```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
from __future__ import print_function
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report
from time import time
#np.random.seed(1337)  # for reproducibility

from keras.preprocessing import sequence
from keras.models import Sequential
from keras.layers.core import Dense, Dropout, Activation, Flatten
from keras.layers.normalization import BatchNormalization
from keras.layers.convolutional import Convolution1D, MaxPooling1D
from keras.utils import np_utils
from keras.callbacks import TensorBoard


# set parameters:
test_dim = 499
maxlen = 100
nb_filter = 512
filter_length_1 = 10
filter_length_2 = 5
hidden_dims = 750
nb_epoch = 12
nb_classes = 2
split_ratio = 0.15

print('Loading data...')

X = np.load('/content/drive/My Drive/Colab Notebooks/data/numpy_vectors/x_test_mfcc_500_50:50_samples_sliced_out.npy')
```

```
y = np.load('/content/drive/My Drive/Colab Notebooks/data/numpy_vectors/y_label_500_50:50_samples_sliced_out.npy')
print(X.shape)
print(y.shape)
```

```
Loading data...
---------------------------------------------------------------------------
FileNotFoundError                         Traceback (most recent call last)
<ipython-input-6-4680f96d35c4> in <module>()
     29 print('Loading data...')
     30
---> 31 X = np.load('/content/drive/My Drive/Colab Notebooks/data/numpy_vectors/x_test_mfcc_500_50:50_samples_sliced_
     32 y = np.load('/content/drive/My Drive/Colab Notebooks/data/numpy_vectors/y_label_500_50:50_samples_sliced_out.
     33 print(X.shape)

/usr/local/lib/python3.6/dist-packages/numpy/lib/npyio.py in load(file, mmap_mode, allow_pickle, fix_imports, encodin
    426         own_fid = False
    427     else:
--> 428         fid = open(os_fspath(file), "rb")
    429         own_fid = True
    430

FileNotFoundError: [Errno 2] No such file or directory: '/content/drive/My Drive/Colab Notebooks/data/numpy_vectors/x
```

SEARCH STACK OVERFLOW

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=split_ratio)

xts = X_train.shape
#X_train = np.reshape(X_train, (xts[0], xts[1], 1))
xtss = X_test.shape
#X_test = np.reshape(X_test, (xtss[0], xtss[1], 1))
yts = y_train.shape
#y_train = np.reshape(y_train, (yts[0], 1))
ytss = y_test.shape
#y_test = np.reshape(y_test, (ytss[0], 1))

print(len(X_train), 'train sequences')
```

```
print(len(X_train), 'train sequences')
print(len(X_test), 'test sequences')

Y_train = np_utils.to_categorical(y_train, nb_classes)
Y_test = np_utils.to_categorical(y_test, nb_classes)

# print('Pad sequences (samples x time)')
# X_train = sequence.pad_sequences(X_train, maxlen=maxlen)
# X_test = sequence.pad_sequences(X_test, maxlen=maxlen)
# print('X_train shape:', X_train.shape)
# print('X_test shape:', X_test.shape)
```

```
1273 train sequences
225 test sequences
```

```
for batch_size in range(10, 11, 5):
    print('Build model...')
    model = Sequential()

    # we start off with an efficient embedding layer which maps
    # our vocab indices into embedding_dims dimensions
    # model.add(Embedding(max_features, embedding_dims, input_length=maxlen))
    # model.add(Dropout(0.25))

    # we add a Convolution1D, which will learn nb_filter
    # word group filters of size filter_length:
    model.add(Convolution1D(nb_filter=nb_filter,
                            filter_length=filter_length_1,
                            input_shape=(test_dim, 13),
                            border_mode='valid',
                            activation='relu'
                            ))
    # we use standard max pooling (halving the output of the previous layer):
    model.add(BatchNormalization())

    model.add(Convolution1D(nb_filter=nb_filter,
```

```
                        filter_length=5,
                        border_mode='valid',
                        activation='relu'
                        ))

model.add(BatchNormalization())

model.add(MaxPooling1D(pool_length=2))

