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**Assignment - 4**

import pandas as pd

import numpy as np

import matplotlib.pyplot as pltimport

seaborn as sns

from sklearn.model selection import train test splitfrom

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 Tokenizerfrom

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 Na NaN

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 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)

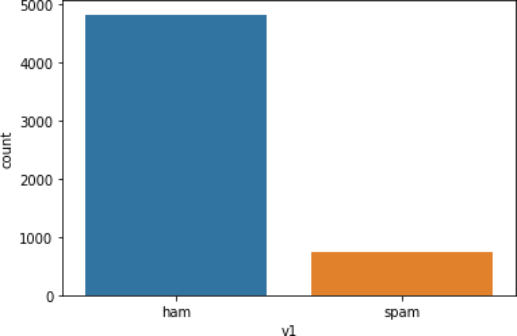
memory usage: 87.2+ KB

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 version0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result an error or misinterpretation

FutureWarning

<matplotlib.axes. subplots.AxesSubplot at 0x7f5197dac250



X = df.v2Y =

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 (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

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: 0.1237Epoch 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 modelm2 =

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]