\_loss: 0.3990 - val\_acc: 0.9387  
 Epoch 22/40  
 - 2s - loss: 0.1676 - acc: 0.9909 - val\_loss: 0.4052 - val\_acc: 0.9539  
 Epoch 23/40  
 - 2s - loss: 0.1884 - acc: 0.9848 - val\_loss: 0.4336 - val\_acc: 0.9106  
 Epoch 24/40  
 - 2s - loss: 0.1795 - acc: 0.9851 - val\_loss: 0.3558 - val\_acc: 0.9683  
 Epoch 25/40  
 - 2s - loss: 0.1925 - acc: 0.9805 - val\_loss: 0.3378 - val\_acc: 0.9553  
 Epoch 26/40  
 - 2s - loss: 0.1622 - acc: 0.9903 - val\_loss: 0.3996 - val\_acc: 0.9344  
 Epoch 27/40  
 - 2s - loss: 0.1673 - acc: 0.9878 - val\_loss: 0.3328 - val\_acc: 0.9618  
 Epoch 28/40



```

- 2s - loss: 0.1792 - acc: 0.9842 - val_loss: 0.3572 - val_acc: 0.9495
Epoch 29/40
- 2s - loss: 0.1462 - acc: 0.9945 - val_loss: 0.3223 - val_acc: 0.9733
Epoch 30/40
- 2s - loss: 0.1579 - acc: 0.9887 - val_loss: 0.3516 - val_acc: 0.9611
Epoch 31/40
- 2s - loss: 0.1438 - acc: 0.9924 - val_loss: 0.3585 - val_acc: 0.9481
Epoch 32/40
- 2s - loss: 0.2326 - acc: 0.9665 - val_loss: 0.3432 - val_acc: 0.9625
Epoch 33/40
- 2s - loss: 0.1495 - acc: 0.9939 - val_loss: 0.3516 - val_acc: 0.9394
Epoch 34/40
- 2s - loss: 0.1409 - acc: 0.9936 - val_loss: 0.3798 - val_acc: 0.9142
Epoch 35/40
- 2s - loss: 0.1500 - acc: 0.9887 - val_loss: 0.3599 - val_acc: 0.9344
Epoch 36/40
- 2s - loss: 0.1385 - acc: 0.9927 - val_loss: 0.3085 - val_acc: 0.9719
Epoch 37/40
- 2s - loss: 0.1531 - acc: 0.9860 - val_loss: 0.3039 - val_acc: 0.9452
Epoch 38/40
- 2s - loss: 0.1728 - acc: 0.9826 - val_loss: 0.2972 - val_acc: 0.9690
Epoch 39/40
- 2s - loss: 0.1488 - acc: 0.9887 - val_loss: 0.3504 - val_acc: 0.9373
Epoch 40/40
- 2s - loss: 0.1415 - acc: 0.9921 - val_loss: 0.4321 - val_acc: 0.8818
Train accuracy 0.9549467276039008 Test accuracy: 0.8817591925018025

```

```

-----
Layer (type)                 Output Shape              Param #
-----
conv1d_1 (Conv1D)            (None, 122, 42)          2688
-----
conv1d_2 (Conv1D)            (None, 116, 16)          4720
-----
dropout_1 (Dropout)          (None, 116, 16)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 58, 16)          0
-----
flatten_1 (Flatten)          (None, 928)              0
-----
dense_1 (Dense)              (None, 16)               14864
-----
dense_2 (Dense)              (None, 3)                51
=====
Total params: 22,323
Trainable params: 22,323
Non-trainable params: 0
-----

```

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/35

- 2s - loss: 62.9197 - acc: 0.4417 - val\_loss: 39.5653 - val\_acc: 0.5451

Epoch 2/35

- 1s - loss: 27.0813 - acc: 0.5833 - val\_loss: 17.6876 - val\_acc: 0.5667

Epoch 3/35

- 1s - loss: 12.2107 - acc: 0.7683 - val\_loss: 8.2120 - val\_acc: 0.7837

Epoch 4/35

- 1s - loss: 5.5473 - acc: 0.9139 - val\_loss: 3.8797 - val\_acc: 0.8486

Epoch 5/35

- 1s - loss: 2.5166 - acc: 0.9586 - val\_loss: 1.9514 - val\_acc: 0.8724

Epoch 6/35

- 1s - loss: 1.2029 - acc: 0.9726 - val\_loss: 1.1020 - val\_acc: 0.9019

Epoch 7/35

- 1s - loss: 0.6543 - acc: 0.9772 - val\_loss: 0.7415 - val\_acc: 0.9156

Epoch 8/35

- 1s - loss: 0.4357 - acc: 0.9830 - val\_loss: 0.6167 - val\_acc: 0.9041

Epoch 9/35

- 1s - loss: 0.3436 - acc: 0.9851 - val\_loss: 0.5313 - val\_acc: 0.9207

Epoch 10/35

- 1s - loss: 0.3028 - acc: 0.9851 - val\_loss: 0.5531 - val\_acc: 0.8652

Epoch 11/35

- 1s - loss: 0.2687 - acc: 0.9887 - val\_loss: 0.4706 - val\_acc: 0.9337

Epoch 12/35

- 1s - loss: 0.2597 - acc: 0.9851 - val\_loss: 0.4340 - val\_acc: 0.9459

Epoch 13/35

- 1s - loss: 0.2394 - acc: 0.9890 - val\_loss: 0.4380 - val\_acc: 0.9416

Epoch 14/35

- 1s - loss: 0.2281 - acc: 0.9875 - val\_loss: 0.4145 - val\_acc: 0.9531

Epoch 15/35

- 1s - loss: 0.2214 - acc: 0.9878 - val\_loss: 0.4177 - val\_acc: 0.9229

Epoch 16/35

- 1s - loss: 0.2206 - acc: 0.9848 - val\_loss: 0.3495 - val\_acc: 0.9676

Epoch 17/35

- 1s - loss: 0.2111 - acc: 0.9866 - val\_loss: 0.3731 - val\_acc: 0.9337

Epoch 18/35

- 1s - loss: 0.1937 - acc: 0.9912 - val\_loss: 0.3845 - val\_acc: 0.9207

Epoch 19/35

- 1s - loss: 0.1942 - acc: 0.9890 - val\_loss: 0.3383 - val\_acc: 0.9539

Epoch 20/35

- 1s - loss: 0.1877 - acc: 0.9942 - val\_loss: 0.3387 - val\_acc: 0.9531

Epoch 21/35

- 1s - loss: 0.1713 - acc: 0.9933 - val\_loss: 0.3491 - val\_acc: 0.9481

Epoch 22/35

- 1s - loss: 0.1719 - acc: 0.9915 - val\_loss: 0.3439 - val\_acc: 0.9445

Epoch 23/35

- 1s - loss: 0.1705 - acc: 0.9912 - val\_loss: 0.3120 - val\_acc: 0.9712

```

Epoch 24/35
- 1s - loss: 0.1756 - acc: 0.9896 - val_loss: 0.3856 - val_acc: 0.9027
Epoch 25/35
- 1s - loss: 0.1732 - acc: 0.9896 - val_loss: 0.2932 - val_acc: 0.9618
Epoch 26/35
- 1s - loss: 0.1746 - acc: 0.9887 - val_loss: 0.3392 - val_acc: 0.9164
Epoch 27/35
- 1s - loss: 0.1536 - acc: 0.9936 - val_loss: 0.2935 - val_acc: 0.9546
Epoch 28/35
- 1s - loss: 0.1445 - acc: 0.9939 - val_loss: 0.2914 - val_acc: 0.9553
Epoch 29/35
- 1s - loss: 0.1484 - acc: 0.9927 - val_loss: 0.2737 - val_acc: 0.9603
Epoch 30/35
- 1s - loss: 0.1447 - acc: 0.9921 - val_loss: 0.2774 - val_acc: 0.9640
Epoch 31/35
- 1s - loss: 0.1357 - acc: 0.9927 - val_loss: 0.2471 - val_acc: 0.9784
Epoch 32/35
- 1s - loss: 0.1273 - acc: 0.9976 - val_loss: 0.2758 - val_acc: 0.9575
Epoch 33/35
- 1s - loss: 0.1362 - acc: 0.9927 - val_loss: 0.2718 - val_acc: 0.9582
Epoch 34/35
- 1s - loss: 0.1277 - acc: 0.9945 - val_loss: 0.2975 - val_acc: 0.9373
Epoch 35/35
- 1s - loss: 0.1422 - acc: 0.9878 - val_loss: 0.2752 - val_acc: 0.9603
Train accuracy 0.9750380517503805 Test accuracy: 0.9603460706560922

```

```

-----
Layer (type)                 Output Shape              Param #
=====
conv1d_1 (Conv1D)            (None, 122, 28)          1792
-----
conv1d_2 (Conv1D)            (None, 118, 32)          4512
-----
dropout_1 (Dropout)          (None, 118, 32)          0
-----
max_pooling1d_1 (MaxPooling1 (None, 23, 32)          0
-----
flatten_1 (Flatten)          (None, 736)              0
-----
dense_1 (Dense)              (None, 16)               11792
-----
dense_2 (Dense)              (None, 3)                51
=====
Total params: 18,147
Trainable params: 18,147
Non-trainable params: 0

