Assignment-4

VirtualEye - Life Guard for Swimming Pools to Detect Active Drowning

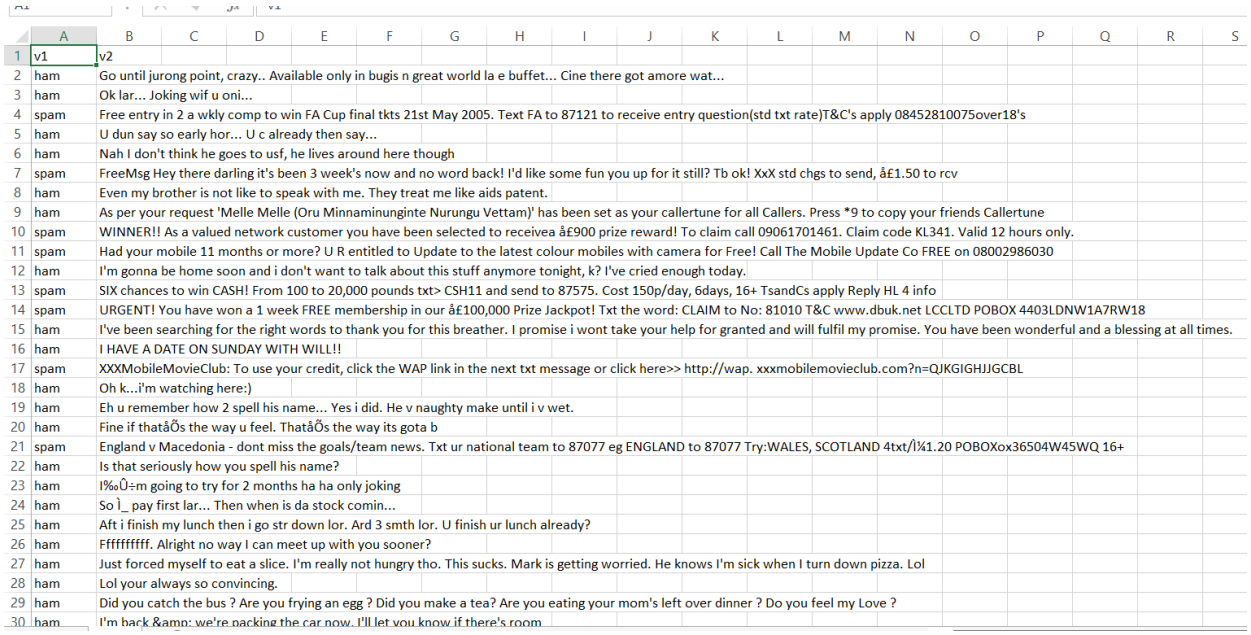
Assignment Date	November 14, 2022
Student Name	SREEKESH DEVANATHAN
Student Roll Number	2127190801080
Maximum Marks	2 Marks

Question-1:

Download the dataset

Solution:

Download the given dataset in the given attached link.