model.add(Convolution1D(nb_filter=nb_filter,
                        filter_length=25,
                        border_mode='same',
                        activation='relu'
                        ))

model.add(BatchNormalization())

model.add(MaxPooling1D(pool_length=2))

model.add(Convolution1D(nb_filter=nb_filter,
                        filter_length=50,
                        border_mode='same',
                        activation='relu'
                        ))

model.add(BatchNormalization())

model.add(MaxPooling1D(pool_length=2))

model.add(Convolution1D(nb_filter=nb_filter,
                        filter_length=2,
                        border_mode='same',
                        activation='relu'
                        ))

model.add(BatchNormalization())
```

```
model.add(MaxPooling1D(pool_length=2))

# We flatten the output of the conv layer,
# so that we can add a vanilla dense layer:
model.add(Flatten())

# We add a vanilla hidden layer:
# model.add(Dense(hidden_dims))
model.add(Dropout(0.25))
# model.add(Activation('relu'))

model.add(Dense(1000))
model.add(Activation('relu'))
model.add(Dense(750))
model.add(Activation('relu'))
model.add(Dense(50))
model.add(Activation('relu'))
# We project onto a single unit output layer, and squash it with a sigmoid:
model.add(Dense(nb_classes))
model.add(Activation('softmax'))

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

print("model/split = {} <> batchsize = {}".format(split_ratio, batch_size))
tensorboard = TensorBoard(log_dir="logs/split_{}_batchsize_{}".format(split_ratio, batch_size))

model.fit(X_train, Y_train, batch_size=batch_size,
        nb_epoch=10,  verbose=1, callbacks=[tensorboard]  )

# model.save('model_hin_tel_38_samples.h5')

y_preds = model.predict(X_test)
for i in range(len(y_preds)):
    print(y_preds[i], y_test[i])

score = model.evaluate(X_test, Y_test, verbose=1)
print(score)
```

```
      print("\n*********************************\n")

  # print(classification_report(Y_test, Y_preds))
```

```
Build model...
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:17: UserWarning: Update your `Conv1D` call to the Keras
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:25: UserWarning: Update your `Conv1D` call to the Keras
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:30: UserWarning: Update your `MaxPooling1D` call to the
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:35: UserWarning: Update your `Conv1D` call to the Keras
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:40: UserWarning: Update your `MaxPooling1D` call to the
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:45: UserWarning: Update your `Conv1D` call to the Keras
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:50: UserWarning: Update your `MaxPooling1D` call to the
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:55: UserWarning: Update your `Conv1D` call to the Keras
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:60: UserWarning: Update your `MaxPooling1D` call to the
model/split = 0.15 <> batchsize = 10
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:88: UserWarning: The `nb_epoch` argument in `fit` has be
Epoch 1/10
1273/1273 [==============================] - 29s 23ms/step - loss: 0.2612 - acc: 0.9513
Epoch 2/10
1273/1273 [==============================] - 28s 22ms/step - loss: 0.0627 - acc: 0.9804
Epoch 3/10
1273/1273 [==============================] - 28s 22ms/step - loss: 6.7230e-04 - acc: 1.0000
Epoch 4/10
1273/1273 [==============================] - 27s 22ms/step - loss: 0.2645 - acc: 0.9694
Epoch 5/10
1273/1273 [==============================] - 27s 21ms/step - loss: 0.3198 - acc: 0.9741
Epoch 6/10
1273/1273 [==============================] - 27s 21ms/step - loss: 0.2755 - acc: 0.9756
Epoch 7/10
1273/1273 [==============================] - 27s 21ms/step - loss: 0.3391 - acc: 0.9749
Epoch 8/10
1273/1273 [==============================] - 27s 21ms/step - loss: 0.0516 - acc: 0.9929
Epoch 9/10
1273/1273 [==============================] - 27s 21ms/step - loss: 0.0481 - acc: 0.9937
Epoch 10/10
1273/1273 [==============================] - 27s 22ms/step - loss: 0.0397 - acc: 0.9788
[0. 1.] 1
[1.0000000e+00 9.4491535e-09] 0
[1.0000000e+00 2.9708039e-08] 0
[0. 1.] 1
[0. 1.] 1
```

