

# FAKE-NEWS DETECTION USING PYTHON

## Phase 4: Development Part 2

Name: Sanjay.B.M

Reg.No: 961221205026

### 1.Fake news Detection:



#### 1.0.1 Importing required library

Here I am going to importing some of the required library, if extra library is required to install It will be install later on.

```
[70]: import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from sklearn.metrics import classification_report
from sklearn.feature_extraction.text import TfidfVectorizer
import re
import string
```

## 1.0.2 Inserting fake and real dataset

```
[43]: fake = pd.read_csv('D:\IBM\Fake.csv')
true = pd.read_csv('D:\IBM\True.csv')
```

C:\Users\Admin\AppData\Local\Temp\ipykernel\_11724\129791993.py:1:

DtypeWarning:

Columns

(4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171) have mixed types. Specify dtype option on import or set low\_memory=False.

```
fake = pd.read_csv('D:\IBM\Fake.csv')
```

```
[6]: fake.head(5)
```

```
[6]:
```

	title \
0	Donald Trump Sends Out Embarrassing New Year'...
1	Drunk Bragging Trump Staffer Started Russian ...
2	Sheriff David Clarke Becomes An Internet Joke...
3	Trump Is So Obsessed He Even Has Obama's Name...
4	Pope Francis Just Called Out Donald Trump Dur...

text subject \

0 Donald Trump just couldn t wish News  
all Americans ...

1 House Intelligence Committee News  
Chairman Devin Nu...

2 On Friday, it was revealed that News  
former Milwauk...

3 On Christmas day, Donald Trump News  
announced that ...

4 Pope Francis used his annual News  
Christmas Day mes...

date Unnamed: 4 Unnamed: 5 Unnamed: 6 Unnamed: 7  
Unnamed: 8 \

0	December 31, 2017	NaN	NaN	NaNNaN
		NaN		
1	December 31, 2017	NaN	NaN	NaNNaN
		NaN		
2	December 30, 2017	NaN	NaN	NaNNaN
		NaN		
3	December 29, 2017	NaN	NaN	NaNNaN
		NaN		
4	December 25, 2017	NaN	NaN	NaNNaN
		NaN		

Unnamed: 9 ... Unnamed: 162 Unnamed: 163

Unnamed: 164 Unnamed: 165 \

0	NaN ...	NaN	NaN	NaN	NaN
1	NaN ...	NaN	NaN	NaN	NaN
2	NaN ...	NaN	NaN	NaN	NaN
3	NaN ...	NaN	NaN	NaN	NaN
4	NaN ...	NaN	NaN	NaN	NaN

Unnamed: 166 Unnamed: 167 Unnamed: 168

Unnamed: 169 Unnamed: 170 \

0	NaN	NaN	NaN	NaN	NaN
1	NaN	NaN	NaN	NaN	NaN
2	NaN	NaN	NaN	NaN	NaN
3	NaN	NaN	NaN	NaN	NaN
4	NaN	NaN	NaN	NaN	NaN

Unnamed: 171

0	NaN
1	NaN
2	NaN
3	NaN
4	NaN

[5 rows x 172 columns]

```
[8]: true.head(5)
```

```
[8]:                                     title \
0 As U.S. budget fight looms, Republicans flip t...
1 U.S. military to accept transgender recruits o...
2 Senior U.S. Republican senator: 'Let Mr. Muell...
3 FBI Russia probe helped by Australian diplomat...
4 Trump wants Postal Service to charge 'much mor...

                                     text      subject \
0 WASHINGTON (Reuters) - The head of a conservat... politicsNews
1 WASHINGTON (Reuters) - Transgender people will... politicsNews
2 WASHINGTON (Reuters) - The special counsel inv... politicsNews
3 WASHINGTON (Reuters) - Trump campaign adviser ... politicsNews
4 SEATTLE/WASHINGTON (Reuters) - President Donal... politicsNews

                                     date
0 December 31, 2017
1 December 29, 2017
2 December 31, 2017
3 December 30, 2017
4 December 29, 2017
```

Inserting a column called “class” for fake and real news dataset to categories fake and true news.

```
[11]: fake["class"] = 0
      true["class"] = 1
```