	A	B
1	v1	v2
2	ham	Go until jurong point, crazy.. Available only in bugis n great world la e buffet... Cine there got amore wat...
3	ham	Ok lar... Joking wif u oni...
4	spam	Free entry in 2 a wkly comp to win FA Cup final tkts 21st May 2005. Text FA to 87121 to receive entry question(std txt rate)T&C's apply 08452810075over18's
5	ham	U dun say so early hor... U c already then say...
6	ham	Nah I don't think he goes to usf, he lives around here though
7	spam	FreeMsg Hey there darling it's been 3 week's now and no word back! I'd like some fun you up for it still? Tb ok! XxX std chgs to send, å£1.50 to rcv
8	ham	Even my brother is not like to speak with me. They treat me like aids patent.
9	ham	As per your request 'Melle Melle (Oru Minnaminunginte Nurungu Vettam)' has been set as your callertune for all Callers. Press *9 to copy your friends Callertune
10	spam	WINNER!! As a valued network customer you have been selected to receivea å£900 prize reward! To claim call 09061701461. Claim code KL341. Valid 12 hours only.
11	spam	Had your mobile 11 months or more? U R entitled to Update to the latest colour mobiles with camera for Free! Call The Mobile Update Co FREE on 08002986030
12	ham	I'm gonna be home soon and i don't want to talk about this stuff anymore tonight, k? I've cried enough today.
13	spam	SIX chances to win CASH! From 100 to 20,000 pounds txt> CSH11 and send to 87575. Cost 150p/day, 6days, 16+ TsandCs apply Reply HL 4 info
14	spam	URGENT! You have won a 1 week FREE membership in our å£100,000 Prize Jackpot! Txt the word: CLAIM to No: 81010 T&C www.dbuk.net LCCLTD POBOX 4403LDNW1A7RW18
15	ham	I've been searching for the right words to thank you for this breather. I promise i wont take your help for granted and will fulfil my promise. You have been wonderful and a blessing at all times.
16	ham	I HAVE A DATE ON SUNDAY WITH WILL!!
17	spam	XXXMobileMovieClub: To use your credit, click the WAP link in the next txt message or click here>> http://wap. xxxmobilemovieclub.com?n=QJKGIGHJJGCBL
18	ham	Oh k...i'm watching here:)
19	ham	Eh u remember how 2 spell his name... Yes i did. He v naughty make until i v wet.
20	ham	Fine if thatåÕs the way u feel. thatåÕs the way its gota b
21	spam	England v Macedonia - dont miss the goals/team news. Txt ur national team to 87077 eg ENGLAND to 87077 Try:WALES, SCOTLAND 4txt/Ì¼1.20 POBOXox36504W45WQ 16+
22	ham	Is that seriously how you spell his name?
23	ham	I‰Û÷m going to try for 2 months ha ha only joking
24	ham	So Ì_ pay first lar... Then when is da stock comin...
25	ham	Aft i finish my lunch then i go str down lor. Ard 3 smth lor. U finish ur lunch already?
26	ham	Ffffffffff. Alright no way I can meet up with you sooner?
27	ham	Just forced myself to eat a slice. I'm really not hungry tho. This sucks. Mark is getting worried. He knows I'm sick when I turn down pizza. Lol
28	ham	Lol your always so convincing.
29	ham	Did you catch the bus ? Are you frying an egg ? Did you make a tea? Are you eating your mom's left over dinner ? Do you feel my Love ?
30	ham	I'm back & we're packing the car now, I'll let you know if there's room

Question-2:

Import required library

Solution:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import tensorflow as tensorflow
from sklearn.model_selection import train_test_split
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

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import tensorflow as tensorflow
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from tensorflow.keras.models import Model
from tensorflow.keras.layers import LSTM, Activation, Dense, Dropout, Input, E
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
```

Question 3:

Read dataset and do pre-processing

Solution:

df = pd.read_csv(r'spam.csv',encoding='latin-1')
df.head()

```
In [2]: df = pd.read_csv(r'spam.csv',encoding='latin-1')
        df.head()
```

Out[2]:

	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

```
In [3]: 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
```

Question 4:

- **Create Model**
- **Add Layers (LSTM, Dense-(Hidden Layers), Output)**
- **Compile the Model**
- **Fit the Model**
- **Save The Model**
- **Test The Model**

Solution:

sns.countplot(df.v1)

plt.xlabel('Label')

plt.title('Number of ham and spam messages')

X = df.v2

Y = df.v1

le = LabelEncoder()

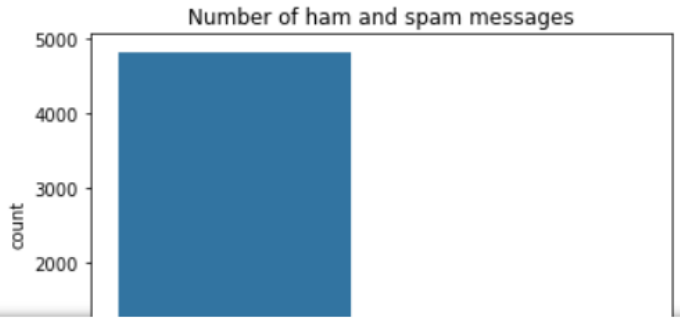
Y = le.fit_transform(Y)