```

```

-----
None

```

Train on 3285 samples, validate on 1387 samples

Epoch 1/55

- 2s - loss: 14.7104 - acc: 0.6183 - val\_loss: 3.3412 - val\_acc: 0.8637

Epoch 2/55

- 1s - loss: 1.2994 - acc: 0.9528 - val\_loss: 0.8177 - val\_acc: 0.9265

Epoch 3/55

- 1s - loss: 0.3896 - acc: 0.9796 - val\_loss: 0.5563 - val\_acc: 0.9510

Epoch 4/55

- 1s - loss: 0.2802 - acc: 0.9845 - val\_loss: 0.4780 - val\_acc: 0.9315

Epoch 5/55

- 1s - loss: 0.2235 - acc: 0.9881 - val\_loss: 0.4527 - val\_acc: 0.9329

Epoch 6/55

- 1s - loss: 0.2076 - acc: 0.9857 - val\_loss: 0.3880 - val\_acc: 0.9510

Epoch 7/55

- 1s - loss: 0.1893 - acc: 0.9878 - val\_loss: 0.3728 - val\_acc: 0.9409

Epoch 8/55

- 1s - loss: 0.1727 - acc: 0.9878 - val\_loss: 0.4007 - val\_acc: 0.9164

Epoch 9/55

- 1s - loss: 0.1466 - acc: 0.9927 - val\_loss: 0.3522 - val\_acc: 0.9315

Epoch 10/55

- 1s - loss: 0.1492 - acc: 0.9924 - val\_loss: 0.3521 - val\_acc: 0.9402

Epoch 11/55

- 1s - loss: 0.1513 - acc: 0.9893 - val\_loss: 0.2969 - val\_acc: 0.9676

Epoch 12/55

- 1s - loss: 0.1265 - acc: 0.9933 - val\_loss: 0.3368 - val\_acc: 0.9221

Epoch 13/55

- 1s - loss: 0.1288 - acc: 0.9924 - val\_loss: 0.3086 - val\_acc: 0.9510

Epoch 14/55

- 1s - loss: 0.1138 - acc: 0.9942 - val\_loss: 0.2905 - val\_acc: 0.9567

Epoch 15/55

- 1s - loss: 0.1238 - acc: 0.9900 - val\_loss: 0.3218 - val\_acc: 0.9250

Epoch 16/55

- 1s - loss: 0.1055 - acc: 0.9957 - val\_loss: 0.2455 - val\_acc: 0.9733

Epoch 17/55

- 1s - loss: 0.1348 - acc: 0.9842 - val\_loss: 0.2350 - val\_acc: 0.9798

Epoch 18/55

- 1s - loss: 0.0919 - acc: 0.9988 - val\_loss: 0.2599 - val\_acc: 0.9611

Epoch 19/55

- 1s - loss: 0.1116 - acc: 0.9887 - val\_loss: 0.2621 - val\_acc: 0.9596

Epoch 20/55

- 1s - loss: 0.0968 - acc: 0.9936 - val\_loss: 0.2329 - val\_acc: 0.9654

Epoch 21/55

- 1s - loss: 0.1076 - acc: 0.9884 - val\_loss: 0.3385 - val\_acc: 0.9286

Epoch 22/55

- 1s - loss: 0.0971 - acc: 0.9954 - val\_loss: 0.2309 - val\_acc: 0.9690

Epoch 23/55

- 1s - loss: 0.1038 - acc: 0.9900 - val\_loss: 0.3530 - val\_acc: 0.9077

Epoch 24/55

- 1s - loss: 0.1046 - acc: 0.9927 - val\_loss: 0.2529 - val\_acc: 0.9423  
 Epoch 25/55  
 - 1s - loss: 0.0925 - acc: 0.9942 - val\_loss: 0.2045 - val\_acc: 0.9719  
 Epoch 26/55  
 - 1s - loss: 0.0907 - acc: 0.9936 - val\_loss: 0.2535 - val\_acc: 0.9466  
 Epoch 27/55  
 - 1s - loss: 0.1000 - acc: 0.9936 - val\_loss: 0.2306 - val\_acc: 0.9625  
 Epoch 28/55  
 - 1s - loss: 0.0713 - acc: 0.9982 - val\_loss: 0.2201 - val\_acc: 0.9661  
 Epoch 29/55  
 - 1s - loss: 0.0842 - acc: 0.9924 - val\_loss: 0.2462 - val\_acc: 0.9481  
 Epoch 30/55  
 - 1s - loss: 0.0853 - acc: 0.9939 - val\_loss: 0.2270 - val\_acc: 0.9539  
 Epoch 31/55  
 - 1s - loss: 0.0704 - acc: 0.9976 - val\_loss: 0.2241 - val\_acc: 0.9539  
 Epoch 32/55  
 - 1s - loss: 0.1286 - acc: 0.9820 - val\_loss: 0.2041 - val\_acc: 0.9640  
 Epoch 33/55  
 - 1s - loss: 0.1177 - acc: 0.9884 - val\_loss: 0.1876 - val\_acc: 0.9719  
 Epoch 34/55  
 - 1s - loss: 0.0686 - acc: 0.9997 - val\_loss: 0.2126 - val\_acc: 0.9697  
 Epoch 35/55  
 - 1s - loss: 0.0640 - acc: 0.9988 - val\_loss: 0.2131 - val\_acc: 0.9618  
 Epoch 36/55  
 - 1s - loss: 0.0833 - acc: 0.9933 - val\_loss: 0.2057 - val\_acc: 0.9640  
 Epoch 37/55  
 - 1s - loss: 0.0632 - acc: 0.9979 - val\_loss: 0.2084 - val\_acc: 0.9661  
 Epoch 38/55  
 - 1s - loss: 0.0642 - acc: 0.9979 - val\_loss: 0.2087 - val\_acc: 0.9611  
 Epoch 39/55  
 - 1s - loss: 0.0574 - acc: 0.9997 - val\_loss: 0.1659 - val\_acc: 0.9769  
 Epoch 40/55  
 - 1s - loss: 0.0897 - acc: 0.9890 - val\_loss: 0.3305 - val\_acc: 0.9229  
 Epoch 41/55  
 - 1s - loss: 0.1653 - acc: 0.9769 - val\_loss: 0.3497 - val\_acc: 0.9445  
 Epoch 42/55  
 - 1s - loss: 0.0843 - acc: 0.9991 - val\_loss: 0.1875 - val\_acc: 0.9748  
 Epoch 43/55  
 - 1s - loss: 0.0573 - acc: 0.9994 - val\_loss: 0.2071 - val\_acc: 0.9466  
 Epoch 44/55  
 - 1s - loss: 0.0551 - acc: 0.9997 - val\_loss: 0.2085 - val\_acc: 0.9697  
 Epoch 45/55  
 - 1s - loss: 0.1139 - acc: 0.9830 - val\_loss: 0.4662 - val\_acc: 0.8731  
 Epoch 46/55  
 - 1s - loss: 0.1311 - acc: 0.9866 - val\_loss: 0.2324 - val\_acc: 0.9488  
 Epoch 47/55  
 - 1s - loss: 0.0620 - acc: 0.9997 - val\_loss: 0.2001 - val\_acc: 0.9640  
 Epoch 48/55

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- 1s - loss: 0.0567 - acc: 0.9988 - val_loss: 0.1758 - val_acc: 0.9740
Epoch 49/55
- 1s - loss: 0.0550 - acc: 0.9991 - val_loss: 0.1990 - val_acc: 0.9575
Epoch 50/55
- 1s - loss: 0.0822 - acc: 0.9900 - val_loss: 0.3142 - val_acc: 0.9438
Epoch 51/55
- 1s - loss: 0.0959 - acc: 0.9915 - val_loss: 0.2027 - val_acc: 0.9603
Epoch 52/55
- 1s - loss: 0.0847 - acc: 0.9924 - val_loss: 0.1840 - val_acc: 0.9668
Epoch 53/55
- 1s - loss: 0.0517 - acc: 0.9997 - val_loss: 0.1993 - val_acc: 0.9596
Epoch 54/55
- 1s - loss: 0.0626 - acc: 0.9963 - val_loss: 0.2404 - val_acc: 0.9366
Epoch 55/55
- 1s - loss: 0.0815 - acc: 0.9927 - val_loss: 0.1907 - val_acc: 0.9539
Train accuracy 0.9981735159817352 Test accuracy: 0.9538572458543619
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 126, 32)	896
conv1d_2 (Conv1D)	(None, 120, 32)	7200
dropout_1 (Dropout)	(None, 120, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 40, 32)	0
flatten_1 (Flatten)	(None, 1280)	0
dense_1 (Dense)	(None, 16)	20496
dense_2 (Dense)	(None, 3)	51

```

=====
Total params: 28,643
Trainable params: 28,643
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 36.3823 - acc: 0.5269 - val_loss: 8.4028 - val_acc: 0.6424
Epoch 2/35
- 2s - loss: 2.7223 - acc: 0.7811 - val_loss: 1.0639 - val_acc: 0.6510
Epoch 3/35
- 1s - loss: 0.6984 - acc: 0.8444 - val_loss: 1.2307 - val_acc: 0.5465
Epoch 4/35
- 1s - loss: 0.6043 - acc: 0.8688 - val_loss: 0.7267 - val_acc: 0.8673

```

Epoch 5/35  
 - 2s - loss: 0.5443 - acc: 0.8986 - val\_loss: 0.6926 - val\_acc: 0.8717

Epoch 6/35  
 - 1s - loss: 0.4721 - acc: 0.9145 - val\_loss: 0.6233 - val\_acc: 0.8955

Epoch 7/35  
 - 2s - loss: 0.4521 - acc: 0.9215 - val\_loss: 0.7439 - val\_acc: 0.7967

Epoch 8/35  
 - 1s - loss: 0.4647 - acc: 0.9148 - val\_loss: 0.5869 - val\_acc: 0.9077

Epoch 9/35  
 - 1s - loss: 0.4282 - acc: 0.9309 - val\_loss: 0.6773 - val\_acc: 0.8551

Epoch 10/35  
 - 2s - loss: 0.4109 - acc: 0.9370 - val\_loss: 0.5958 - val\_acc: 0.8435

Epoch 11/35  
 - 2s - loss: 0.3945 - acc: 0.9333 - val\_loss: 0.6758 - val\_acc: 0.8039

Epoch 12/35  
 - 2s - loss: 0.3657 - acc: 0.9425 - val\_loss: 0.8042 - val\_acc: 0.7289

Epoch 13/35  
 - 1s - loss: 0.3938 - acc: 0.9315 - val\_loss: 0.4911 - val\_acc: 0.8998

Epoch 14/35  
 - 2s - loss: 0.3504 - acc: 0.9446 - val\_loss: 1.0865 - val\_acc: 0.6770

Epoch 15/35  
 - 2s - loss: 0.3762 - acc: 0.9440 - val\_loss: 0.4385 - val\_acc: 0.9394

Epoch 16/35  
 - 2s - loss: 0.3244 - acc: 0.9537 - val\_loss: 0.4095 - val\_acc: 0.9524

Epoch 17/35  
 - 1s - loss: 0.3182 - acc: 0.9525 - val\_loss: 0.4061 - val\_acc: 0.9625

Epoch 18/35  
 - 1s - loss: 0.3037 - acc: 0.9562 - val\_loss: 0.4258 - val\_acc: 0.9373

Epoch 19/35  
 - 2s - loss: 0.2882 - acc: 0.9568 - val\_loss: 0.3806 - val\_acc: 0.9553

Epoch 20/35  
 - 2s - loss: 0.3101 - acc: 0.9580 - val\_loss: 0.3544 - val\_acc: 0.9647

Epoch 21/35  
 - 2s - loss: 0.2959 - acc: 0.9565 - val\_loss: 0.6346 - val\_acc: 0.8421

Epoch 22/35  
 - 1s - loss: 0.2997 - acc: 0.9549 - val\_loss: 0.4210 - val\_acc: 0.9142

Epoch 23/35  
 - 2s - loss: 0.3076 - acc: 0.9543 - val\_loss: 0.3944 - val\_acc: 0.9366

Epoch 24/35  
 - 2s - loss: 0.2961 - acc: 0.9586 - val\_loss: 0.3902 - val\_acc: 0.9387

Epoch 25/35  
 - 2s - loss: 0.2803 - acc: 0.9629 - val\_loss: 0.3855 - val\_acc: 0.9315

Epoch 26/35  
 - 2s - loss: 0.2748 - acc: 0.9607 - val\_loss: 0.3686 - val\_acc: 0.9380

Epoch 27/35  
 - 1s - loss: 0.3174 - acc: 0.9568 - val\_loss: 0.3496 - val\_acc: 0.9560

Epoch 28/35  
 - 1s - loss: 0.2570 - acc: 0.9674 - val\_loss: 0.3272 - val\_acc: 0.9567

```

Epoch 29/35
  - 2s - loss: 0.2703 - acc: 0.9619 - val_loss: 0.3418 - val_acc: 0.9618
Epoch 30/35
  - 2s - loss: 0.2671 - acc: 0.9610 - val_loss: 0.3886 - val_acc: 0.9481
Epoch 31/35
  - 1s - loss: 0.2798 - acc: 0.9595 - val_loss: 0.3214 - val_acc: 0.9575
Epoch 32/35
  - 2s - loss: 0.2596 - acc: 0.9644 - val_loss: 0.3815 - val_acc: 0.9265
Epoch 33/35
  - 2s - loss: 0.2874 - acc: 0.9571 - val_loss: 0.3727 - val_acc: 0.9445
Epoch 34/35
  - 2s - loss: 0.2910 - acc: 0.9571 - val_loss: 0.4160 - val_acc: 0.9394
Epoch 35/35
  - 1s - loss: 0.2627 - acc: 0.9629 - val_loss: 0.2809 - val_acc: 0.9697
Train accuracy 0.9966514459665144 Test accuracy: 0.969718817591925

```

---

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 120, 24)	2328
dropout_1 (Dropout)	(None, 120, 24)	0
max_pooling1d_1 (MaxPooling1D)	(None, 24, 24)	0
flatten_1 (Flatten)	(None, 576)	0
dense_1 (Dense)	(None, 16)	9232
dense_2 (Dense)	(None, 3)	51

