

Assignment -4

SMS SPAM Classification

Assignment Date	13 November 2022
Student Name	Mr.C.Senthil Murugan
Student Roll Number	E1194033
Maximum Marks	2 Marks

```
Untitled2.ipynb - Colaboratory x AI-Assignment-4 LSTM for Text x sms spam classification lstm - Se x +
https://colab.research.google.com/drive/1-21UthSsDtTeGnjxWU58LvgPP8mDkoG#scrollTo=t9-guQg5-4Lh

+ Code + Text
RAM
Disk

Import required library

import pandas as pd
import numpy as np
import csv
import tensorflow as tf
import matplotlib.pyplot as plt

[115] from google.colab import drive
drive.mount('/content/drive')

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

Read dataset and do pre-processing

[116] import chardet
import pandas as pd
with open('/content/drive/MyDrive/spam.csv', 'rb') as f:
    result=chardet.detect(f.read())
df=pd.read_csv('/content/drive/MyDrive/spam.csv',encoding=result['encoding'])
print(df)

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
... .. ... ..
```

```
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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
... .. ... ..
5567 spam This is the 2nd time we have tried 2 contact u... NaN
5568 ham Will I_b going to esplanade fr home? NaN
5569 ham Pity, * was in mood for that. So...any other s... NaN
5570 ham The guy did some bitching but I acted like i'd... NaN
5571 ham Rofl. Its true to its name NaN

Unnamed: 3 Unnamed: 4
0 NaN NaN
1 NaN NaN
2 NaN NaN
3 NaN NaN
4 NaN NaN
... ..
5567 NaN NaN
5568 NaN NaN
5569 NaN NaN
5570 NaN NaN
5571 NaN NaN
```

Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

+

https://colab.research.google.com/drive/1-21UthSsDtTe/GnjxWU58LvgPP8mDkoG#scrollTo=t9-guQg5-4Lh

+ Code + Text

✓

116

0 NaN NaN
1 NaN NaN
2 NaN NaN
3 NaN NaN
4 NaN NaN
... ...
5567 NaN NaN
5568 NaN NaN
5569 NaN NaN
5570 NaN NaN
5571 NaN NaN

[5572 rows x 5 columns]

✓

117

train_set=df.iloc[:,1:2].values

✓

118

train_set

array([['Go until jurong point, crazy.. Available only in bugis n great world la e buffet... Cine there got amore wat...'],
 ['Ok lar... Joking wif u oni...'],
 ['Free entry in 2 a wkly comp to win FA Cup final tkts 21st May 2005. Text FA to 87121 to receive entry question(std txt rate)T&C's apply
08452810075over18's"],
 ...,
 ['Pity, * was in mood for that. So...any other suggestions?'],
 ['The guy did some bitching but I acted like i'd be interested in buying something else next week and he gave it to us for free'],
 ['Rofl. Its true to its name']], dtype=object)

✓

119

from sklearn.preprocessing import MinMaxScaler

✓

120

sc=MinMaxScaler()

✓

121

data=[[11,2],[3,7],[0,10],[11,8]]

0s completed at 23:43

Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

+

https://colab.research.google.com/drive/1-21UthSsDtTe/GnjxWU58LvgPP8mDkoG#scrollTo=t9-guQg5-4Lh

+ Code + Text

✓

122

sc=MinMaxScaler()
model=sc.fit(data)
scaled_data=model.transform(data)

✓

123

print(scaled_data)

[[1. 0.]
 [0.27272727 0.625]
 [0. 1.]
 [1. 0.75]]

✓

124

x_train=[]

✓

125

y_train=[]

✓

126

for i in range(60,1250):
x_train.append([i,60,0])
y_train.append([i,0])