Removing last 10 rows from both the dataset, for manual testing

```
[12]: fake.shape, true.shape
```

```
[12]: ((23502, 173), (21417, 5))
```

```
[13]: fake_manual_testing = fake.tail(10)
      for i in range(23480,23470,-1):
          fake.drop([i], axis = 0, inplace = True)
      true_manual_testing = true.tail(10)
      for i in range(21416,21406,-1):
          true.drop([i], axis = 0, inplace = True)
```

```
[14]: fake.shape, true.shape
```

```
[14]: ((23492, 173), (21407, 5))
```

Merging the manual testing dataframe in single dataset and save it in a csv file

```
[44]: fake_manual_testing["class"] = 0
      true_manual_testing["class"] = 1
```

```
[16]: fake_manual_testing.head(10)
```

```
[16]:
```

	title \
23492	Seven Iranians freed in the prisoner swap have...
23493	#Hashtag Hell & The Fake Left
23494	Astroturfing: Journalist Reveals Brainwashing ...
23495	The New American Century: An Era of Fraud
23496	Hillary Clinton: 'Israel First' (and no peace ...
23497	McPain: John McCain Furious That Iran Treated ...
23498	JUSTICE? Yahoo Settles E-mail Privacy Class-ac...
23499	Sunnistan: US and Allied 'Safe Zone' Plan to T...
23500	How to Blow \$700 Million: Al Jazeera America F...
23501	10 U.S. Navy Sailors Held by Iranian Military ...

	text	subject \
23492	21st Century Wire says This week, the historic...	Middle-east
23493	By Dady Chery and Gilbert MercierAll writers ...	Middle-east
23494	Vic Bishop Waking TimesOur reality is carefull...	Middle-east
23495	Paul Craig RobertsIn the last years of the 20t...	Middle-east
23496	Robert Fantina CounterpunchAlthough the United...	Middle-east
23497	21st Century Wire says As 21WIRE reported earl...	Middle-east
23498	21st Century Wire says It s a familiar theme. ...	Middle-east
23499	Patrick Henningsen 21st Century WireRemember ...	Middle-east
23500	21st Century Wire says Al Jazeera America will...	Middle-east
23501	21st Century Wire says As 21WIRE predicted in ...	Middle-east

	date	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7 \
23492	January 20, 2016	NaN	NaN	NaN	NaN
23493	January 19, 2016	NaN	NaN	NaN	NaN
23494	January 19, 2016	NaN	NaN	NaN	NaN
23495	January 19, 2016	NaN	NaN	NaN	NaN
23496	January 18, 2016	NaN	NaN	NaN	NaN
23497	January 16, 2016	NaN	NaN	NaN	NaN
23498	January 16, 2016	NaN	NaN	NaN	NaN
23499	January 15, 2016	NaN	NaN	NaN	NaN

```

23500 January 14, 2016      NaN      NaN      NaN      NaN
23501 January 12, 2016      NaN      NaN      NaN      NaN
Unnamed: 8 Unnamed: 9 ... Unnamed: 163 Unnamed: 164 Unnamed: 165 \
23492      NaN      NaN ...      NaN      NaN      NaN
23493      NaN      NaN ...      NaN      NaN      NaN
23494      NaN      NaN ...      NaN      NaN      NaN
23495      NaN      NaN ...      NaN      NaN      NaN
23496      NaN      NaN ...      NaN      NaN      NaN
23497      NaN      NaN ...      NaN      NaN      NaN
23498      NaN      NaN ...      NaN      NaN      NaN
23499      NaN      NaN ...      NaN      NaN      NaN
23500      NaN      NaN ...      NaN      NaN      NaN
23501      NaN      NaN ...      NaN      NaN      NaN
Unnamed: 166 Unnamed: 167 Unnamed: 168 Unnamed: 169 Unnamed: 170 \
23492      NaN      NaN      NaN      NaN      NaN
23493      NaN      NaN      NaN      NaN      NaN
23494      NaN      NaN      NaN      NaN      NaN
23495      NaN      NaN      NaN      NaN      NaN
23496      NaN      NaN      NaN      NaN      NaN
23497      NaN      NaN      NaN      NaN      NaN
23498      NaN      NaN      NaN      NaN      NaN
23499      NaN      NaN      NaN      NaN      NaN
23500      NaN      NaN      NaN      NaN      NaN
23501      NaN      NaN      NaN      NaN      NaN

      Unnamed: 171 class
23492      NaN 0
23493      NaN 0
23494      NaN 0
23495      NaN 0
23496      NaN 0
23497      NaN 0
23498      NaN 0
23499      NaN 0
23500      NaN 0
23501      NaN 0
[10 rows x 173 columns]