---

```

Total params: 13,659
Trainable params: 13,659
Non-trainable params: 0

```

---

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/55
  - 2s - loss: 45.9541 - acc: 0.4536 - val_loss: 14.6712 - val_acc: 0.6388
Epoch 2/55
  - 1s - loss: 5.9997 - acc: 0.8773 - val_loss: 1.7479 - val_acc: 0.8926
Epoch 3/55
  - 1s - loss: 0.6600 - acc: 0.9708 - val_loss: 0.5599 - val_acc: 0.9120
Epoch 4/55
  - 1s - loss: 0.2670 - acc: 0.9763 - val_loss: 0.4202 - val_acc: 0.9466
Epoch 5/55

```



- 1s - loss: 0.2924 - acc: 0.9659 - val\_loss: 0.5029 - val\_acc: 0.8983  
 Epoch 6/55  
 - 1s - loss: 0.2346 - acc: 0.9781 - val\_loss: 0.3726 - val\_acc: 0.9553  
 Epoch 7/55  
 - 1s - loss: 0.1823 - acc: 0.9814 - val\_loss: 0.3398 - val\_acc: 0.9661  
 Epoch 8/55  
 - 1s - loss: 0.2698 - acc: 0.9680 - val\_loss: 0.3717 - val\_acc: 0.9503  
 Epoch 9/55  
 - 1s - loss: 0.1670 - acc: 0.9903 - val\_loss: 0.3604 - val\_acc: 0.9229  
 Epoch 10/55  
 - 1s - loss: 0.2006 - acc: 0.9814 - val\_loss: 0.3646 - val\_acc: 0.9539  
 Epoch 11/55  
 - 1s - loss: 0.1450 - acc: 0.9936 - val\_loss: 0.2808 - val\_acc: 0.9589  
 Epoch 12/55  
 - 1s - loss: 0.1869 - acc: 0.9823 - val\_loss: 0.3060 - val\_acc: 0.9640  
 Epoch 13/55  
 - 1s - loss: 0.1764 - acc: 0.9887 - val\_loss: 0.4010 - val\_acc: 0.9221  
 Epoch 14/55  
 - 1s - loss: 0.1435 - acc: 0.9927 - val\_loss: 0.2969 - val\_acc: 0.9430  
 Epoch 15/55  
 - 1s - loss: 0.1917 - acc: 0.9820 - val\_loss: 0.4265 - val\_acc: 0.9063  
 Epoch 16/55  
 - 1s - loss: 0.1886 - acc: 0.9826 - val\_loss: 0.3320 - val\_acc: 0.9474  
 Epoch 17/55  
 - 1s - loss: 0.2217 - acc: 0.9805 - val\_loss: 0.3297 - val\_acc: 0.9380  
 Epoch 18/55  
 - 1s - loss: 0.1786 - acc: 0.9860 - val\_loss: 0.3547 - val\_acc: 0.8976  
 Epoch 19/55  
 - 1s - loss: 0.1942 - acc: 0.9817 - val\_loss: 0.3980 - val\_acc: 0.9366  
 Epoch 20/55  
 - 1s - loss: 0.1368 - acc: 0.9948 - val\_loss: 0.2492 - val\_acc: 0.9647  
 Epoch 21/55  
 - 1s - loss: 0.0963 - acc: 0.9948 - val\_loss: 0.2906 - val\_acc: 0.9373  
 Epoch 22/55  
 - 1s - loss: 0.1547 - acc: 0.9848 - val\_loss: 0.4108 - val\_acc: 0.9019  
 Epoch 23/55  
 - 1s - loss: 0.1940 - acc: 0.9842 - val\_loss: 0.3017 - val\_acc: 0.9308  
 Epoch 24/55  
 - 1s - loss: 0.2116 - acc: 0.9814 - val\_loss: 0.2968 - val\_acc: 0.9402  
 Epoch 25/55  
 - 1s - loss: 0.1333 - acc: 0.9909 - val\_loss: 0.3389 - val\_acc: 0.9128  
 Epoch 26/55  
 - 1s - loss: 0.2062 - acc: 0.9808 - val\_loss: 0.3032 - val\_acc: 0.9618  
 Epoch 27/55  
 - 1s - loss: 0.1152 - acc: 0.9945 - val\_loss: 0.2425 - val\_acc: 0.9575  
 Epoch 28/55  
 - 1s - loss: 0.2108 - acc: 0.9772 - val\_loss: 0.3406 - val\_acc: 0.9632  
 Epoch 29/55

- 1s - loss: 0.1668 - acc: 0.9869 - val\_loss: 0.3262 - val\_acc: 0.9380  
 Epoch 30/55  
 - 1s - loss: 0.1491 - acc: 0.9909 - val\_loss: 0.2739 - val\_acc: 0.9560  
 Epoch 31/55  
 - 1s - loss: 0.1632 - acc: 0.9854 - val\_loss: 0.2978 - val\_acc: 0.9488  
 Epoch 32/55  
 - 1s - loss: 0.1118 - acc: 0.9887 - val\_loss: 0.3791 - val\_acc: 0.9063  
 Epoch 33/55  
 - 1s - loss: 0.1203 - acc: 0.9951 - val\_loss: 0.2797 - val\_acc: 0.9380  
 Epoch 34/55  
 - 1s - loss: 0.2091 - acc: 0.9820 - val\_loss: 0.3148 - val\_acc: 0.9387  
 Epoch 35/55  
 - 1s - loss: 0.1353 - acc: 0.9878 - val\_loss: 0.2092 - val\_acc: 0.9849  
 Epoch 36/55  
 - 1s - loss: 0.0937 - acc: 0.9951 - val\_loss: 0.3793 - val\_acc: 0.9005  
 Epoch 37/55  
 - 1s - loss: 0.2977 - acc: 0.9674 - val\_loss: 0.6978 - val\_acc: 0.9668  
 Epoch 38/55  
 - 1s - loss: 0.3690 - acc: 0.9836 - val\_loss: 0.2695 - val\_acc: 0.9553  
 Epoch 39/55  
 - 1s - loss: 0.0849 - acc: 0.9991 - val\_loss: 0.2757 - val\_acc: 0.9445  
 Epoch 40/55  
 - 1s - loss: 0.0712 - acc: 0.9976 - val\_loss: 0.3605 - val\_acc: 0.9171  
 Epoch 41/55  
 - 1s - loss: 0.1129 - acc: 0.9884 - val\_loss: 0.4625 - val\_acc: 0.9120  
 Epoch 42/55  
 - 1s - loss: 0.2405 - acc: 0.9793 - val\_loss: 0.3008 - val\_acc: 0.9459  
 Epoch 43/55  
 - 1s - loss: 0.1083 - acc: 0.9942 - val\_loss: 0.2397 - val\_acc: 0.9596  
 Epoch 44/55  
 - 1s - loss: 0.0669 - acc: 0.9985 - val\_loss: 0.2865 - val\_acc: 0.9265  
 Epoch 45/55  
 - 1s - loss: 0.0755 - acc: 0.9948 - val\_loss: 0.2644 - val\_acc: 0.9510  
 Epoch 46/55  
 - 1s - loss: 0.1231 - acc: 0.9863 - val\_loss: 0.2559 - val\_acc: 0.9517  
 Epoch 47/55  
 - 1s - loss: 0.0782 - acc: 0.9960 - val\_loss: 0.2112 - val\_acc: 0.9503  
 Epoch 48/55  
 - 1s - loss: 0.1765 - acc: 0.9799 - val\_loss: 0.4129 - val\_acc: 0.9056  
 Epoch 49/55  
 - 1s - loss: 0.2140 - acc: 0.9802 - val\_loss: 0.2954 - val\_acc: 0.9539  
 Epoch 50/55  
 - 1s - loss: 0.0799 - acc: 0.9970 - val\_loss: 0.3089 - val\_acc: 0.9236  
 Epoch 51/55  
 - 1s - loss: 0.1269 - acc: 0.9881 - val\_loss: 0.3483 - val\_acc: 0.9358  
 Epoch 52/55  
 - 1s - loss: 0.0911 - acc: 0.9948 - val\_loss: 0.3579 - val\_acc: 0.9200  
 Epoch 53/55

```

- 1s - loss: 0.0674 - acc: 0.9976 - val_loss: 0.2499 - val_acc: 0.9517
Epoch 54/55
- 1s - loss: 0.1685 - acc: 0.9872 - val_loss: 0.3338 - val_acc: 0.9308
Epoch 55/55
- 1s - loss: 0.0807 - acc: 0.9942 - val_loss: 0.3525 - val_acc: 0.9337
Train accuracy 0.9637747337647588 Test accuracy: 0.9336697909156453

```

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 32)	2048
-----		
conv1d_2 (Conv1D)	(None, 116, 32)	7200
-----		
dropout_1 (Dropout)	(None, 116, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
-----		
flatten_1 (Flatten)	(None, 736)	0
-----		
dense_1 (Dense)	(None, 64)	47168
-----		
dense_2 (Dense)	(None, 3)	195
=====		

```

Total params: 56,611
Trainable params: 56,611
Non-trainable params: 0

```

---

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 36.5170 - acc: 0.6493 - val_loss: 21.6438 - val_acc: 0.6936
Epoch 2/35
- 2s - loss: 13.4174 - acc: 0.9428 - val_loss: 7.9785 - val_acc: 0.9250
Epoch 3/35
- 1s - loss: 4.8053 - acc: 0.9772 - val_loss: 3.1436 - val_acc: 0.8457
Epoch 4/35
- 2s - loss: 1.7396 - acc: 0.9848 - val_loss: 1.3414 - val_acc: 0.9423
Epoch 5/35
- 2s - loss: 0.6754 - acc: 0.9921 - val_loss: 0.7538 - val_acc: 0.9517
Epoch 6/35
- 2s - loss: 0.3345 - acc: 0.9906 - val_loss: 0.5432 - val_acc: 0.9654
Epoch 7/35
- 1s - loss: 0.2152 - acc: 0.9930 - val_loss: 0.5017 - val_acc: 0.9315
Epoch 8/35
- 2s - loss: 0.1851 - acc: 0.9918 - val_loss: 0.4682 - val_acc: 0.9214
Epoch 9/35
- 2s - loss: 0.1577 - acc: 0.9954 - val_loss: 0.3978 - val_acc: 0.9596

```

Epoch 10/35  
 - 2s - loss: 0.1442 - acc: 0.9967 - val\_loss: 0.4096 - val\_acc: 0.9358  
 Epoch 11/35  
 - 1s - loss: 0.1291 - acc: 0.9970 - val\_loss: 0.3666 - val\_acc: 0.9647  
 Epoch 12/35  
 - 1s - loss: 0.1296 - acc: 0.9936 - val\_loss: 0.3548 - val\_acc: 0.9762  
 Epoch 13/35  
 - 2s - loss: 0.1167 - acc: 0.9954 - val\_loss: 0.3621 - val\_acc: 0.9704  
 Epoch 14/35  
 - 1s - loss: 0.1069 - acc: 0.9979 - val\_loss: 0.3428 - val\_acc: 0.9517  
 Epoch 15/35  
 - 2s - loss: 0.1577 - acc: 0.9811 - val\_loss: 0.3467 - val\_acc: 0.9358  
 Epoch 16/35  
 - 1s - loss: 0.1213 - acc: 0.9970 - val\_loss: 0.3017 - val\_acc: 0.9791  
 Epoch 17/35  
 - 2s - loss: 0.1014 - acc: 0.9948 - val\_loss: 0.2979 - val\_acc: 0.9762  
 Epoch 18/35  
 - 1s - loss: 0.0913 - acc: 0.9988 - val\_loss: 0.3123 - val\_acc: 0.9546  
 Epoch 19/35  
 - 1s - loss: 0.1003 - acc: 0.9954 - val\_loss: 0.2832 - val\_acc: 0.9820  
 Epoch 20/35  
 - 2s - loss: 0.0849 - acc: 0.9970 - val\_loss: 0.2768 - val\_acc: 0.9813  
 Epoch 21/35  
 - 2s - loss: 0.0777 - acc: 0.9994 - val\_loss: 0.2969 - val\_acc: 0.9726  
 Epoch 22/35  
 - 1s - loss: 0.0775 - acc: 0.9988 - val\_loss: 0.2975 - val\_acc: 0.9640  
 Epoch 23/35  
 - 1s - loss: 0.1030 - acc: 0.9887 - val\_loss: 0.3885 - val\_acc: 0.9156  
 Epoch 24/35  
 - 1s - loss: 0.1375 - acc: 0.9903 - val\_loss: 0.2670 - val\_acc: 0.9625  
 Epoch 25/35  
 - 2s - loss: 0.0789 - acc: 0.9988 - val\_loss: 0.2624 - val\_acc: 0.9755  
 Epoch 26/35  
 - 2s - loss: 0.0710 - acc: 0.9985 - val\_loss: 0.2383 - val\_acc: 0.9798  
 Epoch 27/35  
 - 1s - loss: 0.0809 - acc: 0.9957 - val\_loss: 0.2357 - val\_acc: 0.9791  
 Epoch 28/35  
 - 1s - loss: 0.0669 - acc: 0.9997 - val\_loss: 0.2452 - val\_acc: 0.9813  
 Epoch 29/35  
 - 1s - loss: 0.0741 - acc: 0.9967 - val\_loss: 0.2042 - val\_acc: 0.9784  
 Epoch 30/35  
 - 1s - loss: 0.0779 - acc: 0.9963 - val\_loss: 0.2188 - val\_acc: 0.9776  
 Epoch 31/35  
 - 1s - loss: 0.0621 - acc: 0.9991 - val\_loss: 0.2238 - val\_acc: 0.9834  
 Epoch 32/35  
 - 2s - loss: 0.0660 - acc: 0.9970 - val\_loss: 0.2076 - val\_acc: 0.9791  
 Epoch 33/35  
 - 1s - loss: 0.1502 - acc: 0.9784 - val\_loss: 0.2104 - val\_acc: 0.9661

