Assignment-4

Problem Statement :- SMS SPAM Classification

|  |  |
| --- | --- |
| Assignment Date | 26 October 2022 |
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| Maximum Marks | 2 Marks |

# Importing the Libraries

import numpy as np import pandas as pd

from sklearn.model\_selection import train\_test\_split

from sklearn.feature\_extraction.text import TfidfVectorizer from sklearn.linear\_model import LogisticRegression

from sklearn.metrics import accuracy\_score

# Data Collection & Pre-Processing

*# loading the data from csv file to a pandas Dataframe*

raw\_mail\_data = pd.read\_csv('/content/spam.csv', encoding = "ISO-8859-1") print(raw\_mail\_data)

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 Ì\_ 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]

*# replace the null values with a null string*

mail\_data = raw\_mail\_data.where((pd.notnull(raw\_mail\_data)),'')

*# printing the first 5 rows of the dataframe*

mail\_data.head()

v1 v2 Unnamed: 2 \

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

Unnamed: 3 Unnamed: 4

0

1

2

3

4

*# checking the number of rows and columns in the dataframe*

mail\_data.shape (5572, 5)

# Label Encoding

*# label spam mail as 0; ham mail as 1;*

mail\_data.loc[mail\_data['v1'] == 'spam', 'v1',] = 0 mail\_data.loc[mail\_data['v1'] == 'ham', 'v1',] = 1

# spam - 0

ham - 1

*# separating the data as texts and label*

X = mail\_data['v2'] Y = mail\_data['v1']

print(X)

1. Go until jurong point, crazy.. Available only ...
2. Ok lar... Joking wif u oni...
3. Free entry in 2 a wkly comp to win FA Cup fina...
4. U dun say so early hor... U c already then say...
5. Nah I don't think he goes to usf, he lives aro...

...

5567 This is the 2nd time we have tried 2 contact u... 5568 Will Ì\_ b going to esplanade fr home? 5569 Pity, \* was in mood for that. So...any other s... 5570 The guy did some bitching but I acted like i'd... 5571 Rofl. Its true to its name Name: v2, Length: 5572, dtype: object

print(Y)

|  |  |  |
| --- | --- | --- |
| 0 | 1 |  |
| 1 | 1 |  |
| 2 | 0 |  |
| 3 | 1 |  |
| 4 | 1  .. |  |
| 5567 | 0 |  |
| 5568 | 1 |  |
| 5569 | 1 |  |
| 5570 | 1 |  |
| 5571  Name: | 1  v1, | Length: 5572, dtype: object |

# Splitting the data into training data & test data

X\_train, X\_test, Y\_train, Y\_test = train\_test\_split(X, Y, test\_size=0.2, rand om\_state=3)

print(X.shape) print(X\_train.shape) print(X\_test.shape)

(5572,)

(4457,)

(1115,)

# Feature Extraction

*# transform the text data to feature vectors that can be used as input to the Logistic regression*

feature\_extraction = TfidfVectorizer(min\_df = 1, stop\_words='english', lowerc ase='True')

X\_train\_features = feature\_extraction.fit\_transform(X\_train)

X\_test\_features = feature\_extraction.transform(X\_test)

*# convert Y\_train and Y\_test values as integers*

Y\_train = Y\_train.astype('int') Y\_test = Y\_test.astype('int')

print(X\_train)

|  |  |  |
| --- | --- | --- |
| 3075 | Mum, hope you are having a great day. Hoping t... | |
| 1787 | Yes:)sura in sun tv.:)lol. | |
| 1614 | Me sef dey laugh you. Meanwhile how's my darli... | |
| 4304 | Yo come over carlos will be here soon | |
| 3266 | Ok then i come n pick u at engin? | |
|  | ... | |
| 789 |  | Gud mrng dear hav a nice day |
| 968 |  | Are you willing to go for aptitude class. |
| 1667 | So | now my dad is gonna call after he gets out ... |
| 3321 | Ok | darlin i supose it was ok i just worry too ... |