```
[1.0000000e+00 1.0174263e-16] 0
[0. 1.] 1
[1.0000000e+00 4.9251014e-08] 0
[1.000000e+00 9.302234e-16] 0
[3.913145e-23 1.000000e+00] 1
[1.0000000e+00 5.2747817e-11] 0
[1.0000000e+00 1.2272266e-13] 0
[0. 1.] 1
[0. 1.] 1
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[1.0000000e+00 1.6295687e-08] 0
[1.0000000e+00 5.2878923e-09] 0
[1.000000e+00 5.572071e-13] 0
[1.0000000e+00 5.4835686e-10] 0
[1.000000e+00 8.256588e-15] 0
[1.000000e+00 9.503117e-14] 0
[1.000000e+00 8.211124e-11] 0
[1.000000e+00 7.127398e-17] 0
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[1.000000e+00 1.060413e-15] 0
[1.0000000e+00 3.3064514e-18] 0
[9.9999666e-01 3.3758026e-06] 0
[0. 1.] 1
[1.0000000e+00 2.6187514e-12] 0
[1.000000e+00 6.320045e-09] 0
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
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[1.00000e+00 4.69186e-09] 0
[0. 1.] 1
[1.000000e+00 6.014659e-10] 0
[0. 1.] 1
[1.0000000e+00 2.9877045e-11] 0
```

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[1.000000e+00 5.580463e-13] 0
[4.1129384e-32 1.0000000e+00] 1
[0. 1.] 1
[1.0000000e+00 9.4179655e-14] 0
[0. 1.] 1
[7.09383e-36 1.00000e+00] 1
[1.0000000e+00 2.0066371e-16] 0
[1.0000000e+00 2.4715158e-10] 0
[1.0000000e+00 5.2324094e-17] 0
[0. 1.] 1
[0. 1.] 1
[1.000000e+00 7.518535e-09] 0
[0. 1.] 1
[1.00000e+00 6.61684e-15] 0
[0. 1.] 1
[1.00000e+00 2.53278e-15] 0
[0. 1.] 1
[1.000000e+00 8.282941e-20] 0
[1.0000000e+00 2.3448368e-13] 0
[0. 1.] 1
[1.0000000e+00 2.0980333e-09] 0
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[1.0000000e+00 5.1961497e-09] 0
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[1.0000000e+00 1.8630502e-08] 0
[0. 1.] 1
```

```
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[9.9999809e-01 1.9452746e-06] 0
[0. 1.] 1
[1.00000e+00 7.45502e-16] 0
[1.000000e+00 5.761595e-20] 0
[2.679855e-13 1.000000e+00] 1
[0. 1.] 1
[0. 1.] 1
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[0. 1.] 1
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[0. 1.] 1
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[1.0000000e+00 1.8410134e-17] 0
[1.00000e+00 4.72667e-11] 0
[0.8108693  0.18913071] 0
[1.000000e+00 2.858621e-10] 0
[1.0000000e+00 2.2055669e-16] 0
[1.000000e+00 5.191883e-08] 0
[1.000000e+00 1.702337e-14] 0
[0. 1.] 1
[1.000000e+00 4.826885e-08] 0
[1.000000e+00 3.102288e-10] 0
[0. 1.] 1
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[1.0000000e+00 2.9196558e-20] 0
[1.0000000e+00 2.8095144e-09] 0
[1.000000e+00 2.887267e-15] 0
[0. 1.] 1
[1.0000000e+00 1.0518926e-14] 0
[9.269593e-12 1.000000e+00] 1
[0.00972082 0.99027914] 1
[9.9901915e-01 9.8085136e-04] 0
[0. 1.] 1
[1.0000000e+00 3.4584108e-10] 0
