Assignment-4

Fertilizer recommendation system for Disease prediction

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Maximum marks	2 marks

```
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 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 import
csv
```

```
with open('/spam.csv', 'r') as csvfile:   reader

= csv.reader(csvfile) df =

pd.read_csv(r'/spam.csv',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)

/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

<matplotlib.axes._subplots.AxesSubplot at 0x7f5197dac250>
```
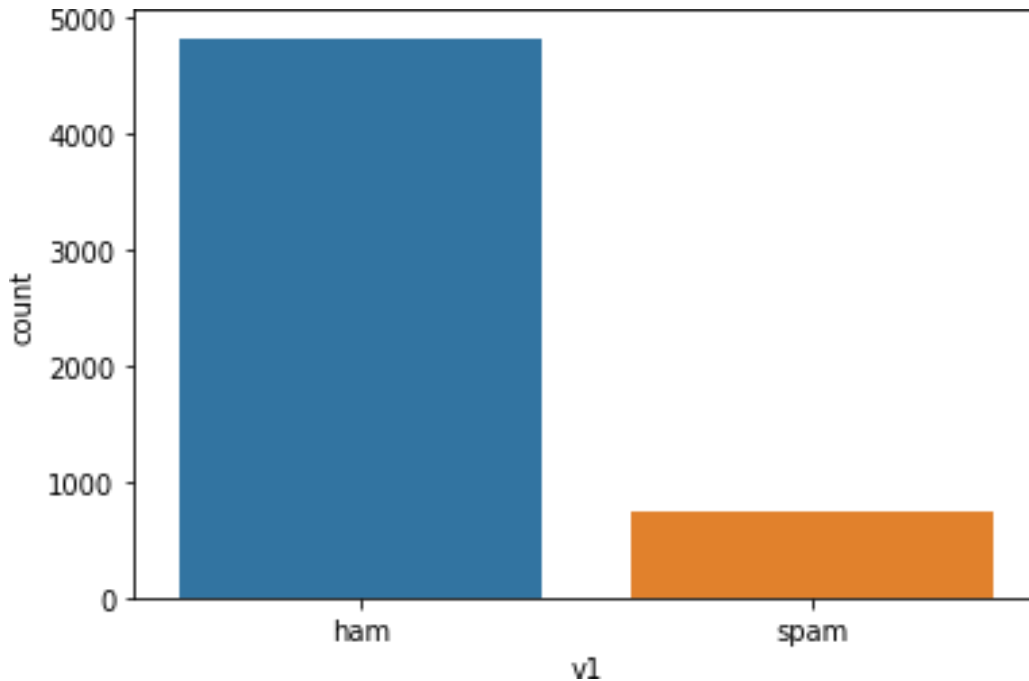
```python
X = df.v2 Y = df.v1
le = LabelEncoder() Y =
le.fit_transform(Y)
Y = Y.reshape(-1,1)

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=['accura
cy','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
```

```python
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 [==============================] - 17s 486ms/step - loss: 0.2960 -
accuracy: 0.8819 - mse: 0.0821 - mae: 0.1563 - val_loss: 0.1341 -
val_accuracy: 0.9675 - val_mse: 0.0344 - val_mae: 0.1237 Epoch 2/10
28/28 [==============================] - 13s 462ms/step - loss: 0.1149 -
accuracy: 0.9764 - mse: 0.0381 - mae: 0.1538 - val_loss: 0.1321 -
val_accuracy: 0.9798 - val_mse: 0.0437 - val_mae: 0.1695

<keras.callbacks.History at 0x7f5193192590>
```

```python
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)
```

```
35/35 [==============================] - 3s 78ms/step - loss: 0.1590 -
accuracy: 0.9812 - mse: 0.0451 - mae: 0.1733
```

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

```
Test set
```

Loss: 0.159 Accuracy: 0.981

```
model.save("./assign4model.h5")
```

```
from tensorflow.keras.models import load_model m2
= load_model("./assign4model.h5")
```

```
m2.evaluate(test_sequences_matrix,Y_test)
```

35/35 [==============================] - 3s 68ms/step - loss: 0.1590 -
accuracy: 0.9812 - mse: 0.0451 - mae: 0.1733

[0.1589982509613037,
 0.9811659455299377,
 0.04506031796336174,
 0.17333826422691345]