Foundation of Data Science

Fake News Detection

Group No :13

Name : Mannam.Venkata.Phaneendra

Roll No : AM.EN.U4CSE19332

SECTION : CSE-D

In [1]:

```
#importing the required dependencies for the project
import numpy as np
import pandas as pd
import re
from nltk.corpus import stopwords
from nltk.stem.porter import PorterStemmer
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
```

In [2]:

```
import nltk
nltk.download('stopwords')
```

```
[nltk_data] Downloading package stopwords to C:\Users\phani
[nltk_data]     mannam\AppData\Roaming\nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```

Out[2]:

```
True
```

In [3]:

```
print(stopwords.words('english'))       #printing the stopwords in English
```

```
['i', 'me', 'my', 'myself', 'we', 'our', 'ours', 'ourselves', 'you', "you'r
e", "you've", "you'll", "you'd", 'your', 'yours', 'yourself', 'yourselves',
'he', 'him', 'his', 'himself', 'she', "she's", 'her', 'hers', 'herself', 'i
t', "it's", 'its', 'itself', 'they', 'them', 'their', 'theirs', 'themselve
s', 'what', 'which', 'who', 'whom', 'this', 'that', "that'll", 'these', 'tho
se', 'am', 'is', 'are', 'was', 'were', 'be', 'been', 'being', 'have', 'has',
'had', 'having', 'do', 'does', 'did', 'doing', 'a', 'an', 'the', 'and', 'bu
t', 'if', 'or', 'because', 'as', 'until', 'while', 'of', 'at', 'by', 'for',
'with', 'about', 'against', 'between', 'into', 'through', 'during', 'befor
e', 'after', 'above', 'below', 'to', 'from', 'up', 'down', 'in', 'out', 'o
n', 'off', 'over', 'under', 'again', 'further', 'then', 'once', 'here', 'the
re', 'when', 'where', 'why', 'how', 'all', 'any', 'both', 'each', 'few', 'mo
re', 'most', 'other', 'some', 'such', 'no', 'nor', 'not', 'only', 'own', 'sa
me', 'so', 'than', 'too', 'very', 's', 't', 'can', 'will', 'just', 'don', "d
on't", 'should', "should've", 'now', 'd', 'll', 'm', 'o', 're', 've', 'y',
'ain', 'aren', "aren't", 'couldn', "couldn't", 'didn', "didn't", 'doesn', "d
oesn't", 'hadn', "hadn't", 'hasn', "hasn't", 'haven', "haven't", 'isn', "is
n't", 'ma', 'mightn', "mightn't", 'mustn', "mustn't", 'needn', "needn't", 's
han', "shan't", 'shouldn', "shouldn't", 'wasn', "wasn't", 'weren', "were
n't", 'won', "won't", 'wouldn', "wouldn't"]
```

In [4]:

```
#Data Pre-processing
news = pd.read_csv('news_dataset.csv')          # loading the dataset to a pandas DataFrame
```

About the Dataset:

```
id no: unique id for a news article

news_title: the title of a news article

author of news: author of the news article

news_text: the text of the article

label: a label that marks whether the news article is real or fake:

    1: Fake news

    0: real News
```

In [5]:

```
news.head()            # printing the first 5 rows of the dataframe
```

Out[5]:

	id no	news_title	author of news	news_text	label
0	0	House Dem Aide: We Didn’t Even See Comey’s Let...	Darrell Lucus	House Dem Aide: We Didn’t Even See Comey’s Let...	1
1	1	FLYNN: Hillary Clinton, Big Woman on Campus - ...	Daniel J. Flynn	Ever get the feeling your life circles the rou...	0
2	2	Why the Truth Might Get You Fired	Consortiumnews.com	Why the Truth Might Get You Fired October 29, ...	1
3	3	15 Civilians Killed In Single US Airstrike Hav...	Jessica Purkiss	Videos 15 Civilians Killed In Single US Airstr...	1
4	4	Iranian woman jailed for fictional unpublished...	Howard Portnoy	Print \nAn Iranian woman has been sentenced to...	1

In [6]:

```
news.isnull()
```

Out[6]:

	id no	news_title	author of news	news_text	label
0	False	False	False	False	False
1	False	False	False	False	False
2	False	False	False	False	False
3	False	False	False	False	False
4	False	False	False	False	False
...	...	...	...	...	...
20795	False	False	False	False	False
20796	False	False	False	False	False
20797	False	False	False	False	False
20798	False	False	False	False	False
20799	False	False	False	False	False

20800 rows × 5 columns

In [7]:

```
news.isnull().sum()          #counting the number of missing values in the dataset
```

Out[7]:

```
id no                0
news_title         558
author of news    1957
news_text           39
label                0
dtype: int64
```

we have shown count the number of missing values in news_dataset. After that, we have mentioned the dropped missing values.

In [8]:

```
news.columns
```

Out[8]:

