# ***Assignment-4***

# ***Fertilizer recommendation system for Disease prediction***

| | |
|---|---|
| Date | 7 november 2022 |
| Team Members | Suganya A, Mathubala M, Gomathi P, Komathi G |
| Team id | PNT2022TMID17560 |
| 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
```

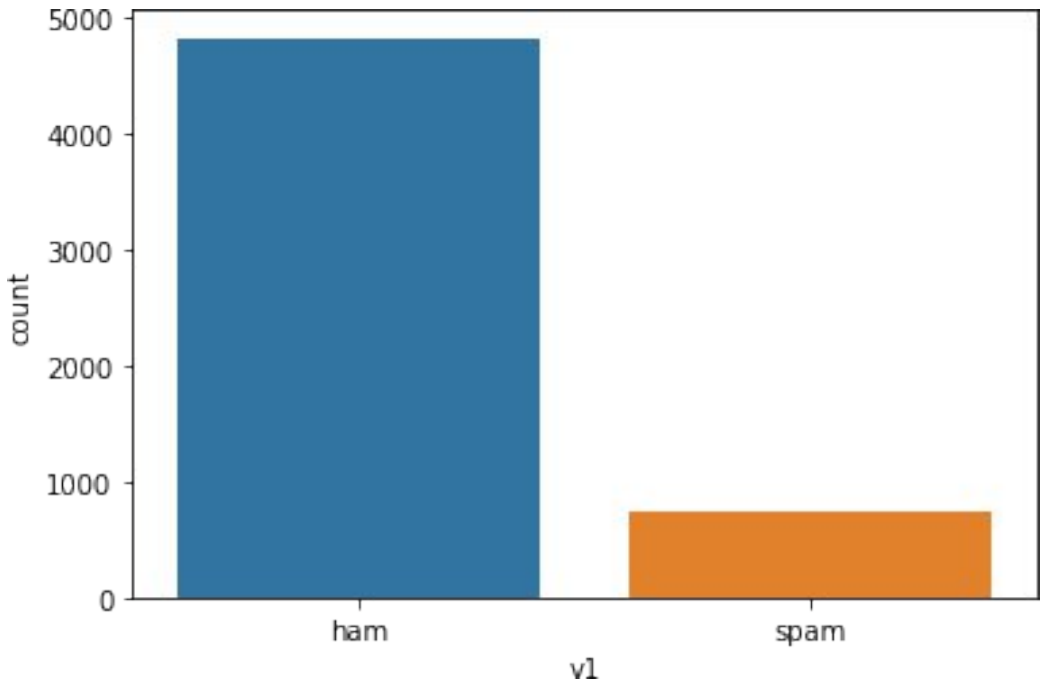
```
2   spam  Free entry in 2 a wkly comp to win FA Cup  fina...        NaN
3   ham  U dun say so early hor... U c already then  say...        NaN    4
    ham  Nah I don't think he goes to usf, he lives  aro...        NaN

  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>
```




```
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
_________________________________________________________________
```

```
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: {: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]
```