```

```
[11]: df_true_manual_testing.head(10)
```

```

[11]:                                     title \
21407 Mata Pires, owner of embattled Brazil builder ...
21408 U.S., North Korea clash at U.N. forum over nuc...
21409 U.S., North Korea clash at U.N. arms forum on ...
21410 Headless torso could belong to submarine journ...
21411 North Korea shipments to Syria chemical arms a...
21412 'Fully committed' NATO backs new U.S. approach...

```

```

21413 LexisNexis withdrew two products from Chinese ...
21414 Minsk cultural hub becomes haven from authorities
21415 Vatican upbeat on possibility of Pope Francis ...
21416 Indonesia to buy $1.14 billion worth of Russia...

```

```

                                text    subject \
21407 SAO PAULO (Reuters) - Cesar Mata Pires, the ow... worldnews
21408 GENEVA (Reuters) - North Korea and the United ... worldnews
21409 GENEVA (Reuters) - North Korea and the United ... worldnews
21410 COPENHAGEN (Reuters) - Danish police said on T... worldnews
21411 UNITED NATIONS (Reuters) - Two North Korean sh... worldnews
21412 BRUSSELS (Reuters) - NATO allies on Tuesday we... worldnews
21413 LONDON (Reuters) - LexisNexis, a provider of l... worldnews
21414 MINSK (Reuters) - In the shadow of disused Sov... worldnews
21415 MOSCOW (Reuters) - Vatican Secretary of State ... worldnews
21416 JAKARTA (Reuters) - Indonesia will buy 11 Sukh... worldnews

```

```

                                date class
21407 August 22, 2017      1
21408 August 22, 2017      1
21409 August 22, 2017      1
21410 August 22, 2017      1
21411 August 21, 2017      1
21412 August 22, 2017      1
21413 August 22, 2017      1
21414 August 22, 2017      1
21415 August 22, 2017      1
21416 August 22, 2017      1

```

```

[12]: df_manual_testing =
pd.concat([df_fake_manual_testing,df_true_manual_testing], axis = 0)
df_manual_testing.to_csv("manual_testing.csv")

```

#### Merging the main fake and true dataframe

```

[17]: marge = pd.concat([fake, true], axis =0 )
marge.head(10)

```

```

[17]:                                title \
0   Donald Trump Sends Out Embarrassing New Year'...
1   Drunk Bragging Trump Staffer Started Russian ...
2   Sheriff David Clarke Becomes An Internet Joke...
3   Trump Is So Obsessed He Even Has Obama's Name...
4   Pope Francis Just Called Out Donald Trump Dur...
5   Racist Alabama Cops Brutalize Black Boy While...
6   Fresh Off The Golf Course, Trump Lashes Out A...
7   Trump Said Some INSANELY Racist Stuff Inside ...

```

8 Former CIA Director Slams Trump Over UN Bully...  
 9 WATCH: Brand-New Pro-Trump Ad Features So Muc...

text subject \

0 Donald Trump just couldn t wish News  
 all Americans ...  
 1 House Intelligence Committee News  
 Chairman Devin Nu...  
 2 On Friday, it was revealed that News  
 former Milwauk...  
 3 On Christmas day, Donald Trump News  
 announced that ...  
 4 Pope Francis used his annual News  
 Christmas Day mes...  
 5 The number of cases of cops News  
 brutalizing and ki...  
 6 Donald Trump spent a good News  
 portion of his day a...  
 7 In the wake of yet another courtNews  
 decision that...  
 8 Many people have raised the News  
 alarm regarding th...  
 9 Just when you might have thoughtNews  
 we d get a br...