✓

127

x_train

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[1656, 60, 0],
[1657, 60, 0],
[1658, 60, 0],
[1659, 60, 0],
[1660, 60, 0],
[1661, 60, 0],
[1662, 60, 0],
[1663, 60, 0],
[1664, 60, 0],
[1665, 60, 0],
[1666, 60, 0],
[1667, 60, 0],
[1668, 60, 0],
[1669, 60, 0],
[1670, 60, 0],
[1671, 60, 0],
[1672, 60, 0],
[1673, 60, 0],
[1674, 60, 0],
[1675, 60, 0],
[1676, 60, 0],
[1677, 60, 0],
[1678, 60, 0],
[1679, 60, 0],
[1680, 60, 0],
[1681, 60, 0],
[1682, 60, 0],
[1683, 60, 0],
[1684, 60, 0],
[1685, 60, 0],
[1686, 60, 0],
[1687, 60, 0],
[1688, 60, 0],
[1689, 60, 0],
[1690, 60, 0],
[1691, 60, 0],
[1692, 60, 0],
[1693, 60, 0],
[1694, 60, 0],
[1695, 60, 0],
[1696, 60, 0],
[1697, 60, 0],
[1698, 60, 0],
[1699, 60, 0],
[1700, 60, 0],
[1701, 60, 0],
[1702, 60, 0],
[1703, 60, 0],
[1704, 60, 0],
[1705, 60, 0],
[1706, 60, 0],
[1707, 60, 0],
[1708, 60, 0],
[1709, 60, 0],
[1710, 60, 0],
[1711, 60, 0],
[1712, 60, 0],
[1713, 60, 0],
[1714, 60, 0],
[1715,

```
Untitled2.ipynb - Colaboratory x AI-Assignment-4 LSTM for Text x sms spam classification lstm - Se x +
https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text
x_train
[616, 60, 0],
[617, 60, 0],
[618, 60, 0],
[619, 60, 0],
[620, 60, 0],
[621, 60, 0],
[622, 60, 0],
[623, 60, 0],
[624, 60, 0],
[625, 60, 0],
[626, 60, 0],
[627, 60, 0],
[628, 60, 0],
[629, 60, 0],
[630, 60, 0],
[631, 60, 0],
[632, 60, 0],
[633, 60, 0],
[634, 60, 0],
[635, 60, 0],
[636, 60, 0],
[637, 60, 0],
[638, 60, 0],
[639, 60, 0],
[640, 60, 0],
[641, 60, 0],
[642, 60, 0],
[643, 60, 0],
[644, 60, 0],
[645, 60, 0],
[646, 60, 0],
[647, 60, 0],
[648, 60, 0],
0s completed at 23:43
```

```
Untitled2.ipynb - Colaboratory x AI-Assignment-4 LSTM for Text x sms spam classification lstm - Se x +
https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text
[1026, 60, 0],
[1027, 60, 0],
[1028, 60, 0],
[1029, 60, 0],
[1030, 60, 0],
[1031, 60, 0],
[1032, 60, 0],
[1033, 60, 0],
[1034, 60, 0],
[1035, 60, 0],
[1036, 60, 0],
[1037, 60, 0],
[1038, 60, 0],
[1039, 60, 0],
[1040, 60, 0],
[1041, 60, 0],
[1042, 60, 0],
[1043, 60, 0],
[1044, 60, 0],
[1045, 60, 0],
[1046, 60, 0],
[1047, 60, 0],
[1048, 60, 0],
[1049, 60, 0],
[1050, 60, 0],
[1051, 60, 0],
[1052, 60, 0],
[1053, 60, 0],
[1054, 60, 0],
[1055, 60, 0],
[1056, 60, 0],
[1057, 60, 0],
[1058, 60, 0],
[1059, 60, 0],
...]
```

Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text

RAM

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[128] y_train

[1003, 0],
[1004, 0],
[1005, 0],
[1006, 0],
[1007, 0],
[1008, 0],
[1009, 0],
[1010, 0],
[1011, 0],
[1012, 0],
[1013, 0],
[1014, 0],
[1015, 0],
[1016, 0],
[1017, 0],
[1018, 0],
[1019, 0],
[1020, 0],
[1021, 0],
[1022, 0],
[1023, 0],
[1024, 0],
[1025, 0],
[1026, 0],
[1027, 0],
[1028, 0],
[1029, 0],
[1030, 0],
[1031, 0],
[1032, 0],
[1033, 0],
[1034, 0],
[1035, 0],
[1036, 0],
[1037, 0],
[1038, 0],
[1039, 0],
[1040, 0],
[1041, 0],
[1042, 0],
[1043, 0],
[1044, 0],
[1045, 0],
[1046, 0],
[1047, 0],
[1048, 0],
[1049, 0],
[1050, 0],
[1051, 0],
[1052, 0],
[1053, 0],
[1054, 0],
[1055, 0],
[1056, 0],
[1057, 0],
[1058, 0],
[1059, 0],
...

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Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text

RAM

Disk

[128]

[1025, 0],
[1026, 0],
[1027, 0],
[1028, 0],
[1029, 0],
[1030, 0],
[1031, 0],
[1032, 0],
[1033, 0],
[1034, 0],
[1035, 0],
[1036, 0],
[1037, 0],
[1038, 0],
[1039, 0],
[1040, 0],
[1041, 0],
[1042, 0],
[1043, 0],
[1044, 0],
[1045, 0],
[1046, 0],
[1047, 0],
[1048, 0],
[1049, 0],
[1050, 0],
[1051, 0],
[1052, 0],
[1053, 0],
[1054, 0],
[1055, 0],
[1056, 0],
[1057, 0],
[1058, 0],
[1059, 0],
...

