

AI-based localization and classification of skin disease with erythema

ASSIGNMENT-4

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SMS SPAM CLASSIFICATION

```
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

READ DATASET AND DO PREPROCESSING

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

df.head()

v1      v2      Unnamed: 2      Unnamed: 3      Unnamed: 4

0      ham      Go until jurong point, crazy.. Available only ...      NaN      NaN      NaN
```

```

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

```

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

```
df.info()
```

```
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)
```

```
plt.xlabel('x-axis')
```

```
plt.title('Number of ham and spam messages')
```

/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
```

```
Text(0.5, 1.0, 'Number of ham and spam messages')
```

```
CREATE INPUT VECTORS AND PROCESS LABELS
```

```
X = df.v2
```

```
Y = df.v1
```

```
le = LabelEncoder()
```

```
Y = le.fit_transform(Y)
```

```
Y = Y.reshape(-1,1)
```

SPLIT THE TRAINING AND TESTING DATA

```
X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.20)
```

PROCESS THE DATA

```
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)
```

CREATE MODELS AND ADD LAYERS

```
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: "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.compile(loss='binary_crossentropy',optimizer=RMSprop(),metrics=['accuracy','mse','mae'])
```

FIT THE MODEL

```

model.fit(sequences_matrix,Y_train,batch_size=128,epochs=100,

        validation_split=0.2,callbacks=[EarlyStopping(monitor='val_loss',min_delta=0.0001)])

Epoch 1/100

28/28 [=====] - 13s 460ms/step - loss: 0.0961 - accuracy: 0.9778 - mse:
0.0358 - mae: 0.1438 - val_loss: 0.1271 - val_accuracy: 0.9832 - val_mse: 0.0568 - val_mae: 0.2060

Epoch 2/100

28/28 [=====] - 14s 507ms/step - loss: 0.0728 - accuracy: 0.9885 - mse:
0.0607 - mae: 0.2129 - val_loss: 0.1175 - val_accuracy: 0.9821 - val_mse: 0.0766 - val_mae: 0.2416

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 92ms/step - loss: 0.1390 - accuracy: 0.9821 - mse:
0.0779 - mae: 0.2393

print('Test set\n  Loss: {:.3f}\n  Accuracy: {:.3f}'.format(accr[0],accr[1]))

Test set

  Loss: 0.139

  Accuracy: 0.982

SAVE THE MODEL

model.save(r"C:\Users\aruna\OneDrive\Desktop\model_ISTM.h5")

TEST THE MODEL

from tensorflow.keras.models import load_model

m2 = load_model(r"C:\Users\aruna\OneDrive\Desktop\model_ISTM.h5")

m2.evaluate(test_sequences_matrix,Y_test)

35/35 [=====] - 4s 68ms/step - loss: 0.1390 - accuracy: 0.9821 - mse:
0.0779 - mae: 0.2393

[0.13899557292461395,

 0.9820627570152283,

 0.07788368314504623,

```

0.23931345343589783]