Epoch 34/35

- 1s - loss: 0.1008 - acc: 0.9930 - val\_loss: 0.2303 - val\_acc: 0.9748

Epoch 35/35

- 1s - loss: 0.0634 - acc: 0.9991 - val\_loss: 0.2257 - val\_acc: 0.9805

Train accuracy 1.0 Test accuracy: 0.9805335255948089

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 124, 32)	1472
-----		
conv1d_2 (Conv1D)	(None, 118, 32)	7200
-----		
dropout_1 (Dropout)	(None, 118, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 39, 32)	0
-----		
flatten_1 (Flatten)	(None, 1248)	0
-----		
dense_1 (Dense)	(None, 64)	79936
-----		
dense_2 (Dense)	(None, 3)	195
=====		

Total params: 88,803

Trainable params: 88,803

Non-trainable params: 0

---

None

Train on 3285 samples, validate on 1387 samples

Epoch 1/40

- 2s - loss: 32.3395 - acc: 0.6560 - val\_loss: 2.9890 - val\_acc: 0.8198

Epoch 2/40

- 2s - loss: 0.9840 - acc: 0.9142 - val\_loss: 0.7338 - val\_acc: 0.8882

Epoch 3/40

- 2s - loss: 0.4886 - acc: 0.9099 - val\_loss: 0.6590 - val\_acc: 0.8724

Epoch 4/40

- 2s - loss: 0.3961 - acc: 0.9437 - val\_loss: 0.6766 - val\_acc: 0.8825

Epoch 5/40

- 2s - loss: 0.3993 - acc: 0.9358 - val\_loss: 0.5410 - val\_acc: 0.9099

Epoch 6/40

- 2s - loss: 0.3138 - acc: 0.9534 - val\_loss: 0.5365 - val\_acc: 0.8897

Epoch 7/40

- 2s - loss: 0.3038 - acc: 0.9607 - val\_loss: 0.4810 - val\_acc: 0.9416

Epoch 8/40

- 2s - loss: 0.3128 - acc: 0.9562 - val\_loss: 0.6504 - val\_acc: 0.8407

Epoch 9/40

- 2s - loss: 0.2782 - acc: 0.9671 - val\_loss: 0.5334 - val\_acc: 0.8854

Epoch 10/40

- 2s - loss: 0.3195 - acc: 0.9534 - val\_loss: 0.4970 - val\_acc: 0.9135  
Epoch 11/40  
- 2s - loss: 0.2409 - acc: 0.9699 - val\_loss: 0.4572 - val\_acc: 0.9214  
Epoch 12/40  
- 2s - loss: 0.3598 - acc: 0.9406 - val\_loss: 0.4900 - val\_acc: 0.9041  
Epoch 13/40  
- 2s - loss: 0.2690 - acc: 0.9689 - val\_loss: 0.5049 - val\_acc: 0.9099  
Epoch 14/40  
- 2s - loss: 0.2373 - acc: 0.9696 - val\_loss: 0.5408 - val\_acc: 0.8796  
Epoch 15/40  
- 2s - loss: 0.2907 - acc: 0.9559 - val\_loss: 0.4952 - val\_acc: 0.8940  
Epoch 16/40  
- 2s - loss: 0.2054 - acc: 0.9830 - val\_loss: 0.4232 - val\_acc: 0.8796  
Epoch 17/40  
- 2s - loss: 0.2533 - acc: 0.9629 - val\_loss: 0.4172 - val\_acc: 0.9322  
Epoch 18/40  
- 2s - loss: 0.2256 - acc: 0.9735 - val\_loss: 0.5628 - val\_acc: 0.8645  
Epoch 19/40  
- 2s - loss: 0.2713 - acc: 0.9574 - val\_loss: 0.5063 - val\_acc: 0.8688  
Epoch 20/40  
- 2s - loss: 0.2534 - acc: 0.9650 - val\_loss: 0.4564 - val\_acc: 0.9106  
Epoch 21/40  
- 2s - loss: 0.2692 - acc: 0.9632 - val\_loss: 0.5149 - val\_acc: 0.9156  
Epoch 22/40  
- 2s - loss: 0.2345 - acc: 0.9705 - val\_loss: 0.5431 - val\_acc: 0.8969  
Epoch 23/40  
- 2s - loss: 0.2719 - acc: 0.9623 - val\_loss: 0.4064 - val\_acc: 0.9120  
Epoch 24/40  
- 2s - loss: 0.1936 - acc: 0.9796 - val\_loss: 0.3901 - val\_acc: 0.9041  
Epoch 25/40  
- 2s - loss: 0.2517 - acc: 0.9565 - val\_loss: 0.7952 - val\_acc: 0.7621  
Epoch 26/40  
- 2s - loss: 0.3146 - acc: 0.9540 - val\_loss: 0.4709 - val\_acc: 0.8983  
Epoch 27/40  
- 2s - loss: 0.2666 - acc: 0.9604 - val\_loss: 0.5467 - val\_acc: 0.9012  
Epoch 28/40  
- 2s - loss: 0.2573 - acc: 0.9647 - val\_loss: 0.4775 - val\_acc: 0.8702  
Epoch 29/40  
- 2s - loss: 0.2413 - acc: 0.9744 - val\_loss: 0.4274 - val\_acc: 0.8998  
Epoch 30/40  
- 2s - loss: 0.2444 - acc: 0.9689 - val\_loss: 0.4532 - val\_acc: 0.9077  
Epoch 31/40  
- 2s - loss: 0.2161 - acc: 0.9705 - val\_loss: 0.5013 - val\_acc: 0.8854  
Epoch 32/40  
- 2s - loss: 0.2442 - acc: 0.9699 - val\_loss: 0.3834 - val\_acc: 0.9092  
Epoch 33/40  
- 2s - loss: 0.2182 - acc: 0.9735 - val\_loss: 0.5061 - val\_acc: 0.8796  
Epoch 34/40

```

- 2s - loss: 0.2144 - acc: 0.9723 - val_loss: 0.5236 - val_acc: 0.8962
Epoch 35/40
- 2s - loss: 0.3955 - acc: 0.9272 - val_loss: 0.7381 - val_acc: 0.8421
Epoch 36/40
- 2s - loss: 0.3473 - acc: 0.9498 - val_loss: 0.5851 - val_acc: 0.8500
Epoch 37/40
- 2s - loss: 0.2673 - acc: 0.9650 - val_loss: 0.3705 - val_acc: 0.9214
Epoch 38/40
- 2s - loss: 0.1806 - acc: 0.9817 - val_loss: 0.4008 - val_acc: 0.8998
Epoch 39/40
- 2s - loss: 0.1968 - acc: 0.9772 - val_loss: 0.5363 - val_acc: 0.9120
Epoch 40/40
- 2s - loss: 0.1926 - acc: 0.9802 - val_loss: 0.3544 - val_acc: 0.9286
Train accuracy 0.9933028919330289 Test accuracy: 0.9286229271809661
-----

```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 42)	2688
conv1d_2 (Conv1D)	(None, 116, 16)	4720
dropout_1 (Dropout)	(None, 116, 16)	0
max_pooling1d_1 (MaxPooling1D)	(None, 58, 16)	0
flatten_1 (Flatten)	(None, 928)	0
dense_1 (Dense)	(None, 64)	59456
dense_2 (Dense)	(None, 3)	195

```

=====
Total params: 67,059
Trainable params: 67,059
Non-trainable params: 0
-----

```

```

None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
- 2s - loss: 39.2574 - acc: 0.7123 - val_loss: 9.8314 - val_acc: 0.6698
Epoch 2/35
- 1s - loss: 3.0654 - acc: 0.8965 - val_loss: 0.7157 - val_acc: 0.9193
Epoch 3/35
- 1s - loss: 0.4338 - acc: 0.9394 - val_loss: 0.8115 - val_acc: 0.7765
Epoch 4/35
- 1s - loss: 0.3198 - acc: 0.9546 - val_loss: 0.4578 - val_acc: 0.9279
Epoch 5/35
- 1s - loss: 0.2615 - acc: 0.9656 - val_loss: 0.5053 - val_acc: 0.8609

```

Epoch 6/35  
- 1s - loss: 0.2365 - acc: 0.9668 - val\_loss: 0.4122 - val\_acc: 0.8955

Epoch 7/35  
- 1s - loss: 0.2311 - acc: 0.9647 - val\_loss: 0.3572 - val\_acc: 0.9380

Epoch 8/35  
- 1s - loss: 0.2148 - acc: 0.9686 - val\_loss: 0.4848 - val\_acc: 0.8947

Epoch 9/35  
- 1s - loss: 0.2069 - acc: 0.9671 - val\_loss: 0.4527 - val\_acc: 0.8940

Epoch 10/35  
- 1s - loss: 0.1891 - acc: 0.9747 - val\_loss: 0.3375 - val\_acc: 0.9128

Epoch 11/35  
- 1s - loss: 0.2024 - acc: 0.9686 - val\_loss: 0.2970 - val\_acc: 0.9344

Epoch 12/35  
- 1s - loss: 0.1980 - acc: 0.9699 - val\_loss: 0.2638 - val\_acc: 0.9510

Epoch 13/35  
- 1s - loss: 0.1987 - acc: 0.9717 - val\_loss: 0.2964 - val\_acc: 0.9380

Epoch 14/35  
- 1s - loss: 0.1952 - acc: 0.9723 - val\_loss: 0.2912 - val\_acc: 0.9474

Epoch 15/35  
- 1s - loss: 0.1870 - acc: 0.9741 - val\_loss: 1.8683 - val\_acc: 0.5429

Epoch 16/35  
- 1s - loss: 0.2094 - acc: 0.9674 - val\_loss: 0.2178 - val\_acc: 0.9632

Epoch 17/35  
- 1s - loss: 0.1702 - acc: 0.9747 - val\_loss: 0.6252 - val\_acc: 0.8421

Epoch 18/35  
- 1s - loss: 0.1850 - acc: 0.9729 - val\_loss: 0.4333 - val\_acc: 0.8745

Epoch 19/35  
- 1s - loss: 0.1739 - acc: 0.9732 - val\_loss: 0.3107 - val\_acc: 0.9445

Epoch 20/35  
- 1s - loss: 0.1847 - acc: 0.9714 - val\_loss: 0.2925 - val\_acc: 0.9351

Epoch 21/35  
- 1s - loss: 0.1740 - acc: 0.9693 - val\_loss: 0.6757 - val\_acc: 0.7837

Epoch 22/35  
- 1s - loss: 0.1787 - acc: 0.9738 - val\_loss: 0.2865 - val\_acc: 0.9229

Epoch 23/35  
- 1s - loss: 0.1875 - acc: 0.9708 - val\_loss: 0.2656 - val\_acc: 0.9503

Epoch 24/35  
- 1s - loss: 0.1706 - acc: 0.9744 - val\_loss: 0.3151 - val\_acc: 0.9430

Epoch 25/35  
- 1s - loss: 0.1808 - acc: 0.9760 - val\_loss: 0.3587 - val\_acc: 0.9077

Epoch 26/35  
- 1s - loss: 0.1790 - acc: 0.9708 - val\_loss: 0.2661 - val\_acc: 0.9510

Epoch 27/35  
- 1s - loss: 0.1766 - acc: 0.9766 - val\_loss: 0.2671 - val\_acc: 0.9459

Epoch 28/35  
- 1s - loss: 0.1967 - acc: 0.9738 - val\_loss: 0.4268 - val\_acc: 0.9286

Epoch 29/35  
- 1s - loss: 0.1514 - acc: 0.9808 - val\_loss: 0.2709 - val\_acc: 0.9387



Epoch 30/35  
 - 1s - loss: 0.1831 - acc: 0.9714 - val\_loss: 0.3091 - val\_acc: 0.9503  
 Epoch 31/35  
 - 1s - loss: 0.1624 - acc: 0.9778 - val\_loss: 0.2603 - val\_acc: 0.9459  
 Epoch 32/35  
 - 1s - loss: 0.1989 - acc: 0.9705 - val\_loss: 0.2610 - val\_acc: 0.9560  
 Epoch 33/35  
 - 1s - loss: 0.1760 - acc: 0.9750 - val\_loss: 0.3056 - val\_acc: 0.9229  
 Epoch 34/35  
 - 1s - loss: 0.1696 - acc: 0.9744 - val\_loss: 0.2369 - val\_acc: 0.9394  
 Epoch 35/35  
 - 1s - loss: 0.1895 - acc: 0.9735 - val\_loss: 0.2752 - val\_acc: 0.9322  
 Train accuracy 0.9884322678843227 Test accuracy: 0.9322278298485941