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```
Untitled2.ipynb - Colaboratory x AI-Assignment-4 LSTM for Text x sms spam classification lstm - Se x +
https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text
[128] [1058, 0],
      [1059, 0],
      ...]

[x] [129] x_train,y_train=np.array(x_train),np.array(y_train)

[130] x_train.shape
      (1190, 3)

[131] x_train.ndim
      2

[132] x_train.shape[0]
      1190

[133] x_train.shape[1]
      3

[134] p=np.arange(9).reshape(3,3,1)

[135] p
      array([[0],
            [1],
            [2]])

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```

```
Untitled2.ipynb - Colaboratory x AI-Assignment-4 LSTM for Text x sms spam classification lstm - Se x +
https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text
[134] p=np.arange(9).reshape(3,3,1)

[x] [135] p
      array([[0],
            [1],
            [2]],

            [[3],
            [4],
            [5]],

            [[6],
            [7],
            [8]])

[136] x_train=np.reshape(x_train,(1190,3,1))

[137] x_train
      array([[[ 60],
               [ 60],
               [ 0]],

            [[ 61],
               [ 60],
               [ 0]],

            [[ 62],
               [ 60],
               [ 0]],

            ...,

            [[ 60],
               [ 60],
               [ 0]],

            [[ 61],
               [ 60],
               [ 0]],

            [[ 62],
               [ 60],
               [ 0]]])

0s completed at 23:43
```

Colaboratory interface showing two code cells and their outputs.

Code Cell 1:

```
[136] x_train=np.reshape(x_train,(1190,3,1))
```

Output:

```
x_train
array([[[[ 60],
          [ 60],
          [ 0]],

        [[ 61],
          [ 60],
          [ 0]],

        [[ 62],
          [ 60],
          [ 0]],

        ...,

        [[1247],
          [ 60],
          [ 0]],

        [[1248],
          [ 60],
          [ 0]],

        [[1249],
          [ 60],
          [ 0]]]])
```

Code Cell 2:

```
[138] x_train.shape
```

Output:

```
(1190, 3, 1)
```

Code Cell 3:

```
[139] y_train
y_train.shape
```

Output:

```
(1190, 2)
```

Add Layers (LSTM, Dense-(Hidden Layers), Output)

```
from keras.models import Sequential
from keras.datasets import mnist
from keras.layers import Dense
from keras.layers import LSTM
```

Code Cell 4:

```
[141] model=Sequential()
```

Code Cell 5:

```
[142] model.add(LSTM(units=50,input_shape=(x_train.shape[1],1),return_sequences=True))
```

Code Cell 6:

```
[143] x_train.shape[1]
```

Output:

```
3
```

Code Cell 7:

```
[144] model.add(LSTM(units=50,return_sequences=True))
```

Code Cell 8:

```
[146] model.add(LSTM(units=50))
```

Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

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https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text

RAM Disk

[144] model.add(LSTM(units=50,return_sequences=True))

[146] model.add(LSTM(units=50))

[147] model.add(Dense(units=1))

Compile the Model

[148] model.compile(optimizer='adam',loss='mse')

Fit the Model

model.fit(x_train,y_train,epochs=5,batch_size=32)

Epoch 1/5
38/38 [=====] - 5s 6ms/step - loss: 271382.8125
Epoch 2/5
38/38 [=====] - 0s 7ms/step - loss: 266213.5312
Epoch 3/5
38/38 [=====] - 0s 7ms/step - loss: 264322.8438
Epoch 4/5
38/38 [=====] - 0s 7ms/step - loss: 262842.5000
Epoch 5/5
38/38 [=====] - 0s 7ms/step - loss: 261484.1875
<keras.callbacks.History at 0x7faf5704f8d0>

Save The Model

[150] model.save('spam.h5')

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Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

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https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

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RAM Disk

Save The Model

[150] model.save('spam.h5')

[152] with open('/content/drive/MyDrive/spam.csv','rb') as f:
result=chardet.detect(f.read())

dataset_test=pd.read_csv('/content/drive/MyDrive/spam.csv',encoding=result['encoding'])
print(dataset_test)

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
... ..
5567 spam This is the 2nd time we have tried 2 contact u... NaN
5568 ham Will i b going to esplanade fr home? NaN
5569 ham Pity, * was in mood for that. So...any other s... NaN
5570 ham The guy did some bitching but I acted like i'd... NaN
5571 ham Rofl. Its true to its name NaN