```
Index(['id no', 'news_title', 'author of news', 'news_text', 'label'], dtype
='object')
```

In [9]:

```
news = news.fillna('')                # replacing the null values with empty string
```

In [10]:

```
news['content'] = news['author of news']+' '+news['news_title']       # merging the author
```

In [11]:

```
print(news['content'])
```

```
0        Darrell Lucus House Dem Aide: We Didn’t Even S...
1        Daniel J. Flynn FLYNN: Hillary Clinton, Big Wo...
2        Consortiumnews.com Why the Truth Might Get You...
3        Jessica Purkiss 15 Civilians Killed In Single ...
4        Howard Portnoy Iranian woman jailed for fictio...
                               ...
20795    Jerome Hudson Rapper T.I.: Trump a ’Poster Chi...
20796    Benjamin Hoffman N.F.L. Playoffs: Schedule, Ma...
20797    Michael J. de la Merced and Rachel Abrams Macy...
20798    Alex Ansary NATO, Russia To Hold Parallel Exer...
20799              David Swanson What Keeps the F-35 Alive
Name: content, Length: 20800, dtype: object
```

In [12]:

```
# separating the data & label
X = news.drop(columns='label', axis=1)
Y = news['label']
```

In [13]:

```
print(X)
print(Y)
```

```
       id no                                          news_title  \
0          0  House Dem Aide: We Didn’t Even See Comey’s Let...
1          1  FLYNN: Hillary Clinton, Big Woman on Campus - ...
2          2                  Why the Truth Might Get You Fired
3          3  15 Civilians Killed In Single US Airstrike Hav...
4          4  Iranian woman jailed for fictional unpublished...
...      ...                                                ...
20795  20795  Rapper T.I.: Trump a ’Poster Child For White S...
20796  20796  N.F.L. Playoffs: Schedule, Matchups and Odds -...
20797  20797  Macy’s Is Said to Receive Takeover Approach by...
20798  20798  NATO, Russia To Hold Parallel Exercises In Bal...
20799  20799                          What Keeps the F-35 Alive

                                  author of news  \
0                                  Darrell Lucus
1                                Daniel J. Flynn
2                             Consortiumnews.com
3                                Jessica Purkiss
4                                 Howard Portnoy
...                                          ...
20795                              Jerome Hudson
20796                           Benjamin Hoffman
20797  Michael J. de la Merced and Rachel Abrams
20798                                Alex Ansary
20799                              David Swanson

                                                news_text  \
0      House Dem Aide: We Didn’t Even See Comey’s Let...
1      Ever get the feeling your life circles the rou...
2      Why the Truth Might Get You Fired October 29, ...
3      Videos 15 Civilians Killed In Single US Airstr...
4      Print \nAn Iranian woman has been sentenced to...
...                                                  ...
20795  Rapper T. I. unloaded on black celebrities who...
20796  When the Green Bay Packers lost to the Washing...
20797  The Macy’s of today grew from the union of sev...
20798  NATO, Russia To Hold Parallel Exercises In Bal...
20799    David Swanson is an author, activist, journa...

                                                  content
0      Darrell Lucus House Dem Aide: We Didn’t Even S...
1      Daniel J. Flynn FLYNN: Hillary Clinton, Big Wo...
2      Consortiumnews.com Why the Truth Might Get You...
3      Jessica Purkiss 15 Civilians Killed In Single ...
4      Howard Portnoy Iranian woman jailed for fictio...
...                                                  ...
20795  Jerome Hudson Rapper T.I.: Trump a ’Poster Chi...
20796  Benjamin Hoffman N.F.L. Playoffs: Schedule, Ma...
20797  Michael J. de la Merced and Rachel Abrams Macy...
20798  Alex Ansary NATO, Russia To Hold Parallel Exer...
20799            David Swanson What Keeps the F-35 Alive

[20800 rows x 5 columns]
0        1
```

```
1        0
2        1
3        1
4        1
        ..
20795    0
20796    0
20797    0
20798    1
20799    1
Name: label, Length: 20800, dtype: int64
```

Stemming:Stemming is the process of reducing a word to its Root word

In [14]:

```
port_stem = PorterStemmer()
```

In [15]:

```
def stemming(content):
    stemmed_content = re.sub('[^a-zA-Z]',' ',content)
    stemmed_content = stemmed_content.lower()
    stemmed_content = stemmed_content.split()
    stemmed_content = [port_stem.stem(word) for word in stemmed_content if not word in stop
    stemmed_content = ' '.join(stemmed_content)
    return stemmed_content
```

In [16]:

```
news['content'] = news['content'].apply(stemming)
```

In [17]:

