

## Assignment-IV

### 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...
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
```

```

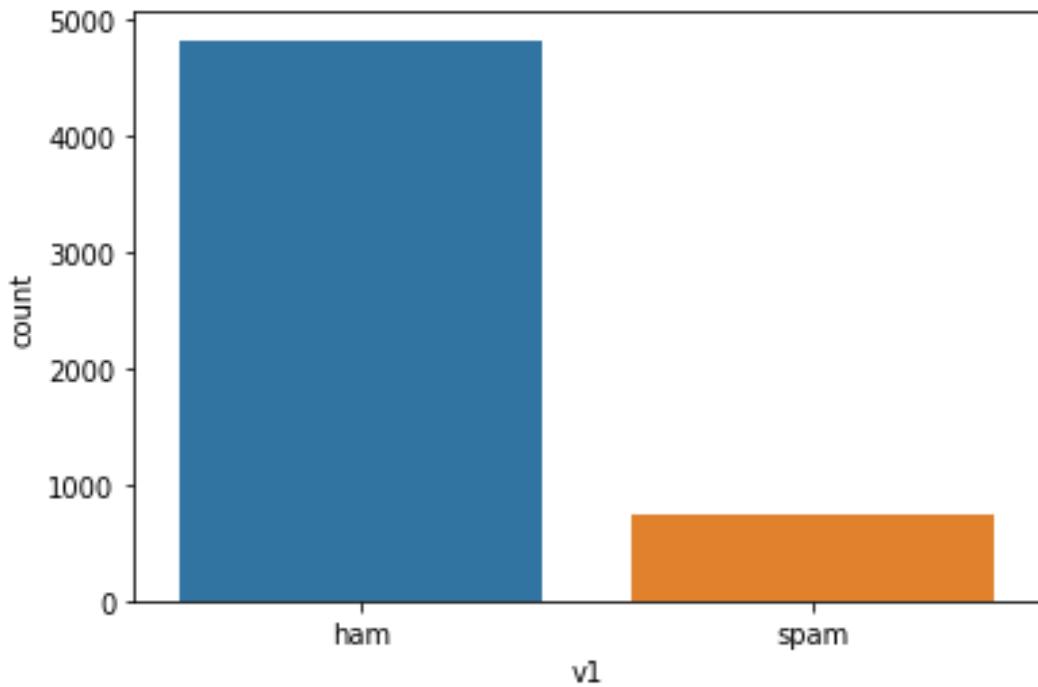
3      NaN      NaN  4      NaN      NaN df.drop(['Unnamed: 2',
   'Unnamed: 3', 'Unnamed: 4'],axis=1,inplace=True) df.info()

<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>

```



```

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: "model"

Layer (type)	Output Shape	Param #
<hr/>		
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
<hr/>		
Total params: 174,929		
Trainable params: 174,929		
Non-trainable params: 0		

---

```

model.fit(sequences_matrix,Y_train,batch_size=128,epochs=10,
validation_split=0.2,callbacks=[EarlyStopping(monitor='val_loss',min_delta=0.001)])

```

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>

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

print('Test set\n Loss: {:.3f}\n Accuracy:
 {:.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]
```