Unnamed: 3 Unnamed: 4

0 NaN NaN
1 NaN NaN
2 NaN NaN
3 NaN NaN
4 NaN NaN
... ..
5567 NaN NaN
5568 NaN NaN
5569 NaN NaN

0s completed at 23:43

Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

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+ Code + Text

✓ 0s

Disk

```
[152] with open('/content/drive/MyDrive/spam.csv', 'rb') as f:
      result=charset.detect(f.read())

dataset_test=pd.read_csv('/content/drive/MyDrive/spam.csv',encoding=result['encoding'])
print(dataset_test)
```

	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	
...
5567	spam	This is the 2nd time we have tried 2 contact u...	NaN	
5568	ham	Will i_b going to esplanade fr home?	NaN	
5569	ham	Pity, * was in mood for that. So...any other s...	NaN	
5570	ham	The guy did some bitching but I acted like i'd...	NaN	
5571	ham	Rofl. Its true to its name	NaN	

Unnamed: 3 Unnamed: 4

0	NaN	NaN
1	NaN	NaN
2	NaN	NaN
3	NaN	NaN
4	NaN	NaN
...
5567	NaN	NaN
5568	NaN	NaN
5569	NaN	NaN
5570	NaN	NaN
5571	NaN	NaN

[5572 rows x 5 columns]

0s completed at 23:43

Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

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https://colab.research.google.com/drive/1-21UthSsDtTeGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjso

+ Code + Text

✓ 0s

Disk

```
[5572 rows x 5 columns]
```

✓ 0s

Disk

```
dataset_test
```

	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
...
5567	spam	This is the 2nd time we have tried 2 contact u...	NaN	NaN	NaN
5568	ham	Will i_b going to esplanade fr home?	NaN	NaN	NaN
5569	ham	Pity, * was in mood for that. So...any other s...	NaN	NaN	NaN
5570	ham	The guy did some bitching but I acted like i'd...	NaN	NaN	NaN
5571	ham	Rofl. Its true to its name	NaN	NaN	NaN

5572 rows x 5 columns

```
[155] spam=dataset_test.iloc[:,1:2].values
```

```
[156] dataset_test.shape
```

0s completed at 23:43

Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

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[156] dataset_test.shape

(5572, 5)

[157] dataset_total=pd.concat((df["v1"],dataset_test["v1"]))

[159] dataset_total.shape

(11144,)

dataset_total

0	ham
1	ham
2	spam
3	ham
4	ham
...	...
5567	spam
5568	ham
5569	ham
5570	ham
5571	ham

Name: v1, Length: 11144, dtype: object

[161] inputs=dataset_total[len(dataset_total)-len(dataset_test)-60:].values

[166] inputs=inputs.reshape(1,-2)

[163] inputs

0s completed at 23:43

Untitled2.ipynb - Colaboratory

AI-Assignment-4 LSTM for Text

sms spam classification lstm - Se

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https://colab.research.google.com/drive/1-21UthSsDtTeJGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjs0

+ Code + Text

RAM

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[166] inputs=inputs.reshape(1,-2)

[167] inputs

array([['ham', 'ham', 'ham', ..., 'ham', 'ham', 'ham']], dtype=object)

[168] inputs.shape

(1, 5632)

Test The Model

x_test=[]

for i in range(60,80):

x_test.append(inputs[i-60:i,0])

[170] x_test=np.array(x_test)

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: VisibleDeprecationWarning: Creating an ndarray from ragged nested sequences (which is a list-or-tuple of objects with ragged shapes).

[171] x_test.shape

(20,)

[172] x_test=np.reshape(x_test,(20,1))

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Untitled2.ipynb - Colaboratory x AI-Assignment-4 LSTM for Text x sms spam classification lstm - Sc x +

https://colab.research.google.com/drive/1-21UthSsDtTeIGnjxWU58LvgPP8mDkoG#scrollTo=umrc4knyAjs0

+ Code + Text

array([['ham', 'ham', 'ham', ..., 'ham', 'ham', 'ham']], dtype=object)

[168] inputs.shape

(1, 5632)

Test The Model

[169] x_test=[]
for i in range(60,80):
x_test.append(inputs[i-60:i,0])

x_test=np.array(x_test)

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: VisibleDeprecationWarning: Creating an ndarray from ragged nested sequences (which is a list-or-tuple of objects that may be ragged) is deprecated. In the future this will result in an error. Use np.array([], dtype=object) to create an empty array of type object.

[171] x_test.shape

(20,)

[172] x_test=np.reshape(x_test,(20,1))

[173] x_test.shape

(20, 1)

0s completed at 23:43