1688 Nan sonathaya soladha. Why boss? Name: v2, Length: 4457, dtype: object

print(X\_train\_features)

|  |  |  |
| --- | --- | --- |
| (0, | 741) | 0.3219352588930141 |
| (0, | 3979) | 0.2410582143632299 |
| (0, | 4296) | 0.3891385935794867 |
| (0, | 6599) | 0.20296878731699391 |
| (0, | 3386) | 0.3219352588930141 |
| (0, | 2122) | 0.38613577623520473 |
| (0, | 3136) | 0.440116181574609 |
| (0, | 3262) | 0.25877035357606315 |
| (0, | 3380) | 0.21807195185332803 |
| (0, | 4513) | 0.2909649098524696 |
| (1, | 4061) | 0.380431198316959 |
| (1, | 6872) | 0.4306015894277422 |
| (1, | 6417) | 0.4769136859540388 |
| (1, | 6442) | 0.5652509076654626 |
| (1, | 7443) | 0.35056971070320353 |
| (2, | 933) | 0.4917598465723273 |
| (2, | 2109) | 0.42972812260098503 |
| (2, | 3917) | 0.40088501350982736 |
| (2, | 2226) | 0.413484525934624 |
| (2, | 5825) | 0.4917598465723273 |
| (3, | 6140) | 0.4903863168693604 |
| (3, | 1599) | 0.5927091854194291 |
| (3, | 1842) | 0.3708680641487708 |
| (3, | 7453) | 0.5202633571003087 |
| (4,  : | 2531)  : | 0.7419319091456392 |

(4452, 2122) 0.31002103760284144

|  |  |  |
| --- | --- | --- |
| (4453, | 999) | 0.6760129013031282 |
| (4453, | 7273) | 0.5787739591782677 |
| (4453, | 1762) | 0.45610005640082985 |
| (4454, | 3029) | 0.42618909997886 |
| (4454, | 2086) | 0.3809693742808703 |
| (4454, | 3088) | 0.34475593009514444 |
| (4454, | 2001) | 0.4166919007849217 |
| (4454, | 1049) | 0.31932060116006045 |
| (4454, | 7346) | 0.31166263834107377 |
| (4454, | 5370) | 0.42618909997886 |
| (4455, | 1148) | 0.38998123077430413 |
| (4455, | 6433) | 0.38998123077430413 |
| (4455, | 6361) | 0.25697343671652706 |
| (4455, | 2764) | 0.3226323745940581 |
| (4455, | 7358) | 0.2915949626395065 |
| (4455, | 7407) | 0.3028481995557642 |
| (4455, | 2108) | 0.3136468384526087 |
| (4455, | 4251) | 0.30616657078392584 |
| (4455, | 3763) | 0.16807158405536876 |
| (4455, | 4773) | 0.35860460546223444 |
| (4456, | 6117) | 0.5304350313291551 |
| (4456, | 6133) | 0.5304350313291551 |
| (4456, | 1386) | 0.4460036316446079 |
| (4456, | 4557) | 0.48821933148688146 |

# Training the Model Logistic Regression

model = LogisticRegression()

*# training the Logistic Regression model with the training data*

model.fit(X\_train\_features, Y\_train) LogisticRegression()

# Evaluating the trained model

*# prediction on training data*

prediction\_on\_training\_data = model.predict(X\_train\_features) accuracy\_on\_training\_data = accuracy\_score(Y\_train, prediction\_on\_training\_da ta)

print('Accuracy on training data : ', accuracy\_on\_training\_data)

Accuracy on training data : 0.9661207089970832

*# prediction on test data*

prediction\_on\_test\_data = model.predict(X\_test\_features) accuracy\_on\_test\_data = accuracy\_score(Y\_test, prediction\_on\_test\_data)

print('Accuracy on test data : ', accuracy\_on\_test\_data) Accuracy on test data : 0.9623318385650225

# Building a Predictive System

input\_mail = ["I've been searching for the right words to thank you for this breather. I promise i wont take your help for granted and will fulfil my prom ise. You have been wonderful and a blessing at all times"]

*# convert text to feature vectors*

input\_data\_features = feature\_extraction.transform(input\_mail)

*# making prediction*

prediction = model.predict(input\_data\_features) print(prediction)

**if** (prediction[0]==1): print('Ham mail')

**else**:

print('Spam mail')

[1]

Ham mail