```
Y = Y.reshape(-1,1)
X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.20)
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)
def RNN():
    inputs = Input(name='inputs',shape=[max_len])
    layer = Embedding(max_words,50,input_length=max_len)(inputs)
    layer = LSTM(128)(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('tanh')(layer)
    model = Model(inputs=inputs,outputs=layer)
    return model
model = RNN()
model.summary()
model.compile(loss='binary_crossentropy',optimizer=RMSprop(),metrics=['accuracy','mse','mae'])
model.save(r"C:\Users\MAGGIE\model_lSTM.h5")
from tensorflow.keras.models import load_model
m2 = load_model(r"C:\Users\MAGGIE\model_lSTM.h5")
m2.evaluate(test_sequences_matrix,Y_test)
```

In [4]:
```
sns.countplot(df.v1)
plt.xlabel('Label')
plt.title('Number of ham and spam messages')
```

```
C:\Users\MAGGIE\anaconda3\lib\site-packages\seaborn\_decorators.py:36: Futu
reWarning: Pass the following variable as a keyword arg: x. From version 0.
12, the only valid positional argument will be `data`, and passing other ar
guments without an explicit keyword will result in an error or misinterpret
ation.
  warnings.warn(
```

Out[4]: Text(0.5, 1.0, 'Number of ham and spam messages')



In [5]:
```
X = df.v2
Y = df.v1
le = LabelEncoder()
Y = le.fit_transform(Y)
Y = Y.reshape(-1,1)
```

In [6]:
```
X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.20)
```

In [7]:
```
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)
```

In [8]:
```
def RNN():
    inputs = Input(name='inputs',shape=[max_len])
    layer = Embedding(max_words,50,input_length=max_len)(inputs)
    layer = LSTM(128)(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('tanh')(layer)
    model = Model(inputs=inputs,outputs=layer)
    return model
```

In [9]:
```
model = RNN()
model.summary()
model.compile(loss='binary_crossentropy',optimizer=RMSprop(),metrics=['accuracy','mse','mae'])
```

```
Model: "model"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 inputs (InputLayer)         [(None, 150)]             0

 embedding (Embedding)       (None, 150, 50)           50000

 lstm (LSTM)                 (None, 128)               91648

 FC1 (Dense)                 (None, 256)               33024

 activation (Activation)     (None, 256)               0

 dropout (Dropout)           (None, 256)               0

 out_layer (Dense)           (None, 1)                 257

 activation_1 (Activation)   (None, 1)                 0

=================================================================
Total params: 174,929
Trainable params: 174,929
Non-trainable params: 0
_________________________________________________________________
```

In [10]:
```
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
28/28 [==============================] - 18s 512ms/step - loss: 0.2518 - accuracy: 0.9072 - mse: 0.0687 - mae: 0.1437 - val_los
s: 0.1685 - val_accuracy: 0.9675 - val_mse: 0.0306 - val_mae: 0.1025
Epoch 2/10
28/28 [==============================] - 12s 413ms/step - loss: 0.0801 - accuracy: 0.9843 - mse: 0.0195 - mae: 0.0883 - val_los
s: 0.1846 - val_accuracy: 0.9720 - val_mse: 0.0306 - val_mae: 0.1086
```

Out[10]:
```
<keras.callbacks.History at 0x2ac38ddae80>
```

In [11]:
```
test_sequences = tok.texts_to_sequences(X_test)
test_sequences_matrix = sequence.pad_sequences(test_sequences,maxlen=max_len)
```

In [12]:
```
accr = model.evaluate(test_sequences_matrix,Y_test)
```

```
35/35 [==============================] - 2s 70ms/step - loss: 0.1396 - accuracy: 0.9794 - mse: 0.0257 - mae: 0.1030
```

In [13]:
```
print('Test set\n  Loss: {:0.3f}\n  Accuracy: {:0.3f}'.format(accr[0],accr[1]))
```

```
Test set
  Loss: 0.140
  Accuracy: 0.979
```

In [18]:
```
model.save(r"C:\Users\MAGGIE\model_lSTM.h5")
```

In [19]:
```
from tensorflow.keras.models import load_model
m2 = load_model(r"C:\Users\MAGGIE\model_lSTM.h5")
```

In [20]:
```
m2.evaluate(test_sequences_matrix,Y_test)
```

```
35/35 [==============================] - 3s 57ms/step - loss: 0.1396 - accuracy: 0.9794 - mse: 0.0257 - mae: 0.1030
```

Out[20]:
```
[0.13960915803909302,
 0.9793722033500671,
 0.02572023682296276,
 0.10301480442285538]
```

In [ ]:
```
```