---

Layer (type)	Output Shape	Param #
=====		
conv1d_1 (Conv1D)	(None, 122, 28)	1792
-----		
conv1d_2 (Conv1D)	(None, 118, 32)	4512
-----		
dropout_1 (Dropout)	(None, 118, 32)	0
-----		
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
-----		
flatten_1 (Flatten)	(None, 736)	0
-----		
dense_1 (Dense)	(None, 64)	47168
-----		
dense_2 (Dense)	(None, 3)	195
=====		

Total params: 53,667  
 Trainable params: 53,667  
 Non-trainable params: 0

---

None  
 Train on 3285 samples, validate on 1387 samples  
 Epoch 1/55  
 - 2s - loss: 26.9340 - acc: 0.7549 - val\_loss: 2.3801 - val\_acc: 0.7974  
 Epoch 2/55  
 - 2s - loss: 0.7593 - acc: 0.9537 - val\_loss: 0.6876 - val\_acc: 0.9308  
 Epoch 3/55  
 - 2s - loss: 0.3472 - acc: 0.9671 - val\_loss: 0.6061 - val\_acc: 0.9092  
 Epoch 4/55  
 - 2s - loss: 0.3164 - acc: 0.9598 - val\_loss: 0.5474 - val\_acc: 0.9373  
 Epoch 5/55  
 - 2s - loss: 0.2510 - acc: 0.9778 - val\_loss: 0.5382 - val\_acc: 0.9193  
 Epoch 6/55

- 2s - loss: 0.2800 - acc: 0.9638 - val\_loss: 0.4893 - val\_acc: 0.9510  
 Epoch 7/55  
 - 2s - loss: 0.2978 - acc: 0.9635 - val\_loss: 0.4826 - val\_acc: 0.9229  
 Epoch 8/55  
 - 2s - loss: 0.2259 - acc: 0.9775 - val\_loss: 0.4997 - val\_acc: 0.9185  
 Epoch 9/55  
 - 2s - loss: 0.2326 - acc: 0.9674 - val\_loss: 0.4630 - val\_acc: 0.9293  
 Epoch 10/55  
 - 2s - loss: 0.2120 - acc: 0.9790 - val\_loss: 0.5121 - val\_acc: 0.8818  
 Epoch 11/55  
 - 2s - loss: 0.2241 - acc: 0.9729 - val\_loss: 0.4184 - val\_acc: 0.9272  
 Epoch 12/55  
 - 2s - loss: 0.2141 - acc: 0.9726 - val\_loss: 0.4389 - val\_acc: 0.9164  
 Epoch 13/55  
 - 2s - loss: 0.2222 - acc: 0.9735 - val\_loss: 0.6670 - val\_acc: 0.8839  
 Epoch 14/55  
 - 2s - loss: 0.1708 - acc: 0.9854 - val\_loss: 0.3869 - val\_acc: 0.9373  
 Epoch 15/55  
 - 2s - loss: 0.2236 - acc: 0.9680 - val\_loss: 0.3781 - val\_acc: 0.9445  
 Epoch 16/55  
 - 2s - loss: 0.1550 - acc: 0.9881 - val\_loss: 0.3680 - val\_acc: 0.9229  
 Epoch 17/55  
 - 2s - loss: 0.2223 - acc: 0.9702 - val\_loss: 0.9123 - val\_acc: 0.6907  
 Epoch 18/55  
 - 2s - loss: 0.1919 - acc: 0.9817 - val\_loss: 0.4474 - val\_acc: 0.8803  
 Epoch 19/55  
 - 2s - loss: 0.2035 - acc: 0.9723 - val\_loss: 0.4579 - val\_acc: 0.9171  
 Epoch 20/55  
 - 2s - loss: 0.1635 - acc: 0.9851 - val\_loss: 0.3845 - val\_acc: 0.9056  
 Epoch 21/55  
 - 2s - loss: 0.1869 - acc: 0.9750 - val\_loss: 0.4326 - val\_acc: 0.8955  
 Epoch 22/55  
 - 2s - loss: 0.2132 - acc: 0.9705 - val\_loss: 0.4289 - val\_acc: 0.9156  
 Epoch 23/55  
 - 2s - loss: 0.1542 - acc: 0.9833 - val\_loss: 0.3889 - val\_acc: 0.9027  
 Epoch 24/55  
 - 2s - loss: 0.1448 - acc: 0.9866 - val\_loss: 0.3399 - val\_acc: 0.9279  
 Epoch 25/55  
 - 2s - loss: 0.1904 - acc: 0.9726 - val\_loss: 0.3455 - val\_acc: 0.9265  
 Epoch 26/55  
 - 2s - loss: 0.1965 - acc: 0.9750 - val\_loss: 0.3679 - val\_acc: 0.9229  
 Epoch 27/55  
 - 2s - loss: 0.1618 - acc: 0.9842 - val\_loss: 0.4143 - val\_acc: 0.9200  
 Epoch 28/55  
 - 2s - loss: 0.1732 - acc: 0.9799 - val\_loss: 0.3439 - val\_acc: 0.9272  
 Epoch 29/55  
 - 2s - loss: 0.1903 - acc: 0.9753 - val\_loss: 0.3231 - val\_acc: 0.9193  
 Epoch 30/55

- 2s - loss: 0.1524 - acc: 0.9830 - val\_loss: 0.3996 - val\_acc: 0.9056  
 Epoch 31/55  
 - 2s - loss: 0.1493 - acc: 0.9839 - val\_loss: 0.3175 - val\_acc: 0.9308  
 Epoch 32/55  
 - 2s - loss: 0.2135 - acc: 0.9668 - val\_loss: 0.3285 - val\_acc: 0.9265  
 Epoch 33/55  
 - 2s - loss: 0.2010 - acc: 0.9735 - val\_loss: 0.4204 - val\_acc: 0.8976  
 Epoch 34/55  
 - 2s - loss: 0.1682 - acc: 0.9793 - val\_loss: 0.4075 - val\_acc: 0.9394  
 Epoch 35/55  
 - 2s - loss: 0.1737 - acc: 0.9802 - val\_loss: 0.3428 - val\_acc: 0.9221  
 Epoch 36/55  
 - 2s - loss: 0.1865 - acc: 0.9732 - val\_loss: 0.3634 - val\_acc: 0.9120  
 Epoch 37/55  
 - 2s - loss: 0.1786 - acc: 0.9784 - val\_loss: 0.3929 - val\_acc: 0.9272  
 Epoch 38/55  
 - 2s - loss: 0.1515 - acc: 0.9836 - val\_loss: 0.3186 - val\_acc: 0.9279  
 Epoch 39/55  
 - 2s - loss: 0.1335 - acc: 0.9860 - val\_loss: 0.4310 - val\_acc: 0.8991  
 Epoch 40/55  
 - 2s - loss: 0.1908 - acc: 0.9756 - val\_loss: 0.3905 - val\_acc: 0.9005  
 Epoch 41/55  
 - 2s - loss: 0.2038 - acc: 0.9699 - val\_loss: 0.4572 - val\_acc: 0.8818  
 Epoch 42/55  
 - 2s - loss: 0.1515 - acc: 0.9845 - val\_loss: 0.3307 - val\_acc: 0.9120  
 Epoch 43/55  
 - 2s - loss: 0.1750 - acc: 0.9756 - val\_loss: 0.3770 - val\_acc: 0.9056  
 Epoch 44/55  
 - 2s - loss: 0.1554 - acc: 0.9808 - val\_loss: 0.3206 - val\_acc: 0.9142  
 Epoch 45/55  
 - 2s - loss: 0.1957 - acc: 0.9738 - val\_loss: 0.4420 - val\_acc: 0.8940  
 Epoch 46/55  
 - 2s - loss: 0.1680 - acc: 0.9784 - val\_loss: 0.4666 - val\_acc: 0.9106  
 Epoch 47/55  
 - 2s - loss: 0.1731 - acc: 0.9775 - val\_loss: 0.4677 - val\_acc: 0.8601  
 Epoch 48/55  
 - 2s - loss: 0.1705 - acc: 0.9769 - val\_loss: 0.3764 - val\_acc: 0.8926  
 Epoch 49/55  
 - 2s - loss: 0.1443 - acc: 0.9857 - val\_loss: 0.3452 - val\_acc: 0.9279  
 Epoch 50/55  
 - 2s - loss: 0.1815 - acc: 0.9686 - val\_loss: 0.4480 - val\_acc: 0.8882  
 Epoch 51/55  
 - 2s - loss: 0.1755 - acc: 0.9775 - val\_loss: 0.3454 - val\_acc: 0.9084  
 Epoch 52/55  
 - 2s - loss: 0.1935 - acc: 0.9717 - val\_loss: 0.3336 - val\_acc: 0.9099  
 Epoch 53/55  
 - 2s - loss: 0.1340 - acc: 0.9848 - val\_loss: 0.2921 - val\_acc: 0.9322  
 Epoch 54/55

```
- 2s - loss: 0.1894 - acc: 0.9738 - val_loss: 0.3660 - val_acc: 0.9373
Epoch 55/55
- 2s - loss: 0.1930 - acc: 0.9720 - val_loss: 0.3936 - val_acc: 0.9019
Train accuracy 0.9844748858447488 Test accuracy: 0.9019466474405191
-----
```

```
In [11]: from hyperas.utils import eval_hyperopt_space
total_trials = dict()
for t, trial in enumerate(trials):
    vals = trial.get('misc').get('vals')
    z = eval_hyperopt_space(space, vals)
    total_trials['M'+str(t+1)] = z
#best Hyper params from hyperas
best_params = eval_hyperopt_space(space, best_run)
best_params
```

```
Out[11]: {'Dense': 64,
'Dense_1': 32,
'Dropout': 0.6725241946290972,
'choiceval': 'adam',
'filters': 32,
'filters_1': 32,
'kernel_size': 7,
'kernel_size_1': 7,
'l2': 0.548595947917793,
'l2_1': 0.28312064960787986,
'lr': 0.00083263584783479,
'lr_1': 0.0020986605171288,
'nb_epoch': 35,
'pool_size': 5}
```

```
In [18]: import keras
```

```
In [23]: #Hyperas model
def model_hyperas(space,verbose=1):
    np.random.seed(0)
    tf.set_random_seed(0)
    sess = tf.Session(graph=tf.get_default_graph())
    K.set_session(sess)
    # Initiliazing the sequential model
    model = Sequential()
    model.add(Conv1D(filters=space['filters'], kernel_size=space['kernel_size'],activation='relu',
                    kernel_initializer='he_uniform',
                    kernel_regularizer=l2(space['l2']),input_shape=(128,9)))
    model.add(Conv1D(filters=space['filters_1'], kernel_size=space['kernel_size_1'],
                    activation='relu',kernel_regularizer=l2(space['l2_1']),kernel_initializer='he_uniform'))
    model.add(Dropout(space['Dropout']))
    model.add(MaxPooling1D(pool_size=space['pool_size']))
```

```

model.add(Flatten())
model.add(Dense(space['Dense'], activation='relu'))
model.add(Dense(3, activation='softmax'))
adam = keras.optimizers.Adam(lr=space['lr'])
rmsprop = keras.optimizers.RMSprop(lr=space['lr_1'])
choiceval = space['choiceval']
if choiceval == 'adam':
    optim = adam
else:
    optim = rmsprop
print(model.summary())
model.compile(loss='categorical_crossentropy', metrics=['accuracy'], optimizer=optim)
result = model.fit(X_train_d, Y_train_d,
                    batch_size=space['Dense_1'],
                    nb_epoch=space['nb_epoch'],
                    verbose=verbose,
                    validation_data=(X_val_d, Y_val_d))
#K.clear_session()
return model,result

```

In [24]: best\_model,result = model\_hyperas(best\_params)

```

-----
Layer (type)                Output Shape                Param #
-----
conv1d_1 (Conv1D)           (None, 122, 32)            2048
-----
conv1d_2 (Conv1D)           (None, 116, 32)            7200
-----
dropout_1 (Dropout)         (None, 116, 32)            0
-----
max_pooling1d_1 (MaxPooling1 (None, 23, 32)            0
-----
flatten_1 (Flatten)         (None, 736)                0
-----
dense_1 (Dense)             (None, 64)                 47168
-----
dense_2 (Dense)             (None, 3)                  195
=====
Total params: 56,611
Trainable params: 56,611
Non-trainable params: 0
-----
None
Train on 3285 samples, validate on 1387 samples
Epoch 1/35
3285/3285 [=====] - 2s 553us/step - loss: 36.5170 - acc: 0.6493 - val.
Epoch 2/35

