

## 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()
```

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
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:

```

```

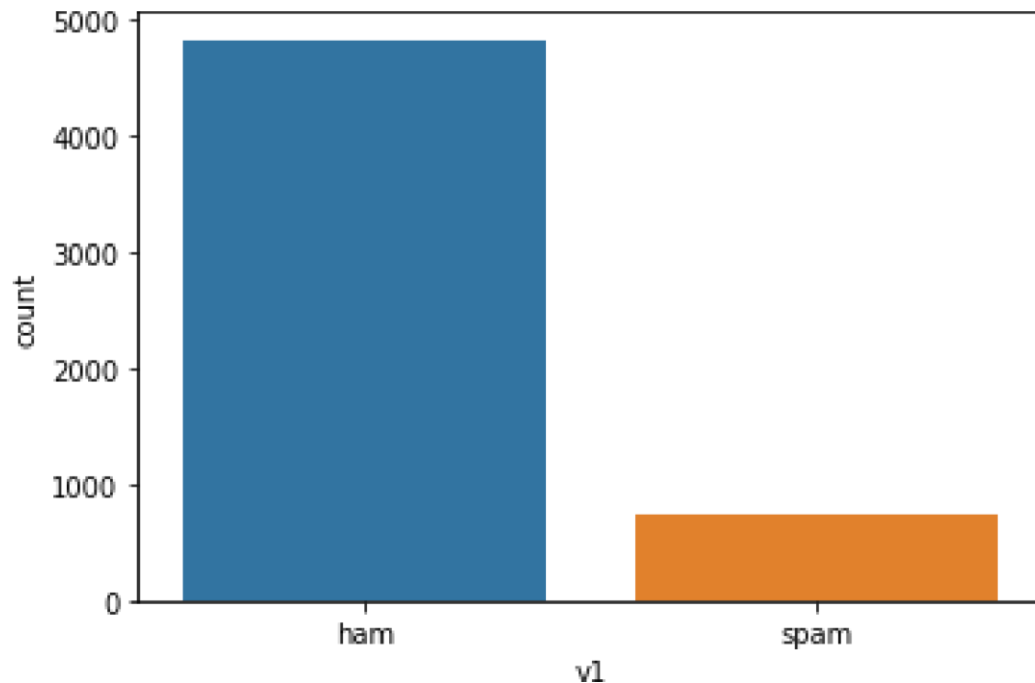
FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12,
the only valid positional argument will be `data`, and passing other arguments
without an explicit keyword will result in an error or misinterpretation.
FutureWarning

```

```

<matplotlib.axes._subplots.AxesSubplot at 0x7f5197dac250>

```



```

= 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 #	
===== 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)	(None, 256)	0	dropout
out_layer (Dense)	(None, 1)	257	
activation_1 (Activation)	(None, 1)	0	

=====

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=0.0001)])
```

```
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> 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:
```

```
{: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]
```