**Assignment-Ⅳ**

**Fertilizer recommendation system for disease prediction**

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| Date | 26 October 2022 |
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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

1. NaN NaN
2. NaN NaN
3. NaN NaN
4. 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

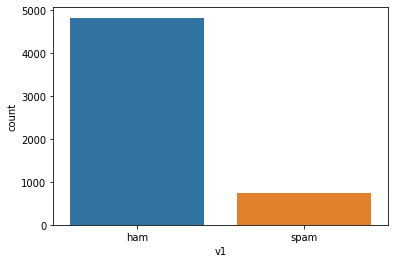
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0 v1 5572 non-null object 1 v2 5572 non-null object dtypes: object(2) memory usage: 87.2+ KB sns.countplot(df.v1)

/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>



1. = df.v2 Y = df.v1

le = LabelEncoder() Y = le.fit\_transform(Y)

1. = 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"

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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

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Total params: 174,929

Trainable params: 174,929

Non-trainable params: 0

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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]