```

```

3285/3285 [=====] - 1s 331us/step - loss: 13.4174 - acc: 0.9428 - val_
Epoch 3/35
3285/3285 [=====] - 1s 320us/step - loss: 4.8053 - acc: 0.9772 - val_
Epoch 4/35
3285/3285 [=====] - 1s 319us/step - loss: 1.7396 - acc: 0.9851 - val_
Epoch 5/35
3285/3285 [=====] - 1s 319us/step - loss: 0.6754 - acc: 0.9921 - val_
Epoch 6/35
3285/3285 [=====] - 1s 316us/step - loss: 0.3342 - acc: 0.9906 - val_
Epoch 7/35
3285/3285 [=====] - 1s 316us/step - loss: 0.2152 - acc: 0.9930 - val_
Epoch 8/35
3285/3285 [=====] - 1s 322us/step - loss: 0.1851 - acc: 0.9918 - val_
Epoch 9/35
3285/3285 [=====] - 1s 320us/step - loss: 0.1573 - acc: 0.9954 - val_
Epoch 10/35
3285/3285 [=====] - 1s 320us/step - loss: 0.1468 - acc: 0.9960 - val_
Epoch 11/35
3285/3285 [=====] - 1s 330us/step - loss: 0.1295 - acc: 0.9960 - val_
Epoch 12/35
3285/3285 [=====] - 1s 325us/step - loss: 0.1278 - acc: 0.9942 - val_
Epoch 13/35
3285/3285 [=====] - 1s 326us/step - loss: 0.1144 - acc: 0.9960 - val_
Epoch 14/35
3285/3285 [=====] - 1s 320us/step - loss: 0.1066 - acc: 0.9979 - val_
Epoch 15/35
3285/3285 [=====] - 1s 320us/step - loss: 0.1332 - acc: 0.9896 - val_
Epoch 16/35
3285/3285 [=====] - 1s 322us/step - loss: 0.1043 - acc: 0.9973 - val_
Epoch 17/35
3285/3285 [=====] - 1s 320us/step - loss: 0.1074 - acc: 0.9951 - val_
Epoch 18/35
3285/3285 [=====] - 1s 319us/step - loss: 0.0913 - acc: 0.9982 - val_
Epoch 19/35
3285/3285 [=====] - 1s 317us/step - loss: 0.1172 - acc: 0.9884 - val_
Epoch 20/35
3285/3285 [=====] - 1s 318us/step - loss: 0.1035 - acc: 0.9921 - val_
Epoch 21/35
3285/3285 [=====] - 1s 317us/step - loss: 0.0959 - acc: 0.9948 - val_
Epoch 22/35
3285/3285 [=====] - 1s 319us/step - loss: 0.0769 - acc: 0.9994 - val_
Epoch 23/35
3285/3285 [=====] - 1s 319us/step - loss: 0.0766 - acc: 0.9985 - val_
Epoch 24/35
3285/3285 [=====] - 1s 319us/step - loss: 0.1604 - acc: 0.9732 - val_
Epoch 25/35
3285/3285 [=====] - 1s 316us/step - loss: 0.1246 - acc: 0.9951 - val_
Epoch 26/35

```

```

3285/3285 [=====] - 1s 317us/step - loss: 0.0749 - acc: 0.9997 - val_
Epoch 27/35
3285/3285 [=====] - 1s 318us/step - loss: 0.0703 - acc: 0.9997 - val_
Epoch 28/35
3285/3285 [=====] - 1s 318us/step - loss: 0.0794 - acc: 0.9957 - val_
Epoch 29/35
3285/3285 [=====] - 1s 316us/step - loss: 0.0679 - acc: 0.9985 - val_
Epoch 30/35
3285/3285 [=====] - 1s 318us/step - loss: 0.0769 - acc: 0.9942 - val_
Epoch 31/35
3285/3285 [=====] - 1s 318us/step - loss: 0.0952 - acc: 0.9924 - val_
Epoch 32/35
3285/3285 [=====] - 1s 323us/step - loss: 0.0615 - acc: 0.9994 - val_
Epoch 33/35
3285/3285 [=====] - 1s 318us/step - loss: 0.0574 - acc: 0.9988 - val_
Epoch 34/35
3285/3285 [=====] - 1s 316us/step - loss: 0.1272 - acc: 0.9784 - val_
Epoch 35/35
3285/3285 [=====] - 1s 318us/step - loss: 0.1743 - acc: 0.9860 - val_

```

```

In [21]: _,acc_val = best_model.evaluate(X_val_d,Y_val_d,verbose=0)
         _,acc_train = best_model.evaluate(X_train_d,Y_train_d,verbose=0)
         print('Train_accuracy',acc_train,'test_accuracy',acc_val)

```

```

Train_accuracy 1.0 test_accuracy 0.9704397981254506

```

We can observe that some models are having around 0.99 accuracy for some epochs. will investigate some models(model 59, 99).

```

In [47]: M59 = total_trials['M59']
         M59

```

```

Out[47]: {'Dense': 32,
          'Dense_1': 32,
          'Dropout': 0.48642317342570957,
          'choiceval': 'adam',
          'filters': 32,
          'filters_1': 32,
          'kernel_size': 7,
          'kernel_size_1': 7,
          'l2': 0.10401484931072974,
          'l2_1': 0.7228970346142163,
          'lr': 0.000772514731035696,
          'lr_1': 0.003074353392879209,
          'nb_epoch': 35,
          'pool_size': 5}

```

```
In [62]: K.clear_session()
        M59['nb_epoch'] = 70
        best_model_all,result = model_hyperas(M59)
```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1D)	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```
=====  
Total params: 32,931  
Trainable params: 32,931  
Non-trainable params: 0
```

```
-----  
None
```

```
Train on 3285 samples, validate on 1387 samples
```

```
Epoch 1/70
```

```
3285/3285 [=====] - 2s 597us/step - loss: 30.8432 - acc: 0.5963 - val_loss: 30.8432 - val_acc: 0.5963
```

```
Epoch 2/70
```

```
3285/3285 [=====] - 1s 312us/step - loss: 7.8188 - acc: 0.9209 - val_loss: 7.8188 - val_acc: 0.9209
```

```
Epoch 3/70
```

```
3285/3285 [=====] - 1s 313us/step - loss: 2.3103 - acc: 0.9863 - val_loss: 2.3103 - val_acc: 0.9863
```

```
Epoch 4/70
```

```
3285/3285 [=====] - 1s 312us/step - loss: 0.9391 - acc: 0.9875 - val_loss: 0.9391 - val_acc: 0.9875
```

```
Epoch 5/70
```

```
3285/3285 [=====] - 1s 312us/step - loss: 0.4885 - acc: 0.9933 - val_loss: 0.4885 - val_acc: 0.9933
```

```
Epoch 6/70
```

```
3285/3285 [=====] - 1s 312us/step - loss: 0.3024 - acc: 0.9948 - val_loss: 0.3024 - val_acc: 0.9948
```

```
Epoch 7/70
```

```
3285/3285 [=====] - 1s 313us/step - loss: 0.2201 - acc: 0.9954 - val_loss: 0.2201 - val_acc: 0.9954
```

```
Epoch 8/70
```

```
3285/3285 [=====] - 1s 312us/step - loss: 0.1842 - acc: 0.9942 - val_loss: 0.1842 - val_acc: 0.9942
```

```
Epoch 9/70
```

```
3285/3285 [=====] - 1s 311us/step - loss: 0.1602 - acc: 0.9967 - val_loss: 0.1602 - val_acc: 0.9967
```

```
Epoch 10/70
```

```
3285/3285 [=====] - 1s 313us/step - loss: 0.1459 - acc: 0.9970 - val_loss: 0.1459 - val_acc: 0.9970
```

```
Epoch 11/70
```



```

3285/3285 [=====] - 1s 310us/step - loss: 0.1402 - acc: 0.9945 - val_
Epoch 12/70
3285/3285 [=====] - 1s 312us/step - loss: 0.1285 - acc: 0.9970 - val_
Epoch 13/70
3285/3285 [=====] - 1s 317us/step - loss: 0.1155 - acc: 0.9985 - val_
Epoch 14/70
3285/3285 [=====] - 1s 311us/step - loss: 0.1013 - acc: 0.9997 - val_
Epoch 15/70
3285/3285 [=====] - 1s 311us/step - loss: 0.1029 - acc: 0.9967 - val_
Epoch 16/70
3285/3285 [=====] - 1s 313us/step - loss: 0.0954 - acc: 0.9985 - val_
Epoch 17/70
3285/3285 [=====] - 1s 313us/step - loss: 0.0997 - acc: 0.9960 - val_
Epoch 18/70
3285/3285 [=====] - 1s 313us/step - loss: 0.0949 - acc: 0.9973 - val_
Epoch 19/70
3285/3285 [=====] - 1s 311us/step - loss: 0.1709 - acc: 0.9744 - val_
Epoch 20/70
3285/3285 [=====] - 1s 312us/step - loss: 0.1247 - acc: 0.9970 - val_
Epoch 21/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0822 - acc: 0.9994 - val_
Epoch 22/70
3285/3285 [=====] - 1s 312us/step - loss: 0.0757 - acc: 0.9994 - val_
Epoch 23/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0787 - acc: 0.9985 - val_
Epoch 24/70
3285/3285 [=====] - 1s 315us/step - loss: 0.0778 - acc: 0.9985 - val_
Epoch 25/70
3285/3285 [=====] - 1s 323us/step - loss: 0.0711 - acc: 0.9991 - val_
Epoch 26/70
3285/3285 [=====] - 1s 314us/step - loss: 0.0691 - acc: 1.0000 - val_
Epoch 27/70
3285/3285 [=====] - 1s 312us/step - loss: 0.0662 - acc: 0.9997 - val_
Epoch 28/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0678 - acc: 0.9988 - val_
Epoch 29/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0651 - acc: 0.9988 - val_
Epoch 30/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0836 - acc: 0.9939 - val_
Epoch 31/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0618 - acc: 0.9991 - val_
Epoch 32/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0718 - acc: 0.9942 - val_
Epoch 33/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0659 - acc: 0.9988 - val_
Epoch 34/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0736 - acc: 0.9939 - val_
Epoch 35/70

```

```

3285/3285 [=====] - 1s 310us/step - loss: 0.1024 - acc: 0.9872 - val_
Epoch 36/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0790 - acc: 0.9967 - val_
Epoch 37/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0555 - acc: 0.9991 - val_
Epoch 38/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0731 - acc: 0.9945 - val_
Epoch 39/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0523 - acc: 0.9997 - val_
Epoch 40/70
3285/3285 [=====] - 1s 313us/step - loss: 0.0496 - acc: 0.9997 - val_
Epoch 41/70
3285/3285 [=====] - 1s 312us/step - loss: 0.0468 - acc: 1.0000 - val_
Epoch 42/70
3285/3285 [=====] - 1s 311us/step - loss: 0.1016 - acc: 0.9860 - val_
Epoch 43/70
3285/3285 [=====] - 1s 312us/step - loss: 0.1060 - acc: 0.9896 - val_
Epoch 44/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0531 - acc: 0.9997 - val_
Epoch 45/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0484 - acc: 1.0000 - val_
Epoch 46/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0448 - acc: 1.0000 - val_
Epoch 47/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0447 - acc: 0.9997 - val_
Epoch 48/70
3285/3285 [=====] - 1s 309us/step - loss: 0.0443 - acc: 0.9997 - val_
Epoch 49/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0435 - acc: 1.0000 - val_
Epoch 50/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0445 - acc: 0.9994 - val_
Epoch 51/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0477 - acc: 0.9979 - val_
Epoch 52/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0388 - acc: 1.0000 - val_
Epoch 53/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0387 - acc: 1.0000 - val_
Epoch 54/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0454 - acc: 0.9985 - val_
Epoch 55/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0723 - acc: 0.9918 - val_
Epoch 56/70
3285/3285 [=====] - 1s 309us/step - loss: 0.0712 - acc: 0.9973 - val_
Epoch 57/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0404 - acc: 1.0000 - val_
Epoch 58/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0399 - acc: 0.9994 - val_
Epoch 59/70

```