[0. 1.] 1
```

```
[0. 1.] 1
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[1.0000000e+00 1.4470658e-14] 0
[0. 1.] 1
[9.9999630e-01 3.7258787e-06] 0
[1.0000000e+00 2.3591462e-14] 0
[0. 1.] 1
[0. 1.] 1
[1.0000000e+00 8.8312596e-10] 0
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[0. 1.] 1
[1.0000000e+00 2.1098913e-13] 0
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[0. 1.] 1
[1.000000e+00 4.046327e-12] 0
[1.9215593e-08 1.0000000e+00] 1
[1.0000000e+00 4.2990854e-12] 0
[6.1672165e-31 1.0000000e+00] 1
[1.0000000e+00 2.5015506e-10] 0
[1.0000000e+00 2.4167427e-13] 0
[1.0000000e+00 5.5982345e-13] 0
[0. 1.] 1
[7.5038475e-36 1.0000000e+00] 1
[0.9984804  0.00151966] 1
[5.3451885e-38 1.0000000e+00] 1
[0. 1.] 1
[0. 1.] 1
[4.4628055e-29 1.0000000e+00] 1
[1.774965e-36 1.000000e+00] 1
[0. 1.] 1
[0. 1.] 1
[1.0000000e+00 1.5507621e-13] 0
[0. 1.] 1
[0. 1.] 1
[1.0000000e+00 3.5254826e-15] 0
[0. 1.] 1
[0. 1.] 1
```

```
[1.0000000e+00 1.2609122e-13] 0
[1.0000000e+00 3.5893556e-16] 0
[0. 1.] 1
[0. 1.] 1
[1.1421168e-33 1.0000000e+00] 1
[0. 1.] 1
[1.0000000e+00 1.4937518e-11] 0
[1.000000e+00 4.429391e-15] 0
[1.000000e+00 9.420989e-09] 0
[1.000000e+00 7.093632e-16] 0
[1.0000000e+00 3.2631037e-10] 0
[1.000000e+00 2.519638e-13] 0
[4.0187588e-13 1.0000000e+00] 1
[0. 1.] 1
[9.9999595e-01 4.1118506e-06] 0
[9.999999e-01 7.172379e-08] 0
[0. 1.] 1
[8.55177e-13 1.00000e+00] 1
[1.0000000e+00 6.0110055e-12] 0
[1.0000000e+00 1.1615431e-12] 0
[1.0000000e+00 7.7009417e-17] 0
[0.00489223 0.99510777] 1
[4.1049173e-30 1.0000000e+00] 1
[1.000000e+00 7.806691e-15] 0
[1.0000000e+00 2.4161398e-16] 0
[0. 1.] 1
[1.000000e+00 3.507439e-16] 0
[1.0000000e+00 3.0289424e-11] 0
[0. 1.] 1
[1.0000000e+00 1.7882132e-11] 0
[9.999981e-01 1.854361e-06] 0
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[1.000000e+00 3.966624e-13] 0
[1.0000000e+00 4.9043398e-11] 0
[1.0000000e+00 3.0563344e-11] 0
```

```
[1.000000e+00 7.388705e-11] 0
[0. 1.] 1
[0. 1.] 1
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[1.0000000e+00 3.3645626e-09] 0
[1.0000000e+00 5.3188794e-19] 0
[9.99895215e-01 1.04796905e-04] 0
[1.6291619e-04 9.9983704e-01] 1
[1.0000000e+00 1.2124434e-09] 0
[0. 1.] 1
[0. 1.] 1
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[1.0000000e+00 3.8066872e-08] 0
[0. 1.] 1
[1.000000e+00 7.141009e-16] 0
[1.0000000e+00 5.2745325e-10] 0
[9.9999928e-01 6.6868074e-07] 0
[1.000000e+00 5.826321e-16] 0
[0.49737185 0.50262815] 0
[1.0000000e+00 1.4455808e-15] 0
[1.8994878e-19 1.0000000e+00] 1
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[0. 1.] 1
[1.0000000e+00 6.6683902e-12] 0
[0. 1.] 1
[1.000000e+00 2.604208e-11] 0
[0. 1.] 1
```