Assignment-IV

Fertilizer Recommendation System for Disease Prediction

Date	26October2022
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Maximum marks	2marks

```
importpandasaspdimp
ortnumpyasnp
importmatplotlib.pyplotaspltimportse
abornassns
fromsklearn.model_selectionimporttrain_test_splitfromsklearn.pr
eprocessingimportLabelEncoder
fromtensorflow.keras.models importModel
fromtensorflow.keras.layersimportLSTM,Activation,Dense,Dropout,Input,
Embedding
fromtensorflow.keras.optimizersimportRMSprop
fromtensorflow.keras.preprocessing.textimportTokenizerfromtensorflow.k
eras.preprocessing importsequence
from tensorflow.keras.utils import
to_categoricalfromtensorflow.keras.callbacksimportEarlyStoppin
g
%matplotlibinlineimpo
rt csv

withopen('/spam.csv','r')ascsvfile:reader=csv.re
   ader(csvfile)

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

```
       v1                                                          v2Unnamed:2\
0     hamGountiljurongpoint,crazy..Availableonly...                          NaN
1     ham                          Oklar...Jokingwifu oni...                 NaN
2   spamFreeentryin2awklycomptowinFACupfina...                               NaN
3    ham    Udunsaysoearlyhor...Ucalreadythensay...                          NaN
4    ham    NahIdon'tthinkhegoesto usf,helivesaro...                         NaN


   Unnamed:3Unnamed:4
0            NaN            NaN
1            NaN            NaN
```

```
2           Na          NaN
             N
3           Na          NaN
             N
4           Na          NaN
             N
```

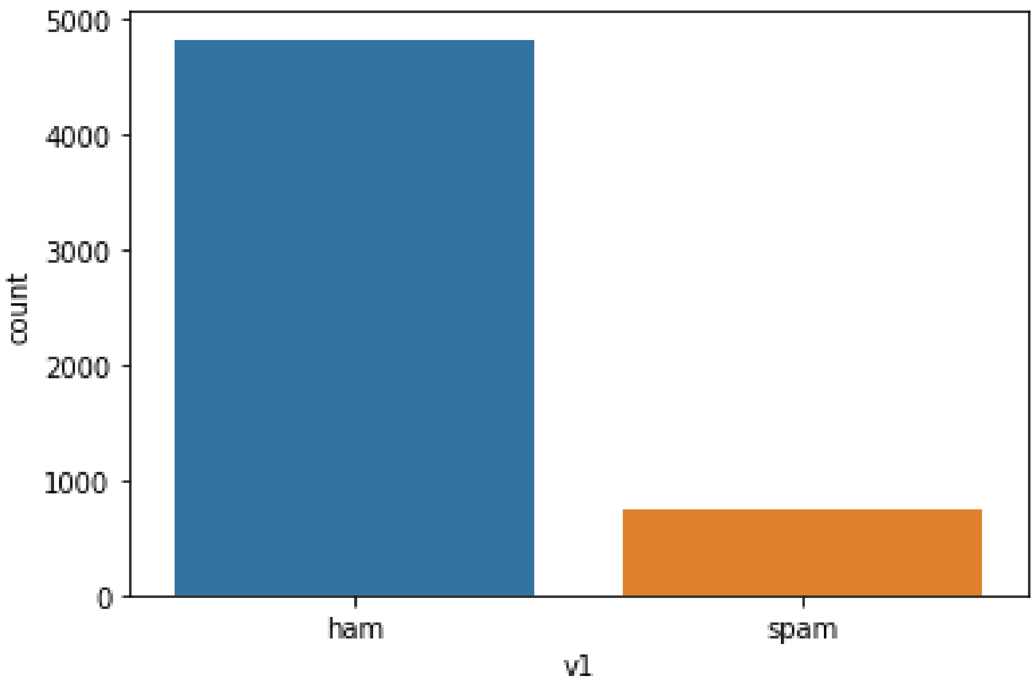
```
df.drop(['Unnamed: 2', 'Unnamed: 3', 'Unnamed: 4'],axis=1,inplace=True)df.info()
```

```
<class
'pandas.core.frame.DataFrame'>RangeIndex:
5572 entries, 0 to
5571Datacolumns(total2columns):
         #     ColumnNon-NullCountDtype
-----   ---------   --------------------   ------ -
  0     v1          5572non-null           object
  1     v2          5572non-null
objectdtypes:object(2)
memoryusage:87.2+KBsns.
```

```
countplot(df.v1)
```

```
/usr/local/lib/python3.7/dist-
packages/seaborn/_decorators.py:43:FutureWarning:Passthefollowingvariableasakeywordarg:x.F
romversion0.12, the only valid positional argument will be `data`, and passing otherarguments
without an explicit keyword will result in an error ormisinterpretation.
   FutureWarning
```

```
<matplotlib.axes._subplots.AxesSubplotat0x7f5197dac250>
```



```
X=df.v2Y=
df.v1
le=LabelEncoder()
Y=le.fit_transform(Y)Y=Y.re
shape(-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)

defRNN():
    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)(la
    yer)
    layer=Dense(1,name='out_layer')(layer)layer=Acti
    vation('tanh')(layer)
    model=Model(inputs=inputs,outputs=layer)
    returnmodel

model =
RNN()model.sum
mary()
model.compile(loss='binary_crossentropy',optimizer=RMSprop(),metrics=['accuracy','mse','mae'])
```

```
Model:"model"
_________________________________________________________________
 Layer(type)                  OutputShape                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

=================================================================
Totalparams:174,929
Trainableparams:174,929
Non-trainableparams: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)])
```

```
Epoch1/10
28/28[==============================]-17s486ms/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:0.1237Epoch2/10
28/28[==============================]-13s462ms/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_tes

t)
test_sequences_matrix=sequence.pad_sequences(test_sequences,maxlen=max_len)

accr=model.evaluate(test_sequences_matrix,Y_test)

35/35[==============================]-3s78ms/step-loss:0.1590-
accuracy:0.9812-mse: 0.0451-mae:0.1733


print('Testset\nLoss:{:0.3f}\nAccuracy:
{:0.3f}'.format(accr[0],accr[1]))

Test
   setLoss:0.15
   9
   Accuracy:0.981

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

fromtensorflow.keras.modelsimportload_modelm2=load
_model("./assign4model.h5")

m2.evaluate(test_sequences_matrix,Y_test)

35/35[==============================]-3s68ms/step           -loss:      0.1590   -
accuracy:0.9812-mse: 0.0451-mae:0.1733

[0.1589982509613037,
 0.9811659455299377,
```

0.04506031796336174,
0.17333826422691345]