```

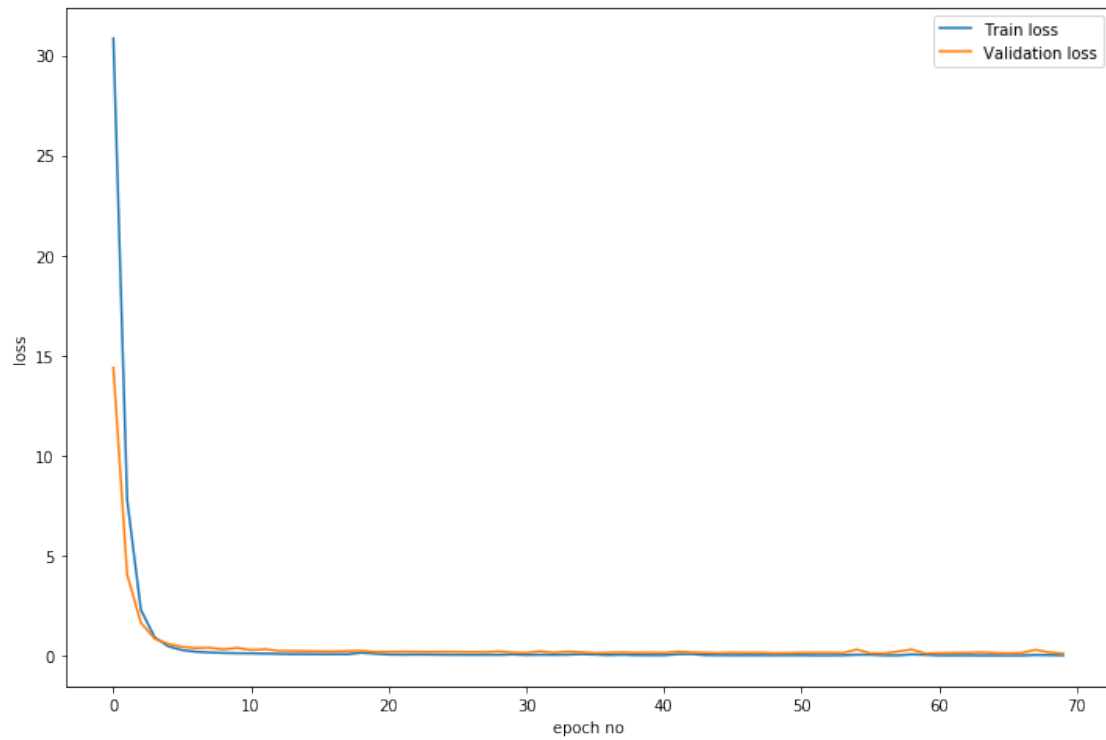
3285/3285 [=====] - 1s 310us/step - loss: 0.0866 - acc: 0.9875 - val_
Epoch 60/70
3285/3285 [=====] - 1s 308us/step - loss: 0.0687 - acc: 0.9973 - val_
Epoch 61/70
3285/3285 [=====] - 1s 309us/step - loss: 0.0385 - acc: 1.0000 - val_
Epoch 62/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0370 - acc: 1.0000 - val_
Epoch 63/70
3285/3285 [=====] - 1s 309us/step - loss: 0.0416 - acc: 0.9985 - val_
Epoch 64/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0354 - acc: 0.9997 - val_
Epoch 65/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0348 - acc: 0.9997 - val_
Epoch 66/70
3285/3285 [=====] - 1s 309us/step - loss: 0.0340 - acc: 1.0000 - val_
Epoch 67/70
3285/3285 [=====] - 1s 309us/step - loss: 0.0327 - acc: 0.9997 - val_
Epoch 68/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0624 - acc: 0.9921 - val_
Epoch 69/70
3285/3285 [=====] - 1s 310us/step - loss: 0.0514 - acc: 0.9976 - val_
Epoch 70/70
3285/3285 [=====] - 1s 311us/step - loss: 0.0376 - acc: 0.9994 - val_

```

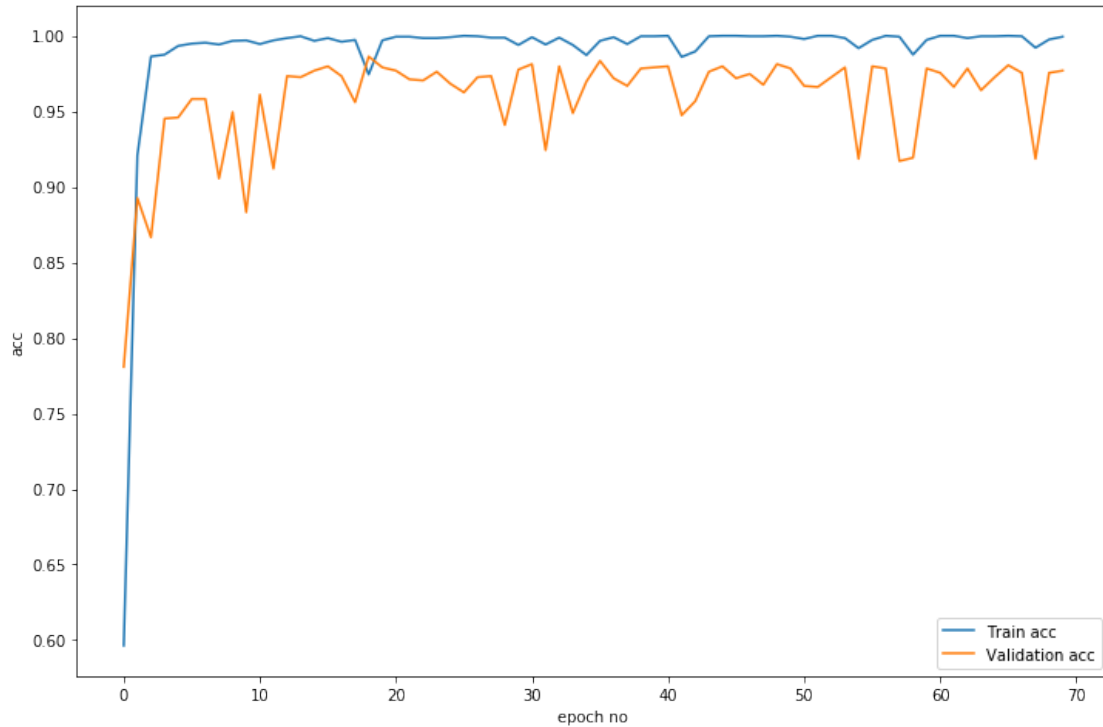
```

In [64]: plt.figure(figsize=(12,8))
          plt.plot(result.history['loss'],label='Train loss')
          plt.plot(result.history['val_loss'],label = 'Validation loss')
          plt.xlabel('epoch no')
          plt.ylabel('loss')
          plt.legend()
          plt.show()

```



```
In [65]: plt.figure(figsize=(12,8))
plt.plot(result.history['acc'],label='Train acc')
plt.plot(result.history['val_acc'],label = 'Validation acc')
plt.xlabel('epoch no')
plt.ylabel('acc')
plt.legend()
plt.show()
```



```
In [45]: ##upto 19 epoces will give good score
K.clear_session()
M59['nb_epoch'] = 19
best_model,result = model_hyperas(M59)
```

Layer (type)	Output Shape	Param #
conv1d_1 (Conv1D)	(None, 122, 32)	2048
conv1d_2 (Conv1D)	(None, 116, 32)	7200
dropout_1 (Dropout)	(None, 116, 32)	0
max_pooling1d_1 (MaxPooling1	(None, 23, 32)	0
flatten_1 (Flatten)	(None, 736)	0
dense_1 (Dense)	(None, 32)	23584
dense_2 (Dense)	(None, 3)	99

```
Total params: 32,931
Trainable params: 32,931
```

Non-trainable params: 0

-----  
None

Train on 3285 samples, validate on 1387 samples

Epoch 1/19

3285/3285 [=====] - 2s 587us/step - loss: 30.8432 - acc: 0.5963 - val\_

Epoch 2/19

3285/3285 [=====] - 1s 311us/step - loss: 7.8188 - acc: 0.9209 - val\_

Epoch 3/19

3285/3285 [=====] - 1s 312us/step - loss: 2.3103 - acc: 0.9863 - val\_

Epoch 4/19

3285/3285 [=====] - 1s 310us/step - loss: 0.9391 - acc: 0.9875 - val\_

Epoch 5/19

3285/3285 [=====] - 1s 311us/step - loss: 0.4885 - acc: 0.9933 - val\_

Epoch 6/19

3285/3285 [=====] - 1s 311us/step - loss: 0.3024 - acc: 0.9948 - val\_

Epoch 7/19

3285/3285 [=====] - 1s 313us/step - loss: 0.2201 - acc: 0.9954 - val\_

Epoch 8/19

3285/3285 [=====] - 1s 312us/step - loss: 0.1842 - acc: 0.9942 - val\_

Epoch 9/19

3285/3285 [=====] - 1s 310us/step - loss: 0.1602 - acc: 0.9967 - val\_

Epoch 10/19

3285/3285 [=====] - 1s 312us/step - loss: 0.1459 - acc: 0.9970 - val\_

Epoch 11/19

3285/3285 [=====] - 1s 312us/step - loss: 0.1402 - acc: 0.9945 - val\_

Epoch 12/19

3285/3285 [=====] - 1s 313us/step - loss: 0.1285 - acc: 0.9970 - val\_

Epoch 13/19

3285/3285 [=====] - 1s 312us/step - loss: 0.1155 - acc: 0.9985 - val\_

Epoch 14/19

3285/3285 [=====] - 1s 310us/step - loss: 0.1013 - acc: 0.9997 - val\_

Epoch 15/19

3285/3285 [=====] - 1s 315us/step - loss: 0.1029 - acc: 0.9967 - val\_

Epoch 16/19

3285/3285 [=====] - 1s 312us/step - loss: 0.0954 - acc: 0.9985 - val\_

Epoch 17/19

3285/3285 [=====] - 1s 313us/step - loss: 0.0997 - acc: 0.9960 - val\_

Epoch 18/19

3285/3285 [=====] - 1s 310us/step - loss: 0.0949 - acc: 0.9973 - val\_

Epoch 19/19

3285/3285 [=====] - 1s 313us/step - loss: 0.1709 - acc: 0.9744 - val\_

In [49]: `from sklearn import metrics`

`ACTIVITIES = {`

`0: 'WALKING',`

`1: 'WALKING_UPSTAIRS',`

```

        2: 'WALKING_DOWNSTAIRS',
    }

    # Utility function to print the confusion matrix
    def confusion_matrix_cnn(Y_true, Y_pred):
        Y_true = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_true, axis=1)])
        Y_pred = pd.Series([ACTIVITIES[y] for y in np.argmax(Y_pred, axis=1)])

        #return pd.crosstab(Y_true, Y_pred, rownames=['True'], colnames=['Pred'])
        return metrics.confusion_matrix(Y_true, Y_pred)

