ASSIGNMENT-4

PYTHON PROGRAMMING

Assignment Date	**2 NOV 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()
```

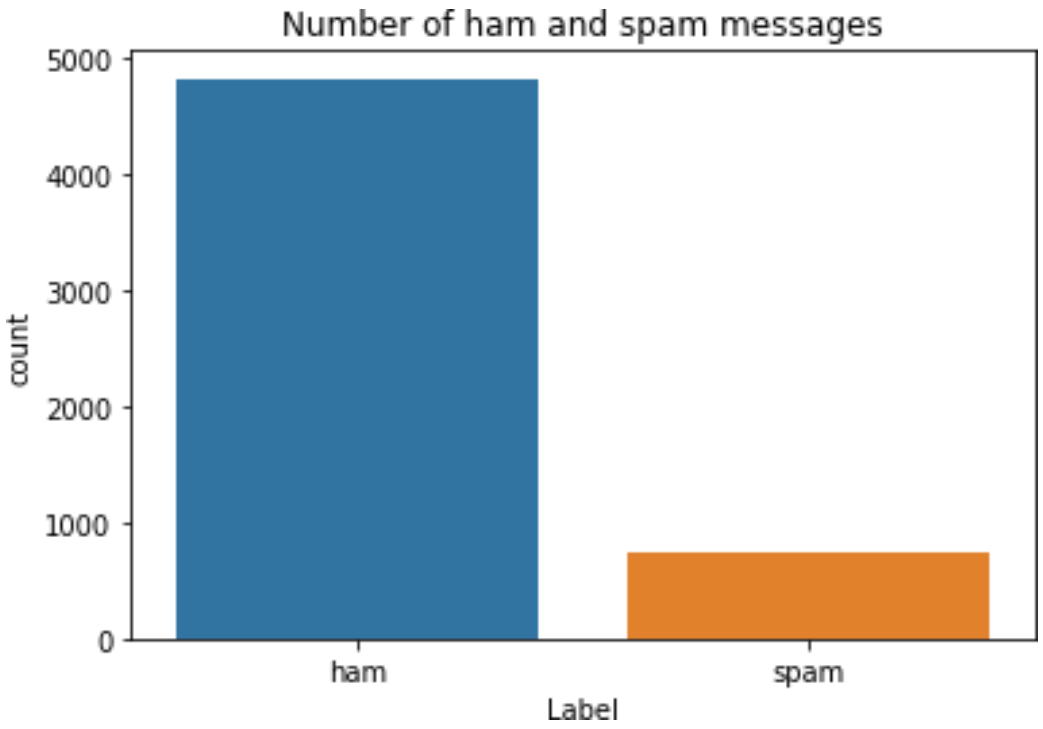
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5572 entries, 0 to 5571 Data
columns (total 2 columns):
 # Column Non-Null Count Dtype
```

```
 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
```