ASSIGNMENT-4

PYTHON PROGRAMMING

Assignment Date	**30 October 2022**
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Maximum Marks	**2 Marks**

#Download the Dataset #Import the library

```
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
tensorflow.keras.preprocessing.sequence import pad_sequences from
sklearn.preprocessing   import      LabelEncoder      from
tensorflow.keras.models import Model   from tensorflow.keras.layers import
LSTM, Activation, Dense, Dropout, Input, Embedding  from
tensorflow.keras.optimizers import RMSprop from
tensorflow.keras.preprocessing.text import Tokenizer from
tensorflow.keras.preprocessing import sequence from tensorflow.keras.utils
import to_categorical from tensorflow.keras.callbacks import EarlyStopping
%matplotlib inline
```

#Read Dataset and Preprocessing

```
df = pd.read_csv('/content/spam.csv',delimiter=',',encoding='latin-1')
df.head()
```

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

```
0         NaN         NaN
1         NaN         NaN
2         NaN         NaN
3         NaN         NaN   4         NaN         NaN
```

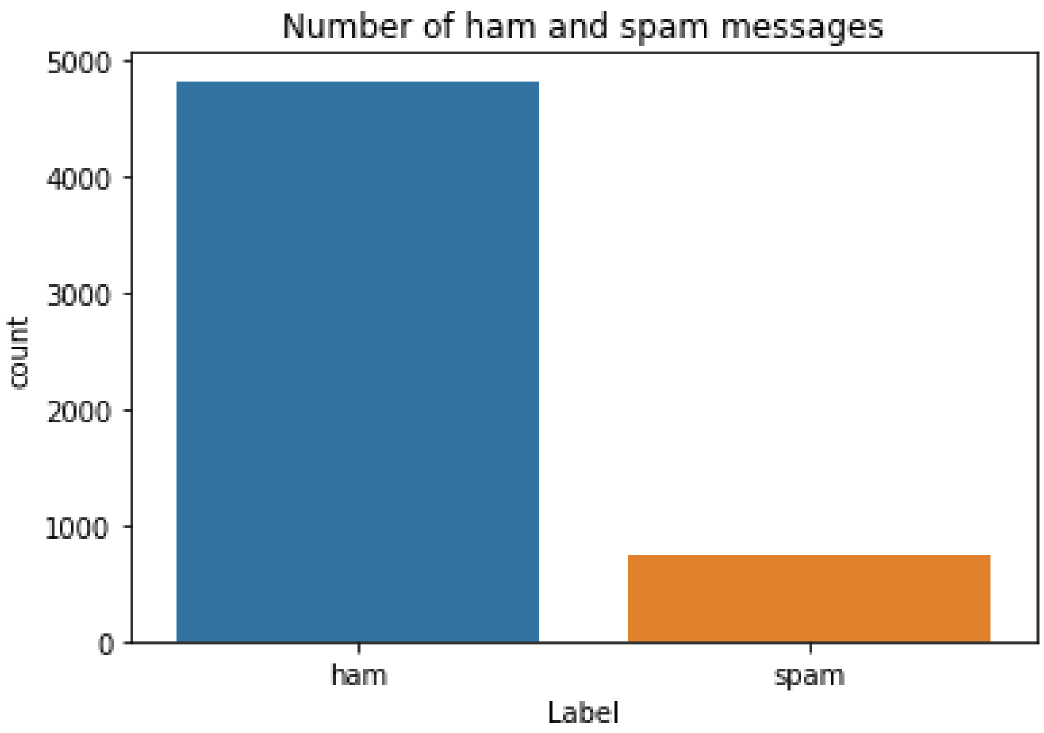
```
df.drop(['Unnamed: 2', 'Unnamed: 3', 'Unnamed: 4'],axis=1,inplace=True)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
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
```

```
sns.countplot(df.v1) plt.xlabel('Label') plt.title('Number
of ham and spam messages')
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43:
FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.   FutureWarning
```

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



#Creating input and output vectors.

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

#Split into training and test data.

```
X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.15)
```

#Processing the data from tensorflow.keras.preprocessing.sequence

```
import pad_sequences

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 =
sequence.pad_sequences(sequences,maxlen=max_len)
```

#Create the model, Add Layers (LSTM, Dense)

```
def RNN():    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)     return model
```

#Compile the model

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

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
_________________________________________________________________
```

#Fit The Model

```
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
30/30 [==============================] - 12s 295ms/step - loss: 0.3310 -
accuracy: 0.8759 - val_loss: 0.1603 - val_accuracy: 0.9346 Epoch 2/10
30/30 [==============================] - 8s 273ms/step - loss: 0.0854 -
accuracy: 0.9778 - val_loss: 0.0571 - val_accuracy: 0.9831

<keras.callbacks.History at 0x7fbf58e3fbd0>
```

#Process the data

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

#Save the model `model.save('spam.h5')` **#Testing the**

model

```
accr                    =
model.evaluate(test_sequences_matrix,Y_test)
27/27 [==============================] - 1s 34ms/step - loss: 0.0363 -
accuracy:  0.9904    print('Test  set\n    Loss:  {:0.3f}\n    Accuracy:
{:0.3f}'.format(accr[0],accr[1]))
```

```
Test set
  Loss: 0.036
  Accuracy: 0.990
```