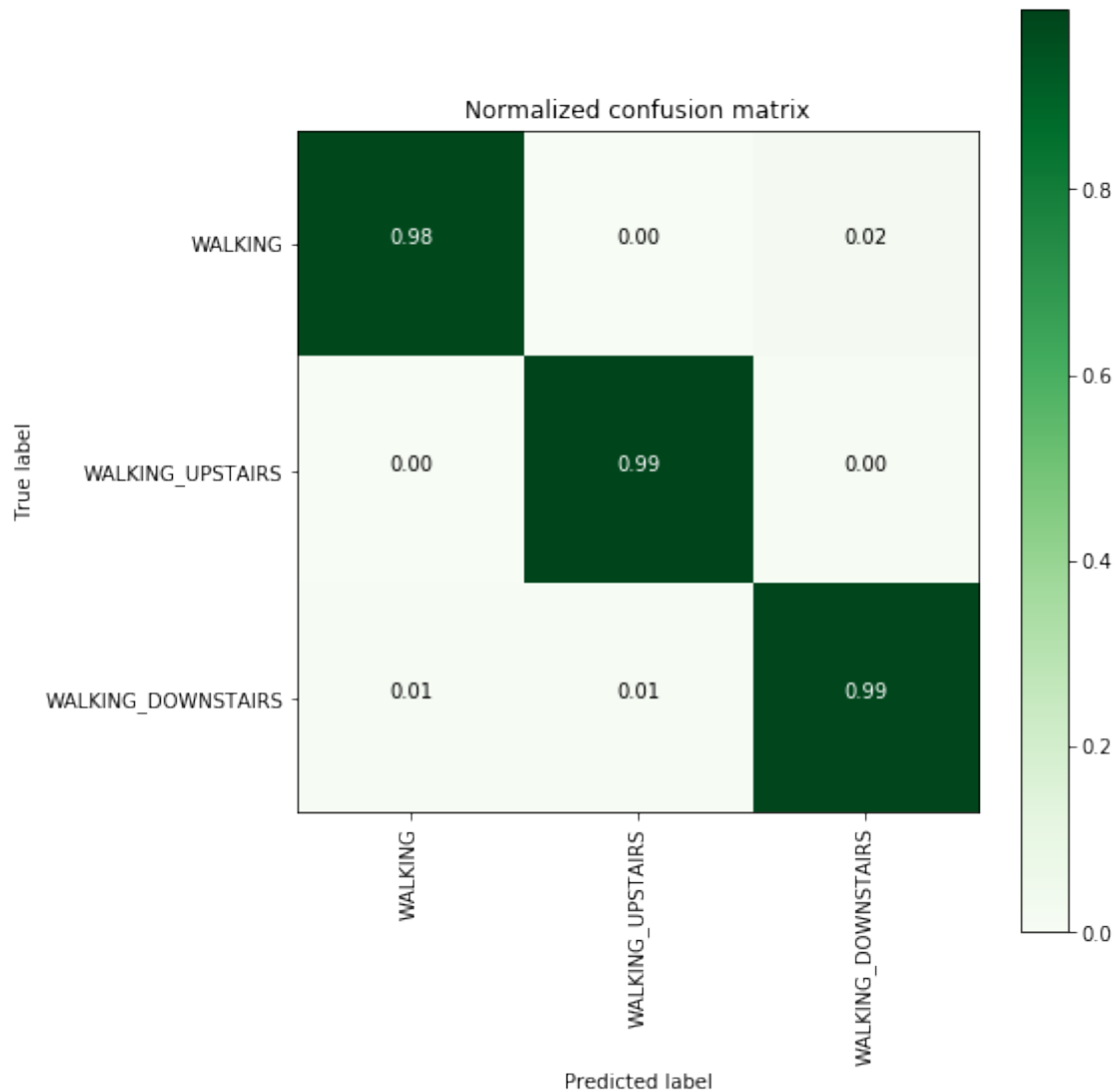
    # Confusion Matrix
    print(confusion_matrix_cnn(Y_val_d, best_model.predict(X_val_d)))

[[486   0  10]
 [  1 417   2]
 [  3   3 465]]

In [57]: plt.figure(figsize=(8,8))
         cm = confusion_matrix_cnn(Y_val_d, best_model.predict(X_val_d))
         plot_confusion_matrix(cm, classes=['WALKING', 'WALKING_UPSTAIRS', 'WALKING_DOWNSTAIRS']
                               normalize=True, title='Normalized confusion matrix', cmap = plt
         plt.show()

<matplotlib.figure.Figure at 0x147481785470>

```



it is also giving good scores than previous

```
In [58]: #saving model
         best_model.save('final_model_dynamic.h5')

In [154]: def data():
           """
           Obtain the dataset from multiple files.
           Returns: X_train, X_test, y_train, y_test
           """
           # Data directory
           DATADIR = 'UCI_HAR_Dataset'
           # Raw data signals
           # Signals are from Accelerometer and Gyroscope
```



```

# The signals are in x,y,z directions
# Sensor signals are filtered to have only body acceleration
# excluding the acceleration due to gravity
# Triaxial acceleration from the accelerometer is total acceleration
SIGNALS = [
    "body_acc_x",
    "body_acc_y",
    "body_acc_z",
    "body_gyro_x",
    "body_gyro_y",
    "body_gyro_z",
    "total_acc_x",
    "total_acc_y",
    "total_acc_z"
]

# Utility function to read the data from csv file
def _read_csv(filename):
    return pd.read_csv(filename, delim_whitespace=True, header=None)

# Utility function to load the load
def load_signals(subset):
    signals_data = []

    for signal in SIGNALS:
        filename = f'UCI_HAR_Dataset/{subset}/Inertial Signals/{signal}_{subset}.csv'
        signals_data.append( _read_csv(filename).as_matrix())

    # Transpose is used to change the dimensionality of the output,
    # aggregating the signals by combination of sample/timestep.
    # Resultant shape is (7352 train/2947 test samples, 128 timesteps, 9 signals)
    return np.transpose(signals_data, (1, 2, 0))

def load_y(subset):
    """
    The objective that we are trying to predict is a integer, from 1 to 6,
    that represents a human activity. We return a binary representation of
    every sample objective as a 6 bits vector using One Hot Encoding
    (https://pandas.pydata.org/pandas-docs/stable/generated/pandas.get\_dummies.h)
    """
    filename = f'UCI_HAR_Dataset/{subset}/y_{subset}.txt'
    y = _read_csv(filename)[0]
    return y

X_train, X_val = load_signals('train'), load_signals('test')
Y_train, Y_val = load_y('train'), load_y('test')

return X_train, Y_train, X_val, Y_val

```

```
In [155]: X_train, Y_train, X_val, Y_val = data()
```

```
In [167]: print('shape of test Y',Y_val.shape)
```

shape of test Y (2947,)

### 13.3.4 Final prediction pipeline

```
In [159]: ##loading keras models and pickle files for scaling data
from keras.models import load_model
import pickle
model_2class = load_model('final_model_2class.h5')
model_dynamic = load_model('final_model_dynamic.h5')
model_static = load_model('final_model_static.h5')
scale_2class = pickle.load(open('Scale_2class.p', 'rb'))
scale_static = pickle.load(open('Scale_static.p', 'rb'))
scale_dynamic = pickle.load(open('Scale_dynamic.p', 'rb'))
```

```
In [162]: ##scaling the data
def transform_data(X,scale):
    X_temp = X.reshape((X.shape[0] * X.shape[1], X.shape[2]))
    X_temp = scale.transform(X_temp)
    return X_temp.reshape(X.shape)
```

```
In [169]: #predicting output activity
def predict_activity(X):
    ##predicting whether dynamic or static
    predict_2class = model_2class.predict(transform_data(X,scale_2class))
    Y_pred_2class = np.argmax(predict_2class, axis=1)
    #static data filter
    X_static = X[Y_pred_2class==1]
    #dynamic data filter
    X_dynamic = X[Y_pred_2class==0]
    #predicting static activities
    predict_static = model_static.predict(transform_data(X_static,scale_static))
    predict_static = np.argmax(predict_static,axis=1)
    #adding 4 because need to get inal prediction lable as output
    predict_static = predict_static + 4
    #predicting dynamic activites
    predict_dynamic = model_dynamic.predict(transform_data(X_dynamic,scale_dynamic))
    predict_dynamic = np.argmax(predict_dynamic,axis=1)
    #adding 1 because need to get inal prediction lable as output
    predict_dynamic = predict_dynamic + 1
    ##appending final output to one list in the same sequence of input data
    i,j = 0,0
    final_pred = []
    for mask in Y_pred_2class:
        if mask == 1:
```

```

        final_pred.append(predict_static[i])
        i = i + 1
    else:
        final_pred.append(predict_dynamic[j])
        j = j + 1
    return final_pred

```

```

In [170]: ##predicting
          final_pred_val = predict_activity(X_val)
          final_pred_train = predict_activity(X_train)

```

```

In [173]: ##accuracy of train and test
          from sklearn.metrics import accuracy_score
          print('Accuracy of train data',accuracy_score(Y_train,final_pred_train))
          print('Accuracy of validation data',accuracy_score(Y_val,final_pred_val))

```

```

Accuracy of train data 0.9832698585418934
Accuracy of validation data 0.9684424838819138

```

```

In [182]: #confusion metric
          cm = metrics.confusion_matrix(Y_val, final_pred_val,labels=range(1,7))
          cm

```

```

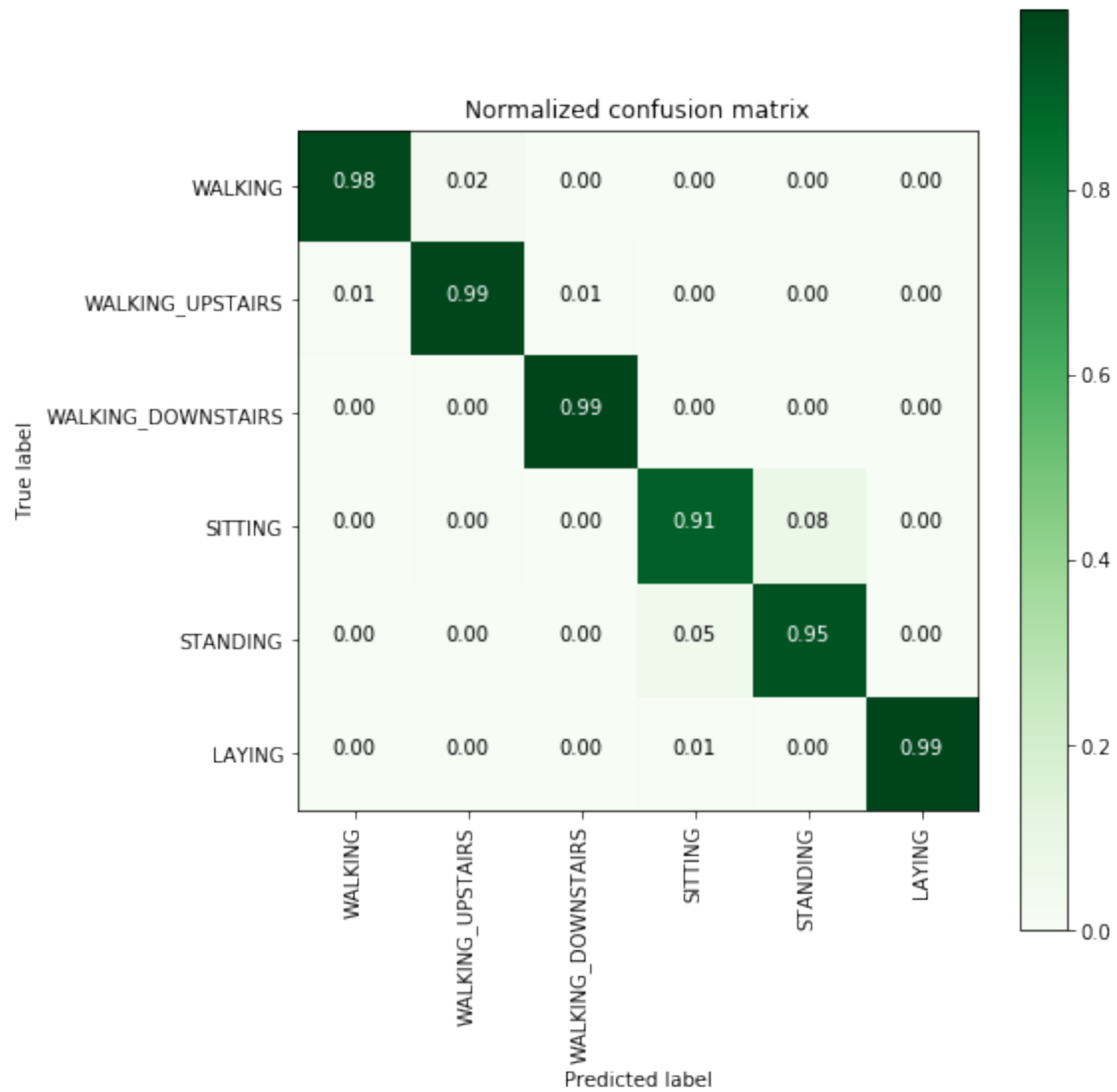
Out[182]: array([[486,  10,   0,   0,   0,   0],
                 [  3, 465,   3,   0,   0,   0],
                 [  1,   2, 417,   0,   0,   0],
                 [  1,   2,   0, 447,  41,   0],
                 [  0,   0,   0,  27, 505,   0],
                 [  0,   0,   0,   3,   0, 534]])

```

```

In [184]: plt.figure(figsize=(8,8))
          labels=['WALKING','WALKING_UPSTAIRS','WALKING_DOWNSTAIRS','SITTING','STANDING','LAYING']
          plot_confusion_matrix(cm, classes=labels,
                                normalize=True, title='Normalized confusion matrix', cmap = plt.cm.Blues)
          plt.show()

```



Divide and Conquer approach with CNN is giving good result with final test accuracy of ~0.97. and train accuracy ~0.98.