Assignment -4
Python Programming

Assignment Date	05 October 2022
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Maximum Marks	2 Marks

Importing Required Libraries

```
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 to_categorical from keras.callbacks import
EarlyStopping from keras.utils import pad_sequences %matplotlib inline
```

Read Dataset and Preprocessing

```
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
```

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

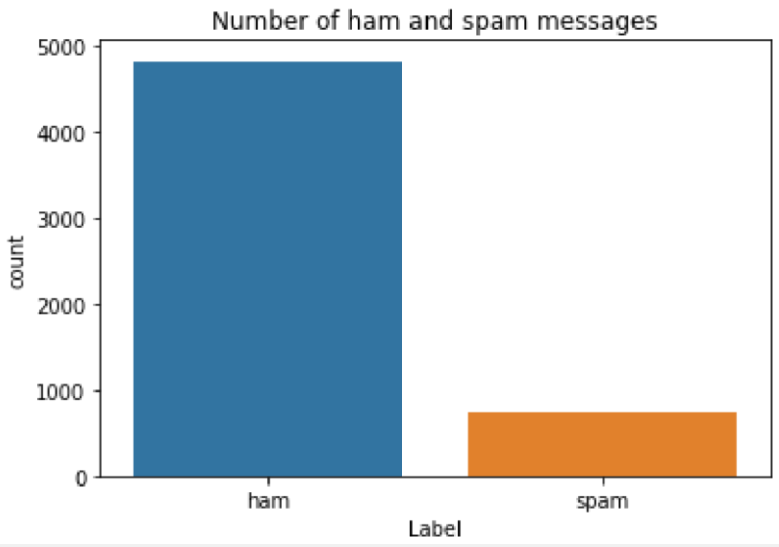
```
<class 'pandas.core.frame.DataFrame'> RangeIndex:
 5572 entries, 0 to 5571
  Data columns (total 2 columns):
   #   Column  Non-Null Count  Dtype
  ---  ------  --------------  -----
  0   v1      5572 non-null   object  1
  v2      5572 non-null   object
  dtypes: object(2) memory usage: 87.2+
  KB
```

```
sns.countplot(df.v1)
plt.xlabel('Label')
plt.title('Number of ham and spam messages')
X = df.v2

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

X df.v2Y = df.v1 le = LabelEncoder()
Y = le.fit_transform(Y)
Y = Y.reshape(-1,1)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass
  FutureWarning
```



```
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)
```

Create Model

```
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
```

Adding LSTM Layers

```
model = RNN()  model.summary()
```

```
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
_________________________________________________________________
```

Compile The Model

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

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=0.000
```

```
Epoch 1/10
30/30 [==============================] - 13s 281ms/step - loss: 0.3342 - accuracy: 0
Epoch 2/10
30/30 [==============================] - 8s 264ms/step - loss: 0.0833 - accuracy: 0.9
<keras.callbacks.History at 0x7f7f57c210d0>
```

Save The Model

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

Test The Model

```
test_sequences = tok.texts_to_sequences(X_test)
```

```
test_sequences_matrix = pad_sequences(test_sequences,maxlen=max_len)
test_sequences_matrix
```

```
array([[  0,   0,   0, ...,  18,   5, 136],
       [  0,   0,   0, ...,  84,  33,  89],
       [  0,   0,   0, ..., 475,   2, 306],
       ...,
       [  0,   0,   0, ..., 625,  54, 171],
       [  0,   0,   0, ...,  56,  42,  41],
       [  0,   0,   0, ..., 185, 108, 236]], dtype=int32)
```

Accuracy Of The Model

```
accr = model.evaluate(test_sequences_matrix,Y_test)
print('Accuracy:',accr[1])
print('Loss:',accr[0])
```

```
27/27 [==============================] - 1s 39ms/step - loss: 0.0614 - accuracy: 0.98
Accuracy: 0.9820573925971985
Loss: 0.061391204595565796
```

Colab paid products - Cancel contracts here