

Assignment -4

Python Programming

| | |
|---------------------|--------------|
| Assignment Date | 29-10-2022 |
| Student Name | Hariharan M |
| Student Roll Number | 312319104039 |
| Maximum Marks | 2 MARKS |

Question 1:

Import the necessary libraries

Solution:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
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 pad_sequences
from keras.utils import to_categorical
from keras.callbacks import EarlyStopping
```

Question2:

Download the Dataset

Solution:

Dataset Downloaded and uploaded to drive <https://www.kaggle.com/code/kredy10/simple-lstm-for-textclassification/data>

Question3:

Read dataset and do pre-processing

Solution:

Read dataset

```
In [21]: df = pd.read_csv('/content/drive/MyDrive/spam.csv', delimiter=',', encoding='latin-1')
df.head()
```

```
Out[21]:
```

| | 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 |

Pre-processing the Dataset

```
In [22]: df.drop(['Unnamed: 2', 'Unnamed: 3', 'Unnamed: 4'],axis=1,inplace=True)
df.info()
```

```
RangeIndex: 5572 entries, 0 to 5571
Data columns (total 2 columns):
#   Column  Non-Null Count  Dtype
---  ------  -
0    v1      5572 non-null     object
1    v2      5572 non-null     object
dtypes: object(2)
memory usage: 87.2+ KB
```

```
In [23]: X = df.v2
Y = df.v1
le = LabelEncoder()
Y = le.fit_transform(Y)
Y = Y.reshape(-1,1)
```

```
In [24]: X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.15)
```

```
In [25]: 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 = pad_sequences(sequences,maxlen=max_len)
```

```
In [26]: 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)
model = Model(inputs=inputs,outputs=layer)

model.summary()
```

Model: "model_1"

| Layer (type) | Output Shape | Param # |
|---------------------------|-----------------|---------|
| inputs (InputLayer) | [(None, 150)] | 0 |
| embedding_1 (Embedding) | (None, 150, 50) | 50000 |
| lstm_1 (LSTM) | (None, 64) | 29440 |
| FC1 (Dense) | (None, 256) | 16640 |
| activation_2 (Activation) | (None, 256) | 0 |
| dropout_1 (Dropout) | (None, 256) | 0 |
| out_layer (Dense) | (None, 1) | 257 |
| activation_3 (Activation) | (None, 1) | 0 |

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

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

Train and Fit the Model

```
In [28]: model.fit(sequences_matrix,Y_train,batch_size=128,epochs=10,  
                validation_split=0.2)
```

```
Epoch 1/10  
30/30 [=====] - 10s 264ms/step - loss: 0.3182 - accuracy: 0.8788 - val_loss: 0.1571 - val_accuracy: 0.9715  
Epoch 2/10  
30/30 [=====] - 7s 247ms/step - loss: 0.0805 - accuracy: 0.9786 - val_loss: 0.0742 - val_accuracy: 0.9778  
Epoch 3/10  
30/30 [=====] - 7s 237ms/step - loss: 0.0403 - accuracy: 0.9881 - val_loss: 0.0670 - val_accuracy: 0.9821  
Epoch 4/10  
30/30 [=====] - 7s 245ms/step - loss: 0.0272 - accuracy: 0.9929 - val_loss: 0.0806 - val_accuracy: 0.9778  
Epoch 5/10  
30/30 [=====] - 7s 242ms/step - loss: 0.0220 - accuracy: 0.9937 - val_loss: 0.0820 - val_accuracy: 0.9800  
Epoch 6/10  
30/30 [=====] - 7s 240ms/step - loss: 0.0178 - accuracy: 0.9955 - val_loss: 0.0787 - val_accuracy: 0.9789  
Epoch 7/10  
30/30 [=====] - 7s 243ms/step - loss: 0.0150 - accuracy: 0.9958 - val_loss: 0.0969 - val_accuracy: 0.9800  
Epoch 8/10  
30/30 [=====] - 7s 241ms/step - loss: 0.0162 - accuracy: 0.9958 - val_loss: 0.0901 - val_accuracy: 0.9768  
Epoch 9/10  
30/30 [=====] - 7s 246ms/step - loss: 0.0099 - accuracy: 0.9968 - val_loss: 0.1284 - val_accuracy: 0.9789  
Epoch 10/10  
30/30 [=====] - 7s 247ms/step - loss: 0.0355 - accuracy: 0.9905 - val_loss: 0.1264 - val_accuracy: 0.9726
```

Out[28]:

Save The Model

```
In [29]: model.save('sms_classifier.h5')
```

Preprocessing the Test Dataset

```
In [30]: test_sequences = tok.texts_to_sequences(X_test)
test_sequences_matrix = pad_sequences(test_sequences,maxlen=max_len)
```

Testing the Model

```
In [31]: accr = model.evaluate(test_sequences_matrix,Y_test)
```

27/27 [*****] - 1s 20ms/step - loss: 0.0886 - accuracy: 0.9821

```
In [32]: print('Test set\n Loss: {:.3f}\n Accuracy: {:.3f}'.format(accr[0],accr[1]))
```

Test set
Loss: 0.089
Accuracy: 0.982