```
print(news['content'])
```

```
0        darrel lucu hous dem aid even see comey letter...
1        daniel j flynn flynn hillari clinton big woman...
2                   consortiumnew com truth might get fire
3        jessica purkiss civilian kill singl us airstri...
4        howard portnoy iranian woman jail fiction unpu...
                               ...
20795    jerom hudson rapper trump poster child white s...
20796    benjamin hoffman n f l playoff schedul matchup...
20797    michael j de la merc rachel abram maci said re...
20798    alex ansari nato russia hold parallel exercis ...
20799                        david swanson keep f aliv
Name: content, Length: 20800, dtype: object
```

In [18]:

```
#separating the data and label
X = news['content'].values
Y = news['label'].values
```

In [19]:

```
print(X)
```

```
['darrel lucu hous dem aid even see comey letter jason chaffetz tweet'
 'daniel j flynn flynn hillari clinton big woman campu breitbart'
 'consortiumnew com truth might get fire' ...
 'michael j de la merc rachel abram maci said receiv takeov approach hudson
bay new york time'
 'alex ansari nato russia hold parallel exercis balkan'
 'david swanson keep f aliv']
```

In [20]:

```
print(Y)
```

```
[1 0 1 ... 0 1 1]
```

In [21]:

```
Y.shape
```

Out[21]:

```
(20800,)
```

converting the textual data to numerical data

In [22]:

```
vectorizer = TfidfVectorizer()
vectorizer.fit(X)

X = vectorizer.transform(X)
```

In [23]:

```
print(X)
```

```
  (0, 15686)	0.28485063562728646
  (0, 13473)	0.2565896679337957
  (0, 8909)	0.3635963806326075
  (0, 8630)	0.29212514087043684
  (0, 7692)	0.24785219520671603
  (0, 7005)	0.21874169089359144
  (0, 4973)	0.233316966909351
  (0, 3792)	0.2705332480845492
  (0, 3600)	0.3598939188262559
  (0, 2959)	0.2468450128533713
  (0, 2483)	0.3676519686797209
  (0, 267)	0.27010124977708766
  (1, 16799)	0.30071745655510157
  (1, 6816)	0.1904660198296849
  (1, 5503)	0.7143299355715573
  (1, 3568)	0.26373768806048464
  (1, 2813)	0.19094574062359204
  (1, 2223)	0.3827320386859759
  (1, 1894)	0.15521974226349364
  (1, 1497)	0.2939891562094648
  (2, 15611)	0.41544962664721613
  (2, 9620)	0.49351492943649944
  (2, 5968)	0.3474613386728292
  (2, 5389)	0.3866530551182615
  (2, 3103)	0.46097489583229645
  :	:
  (20797, 13122)	0.2482526352197606
  (20797, 12344)	0.27263457663336677
  (20797, 12138)	0.24778257724396507
  (20797, 10306)	0.08038079000566466
  (20797, 9588)	0.174553480255222
  (20797, 9518)	0.2954204003420313
  (20797, 8988)	0.36160868928090795
  (20797, 8364)	0.22322585870464118
  (20797, 7042)	0.21799048897828688
  (20797, 3643)	0.21155500613623743
  (20797, 1287)	0.33538056804139865
  (20797, 699)	0.30685846079762347
  (20797, 43)	0.29710241860700626
  (20798, 13046)	0.22363267488270608
  (20798, 11052)	0.4460515589182236
  (20798, 10177)	0.3192496370187028
  (20798, 6889)	0.32496285694299426
  (20798, 5032)	0.4083701450239529
  (20798, 1125)	0.4460515589182236
  (20798, 588)	0.3112141524638974
  (20798, 350)	0.28446937819072576
  (20799, 14852)	0.5677577267055112
  (20799, 8036)	0.45983893273780013
  (20799, 3623)	0.37927626273066584
  (20799, 377)	0.5677577267055112
```

Splitting the dataset to training & test data

In [24]:

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.2, stratify=Y, rand
```

Logistic Regression Model

In [25]:

```
model = LogisticRegression()
```

In [26]:

```
model.fit(X_train, Y_train)
```

Out[26]:

```
LogisticRegression()
```

Accuracy Score

In [27]:

```
X_train_prediction = model.predict(X_train)             # accuracy score on the training da
training_data_accuracy = accuracy_score(X_train_prediction, Y_train)
```

In [28]:

```
print('Accuracy score of the training data : ', training_data_accuracy)
```

```
Accuracy score of the training data :  0.9865985576923076
```

In [29]:

```
# accuracy score on the test data
X_test_prediction = model.predict(X_test)
test_data_accuracy = accuracy_score(X_test_prediction, Y_test)
```

In [30]:

```
print('Accuracy score of the test data : ', test_data_accuracy)
```

```
Accuracy score of the test data :  0.9790865384615385
```

Making a Predictive System

In [31]:

```
X_new = X_test[3]

prediction = model.predict(X_new)
print(prediction)

if (prediction[0]==0):
  print('The news is Real')
else:
  print('The news is Fake')
```

```
[0]
The news is Real
```