Assignment -4

Python Programming

Assignment Date	28 October 2022
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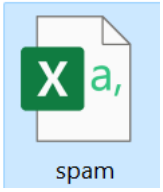
Maximum Marks	2 Marks

Question-1:

Download the dataset

Output:

Download the dataset from
https://www.kaggle.com/code/kredy10/simple-lstm-for-text-classification/data



Question-2:

Import required library

Output:

```
[1]  import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
     import seaborn as sns
     import keras
     from sklearn.model_selection import train_test_split
     from sklearn.preprocessing import LabelEncoder
     from keras.models import Model
     from keras.layers import LSTM, Activation, Dense, Dropout, Input, Embedding
     from keras.optimizers import RMSprop
     from keras.preprocessing.text import Tokenizer
     from keras.preprocessing import sequence
     from keras.utils import to_categorical, pad_sequences
     from keras.callbacks import EarlyStopping
     %matplotlib inline
```

Question 3:

Read dataset and do pre-processing

Output:

```
[2]  df = pd.read_csv('spam.csv',delimiter=',',encoding='latin-1')
     df.head()
```

	v1	v2	Unnamed: 2	Unnamed: 3	Unnamed: 4
0	ham	Go until jurong point, crazy.. Available only ...	NaN	NaN	NaN
1	ham	Ok lar... Joking wif u oni...	NaN	NaN	NaN
2	spam	Free entry in 2 a wkly comp to win FA Cup fina...	NaN	NaN	NaN
3	ham	U dun say so early hor... U c already then say...	NaN	NaN	NaN
4	ham	Nah I don't think he goes to usf, he lives aro...	NaN	NaN	NaN

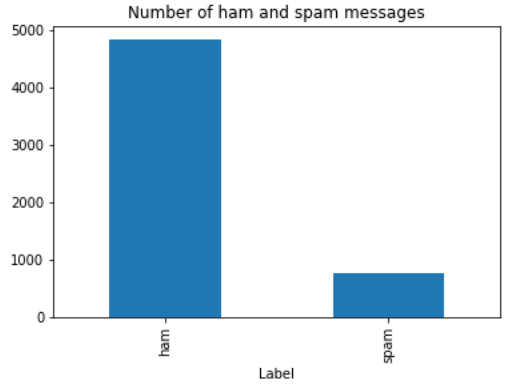
```
df.drop(['Unnamed: 2', 'Unnamed: 3', 'Unnamed: 4'],axis=1,inplace=True)
```

```
df.shape
```

```
(5572, 2)
```

```
df['v1'].value_counts().plot(kind='bar')
plt.xlabel('Label')
plt.title('Number of ham and spam messages')
```

```
Text(0.5, 1.0, 'Number of ham and spam messages')
```




```
X = df.v2
Y = df.v1
#label encoding for Y
le = LabelEncoder()
Y = le.fit_transform(Y)
Y = Y.reshape(-1,1)
```

```
X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.20)
```

```
max_words = 1000
max_len = 150
tok = Tokenizer(num_words=max_words)
tok.fit_on_texts(X_train)
sequences = tok.texts_to_sequences(X_train)
sequences_matrix = keras.utils.pad_sequences(sequences,maxlen=max_len)
```

Question 4:

Create Model

Output:

```
model = Model(inputs=inputs,outputs=layer)
```

Question 5:

Add Layers (LSTM, Dense-(Hidden Layers), Output)

Output:

```
inputs = Input(name='inputs',shape=[max_len])
layer = Embedding(max_words,50,input_length=max_len)(inputs)
layer = LSTM(64)(layer)
layer = Dense(256,name='FC1')(layer)
layer = Activation('relu')(layer)
layer = Dropout(0.5)(layer)
layer = Dense(1,name='out_layer')(layer)
layer = Activation('sigmoid')(layer)
```

Question 6:

Compile the Model

Output:

```
model.summary()
model.compile(loss='binary_crossentropy',optimizer=RMSprop(),metrics=['accuracy'])
```

```
Model: "model"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 inputs (InputLayer)         [(None, 150)]             0

 embedding (Embedding)       (None, 150, 50)           50000

 lstm (LSTM)                 (None, 64)                29440

 FC1 (Dense)                 (None, 256)               16640

 activation (Activation)     (None, 256)               0

 dropout (Dropout)           (None, 256)               0

 out_layer (Dense)           (None, 1)                 257

 activation_1 (Activation)   (None, 1)                 0

=================================================================
Total params: 96,337
Trainable params: 96,337
Non-trainable params: 0
_________________________________________________________________
```

Question 7:

Fit the Model

Output:

```
model.fit(sequences_matrix,Y_train,batch_size=128,epochs=10,validation_split=0.2,callbacks=[EarlyStopping(monitor='val_loss',min_delta=0.0001)])
```

```
Epoch 1/10
28/28 [==============================] - 11s 287ms/step - loss: 0.3337 - accuracy: 0.8654 - val_loss: 0.2007 - val_accuracy: 0.9742
Epoch 2/10
28/28 [==============================] - 11s 392ms/step - loss: 0.0863 - accuracy: 0.9792 - val_loss: 0.0667 - val_accuracy: 0.9832
<keras.callbacks.History at 0x7f3ec8f940d0>
```

Question 8:

Save The Model

Output:

```
model.save('spam_lstm_model.h5')
```

Question 9:

Test The Model

Output:

```
test_sequences = tok.texts_to_sequences(X_test)
test_sequences_matrix = keras.utils.pad_sequences(test_sequences,maxlen=max_len)
```

```
accr = model.evaluate(test_sequences_matrix,Y_test)
print('Test set\n  Loss: {:0.3f}\n  Accuracy: {:0.3f}'.format(accr[0],accr[1]))
```

```
35/35 [==============================] - 1s 23ms/step - loss: 0.0512 - accuracy: 0.9874
Test set
  Loss: 0.051
  Accuracy: 0.987
```