Assignment -4

SMS SPAM Classification

Assignment Date	11 November 2022
Title	Crude Oil Price Prediction
Team ID	PNT2022TMID31476

1.Download the data set

2.Import library

```
import pandas as pd import numpy as np import seaborn as
sns import matplotlib.pyplot as plt 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.models
import load_model
```

3.Read dataset and preprocessing

```
df =
pd.read_csv('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
```

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

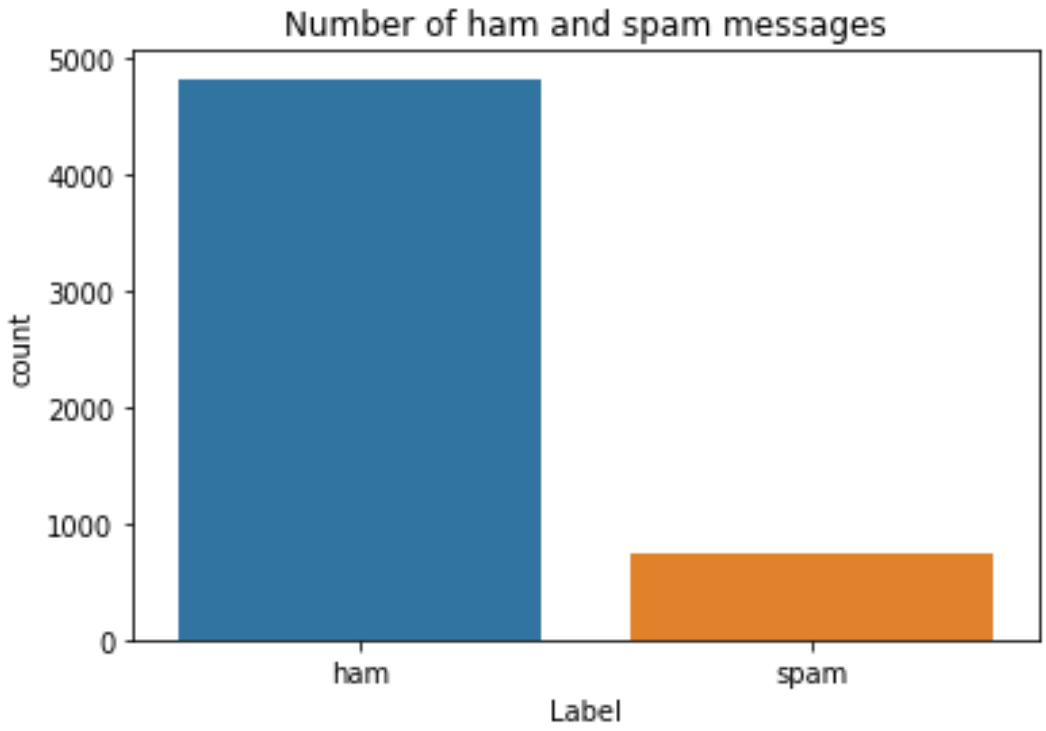
```
df.info()
```

```
<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')
```




```
X = df.v2 Y = df.v1 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=0.15)
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)
```

4.Create Model & 5.Add Layers (LSTM, Dense-(Hidden Layers), 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) model = Model(inputs=inputs,outputs=layer)
```

6.Compile the model

```
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
_________________________________________________________________
```

7.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 [==============================] - 14s 301ms/step - loss: 0.3161 -
accuracy: 0.8788 - val_loss: 0.1419 - val_accuracy: 0.9641 Epoch 2/10
30/30 [==============================] - 11s 385ms/step - loss: 0.0887 -
accuracy: 0.9789 - val_loss: 0.0677 - val_accuracy: 0.9810
```

```
<keras.callbacks.History at 0x7f98f21de750>
```

8.Save the model `model.save('model.h5')` 9.Test the model

```
test_sequences = tok.texts_to_sequences(X_test) test_sequences_matrix =
sequence.pad_sequences(test_sequences,maxlen=max_len) accr =
model.evaluate(test_sequences_matrix,Y_test)
```

```
27/27 [==============================] - 1s 23ms/step - loss: 0.0870 -
accuracy: 0.9749
```

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

```
Test set
  Loss: 0.087   Accuracy:
0.975
```

```
print("Loss: ", accr[0]) print("Accuracy:",
accr[1]*100,"%")
```

```
Loss:  0.08696156740188599
Accuracy: 97.48803973197937 %
```