date Unnamed: 4 Unnamed: 5 Unnamed: 6 Unnamed: 7  
 Unnamed: 8 \

0	December 31, 2017	NaN	NaN	NaNNaN
		NaN		
1	December 31, 2017	NaN	NaN	NaNNaN
		NaN		
2	December 30, 2017	NaN	NaN	NaNNaN
		NaN		
3	December 29, 2017	NaN	NaN	NaNNaN
		NaN		
4	December 25, 2017	NaN	NaN	NaNNaN
		NaN		
5	December 25, 2017	NaN	NaN	NaNNaN
		NaN		
6	December 23, 2017	NaN	NaN	NaNNaN
		NaN		
7	December 23, 2017	NaN	NaN	NaNNaN
		NaN		
8	December 22, 2017	NaN	NaN	NaNNaN
		NaN		



```

9 December 21, 2017      NaN      NaN      NaNNaN
                        NaN

```

```

      Unnamed: 9 ... Unnamed: 163 Unnamed: 164
      Unnamed: 165 Unnamed: 166 \
0      NaN ...      NaN      NaN      NaN      NaN
1      NaN ...      NaN      NaN      NaN      NaN
2      NaN ...      NaN      NaN      NaN      NaN
3      NaN ...      NaN      NaN      NaN      NaN
4      NaN ...      NaN      NaN      NaN      NaN
5      NaN ...      NaN      NaN      NaN      NaN
6      NaN ...      NaN      NaN      NaN      NaN
7      NaN ...      NaN      NaN      NaN      NaN
8      NaN ...      NaN      NaN      NaN      NaN
9      NaN ...      NaN      NaN      NaN      NaN
      Unnamed: 167 Unnamed: 168 Unnamed: 169 Unnamed: 170 Unnamed: 171
      class
0      NaN      NaN      NaN      NaN      NaN      NaN      0
1      NaN      NaN      NaN      NaN      NaN      NaN      0
2      NaN      NaN      NaN      NaN      NaN      NaN      0
3      NaN      NaN      NaN      NaN      NaN      NaN      0
4      NaN      NaN      NaN      NaN      NaN      NaN      0
5      NaN      NaN      NaN      NaN      NaN      NaN      0
6      NaN      NaN      NaN      NaN      NaN      NaN      0
7      NaN      NaN      NaN      NaN      NaN      NaN      0
8      NaN      NaN      NaN      NaN      NaN      NaN      0
9      NaN      NaN      NaN      NaN      NaN      NaN      0
[10 rows x 173 columns]

```

```
[18]: marge.columns
```

```
[18]: Index(['title', 'text', 'subject', 'date', 'Unnamed: 4', 'Unnamed: 5',
'Unnamed: 6', 'Unnamed: 7', 'Unnamed: 8', 'Unnamed: 9',
...
'Unnamed: 163', 'Unnamed: 164', 'Unnamed: 165', 'Unnamed: 166',
'Unnamed: 167', 'Unnamed: 168', 'Unnamed: 169', 'Unnamed: 170',
'Unnamed: 171', 'class'],
dtype='object', length=173)
```

**“title”, “subject” and “date” columns is not required for detecting the fake news, so I am going to drop the columns.**

```
[19]:
```

```
[20]: df.isnull().sum()
```

```
df = marge.drop(["title", "subject", "date"], axis = 1)
```

```
[20]: text      0
      Unnamed: 4    44878
      Unnamed: 5    44879
      Unnamed: 6    44879
      Unnamed: 7    44879
      ...
      Unnamed: 168  44897
      Unnamed: 169  44897
      Unnamed: 170  44897
      Unnamed: 171  44897
      class      0
      Length: 170, dtype: int64
```

### Randomly shuffling the dataframe

```
[21]:
```

```
[22]: df.head()
```

```
df = df.sample(frac = 1)
```

```
[22]: text Unnamed: 4 \
16097 BUENOS AIRES (Reuters) - Argentina s President... NaN
2842I woke up this morning completely unfazed over... NaN
5912BERLIN (Reuters) - German Chancellor Angela Me... NaN
21886If you have a system that rewards you for bei... NaN
5629WASHINGTON (Reuters) - U.S. Republicans on Fri... NaN
      Unnamed: 5 Unnamed: 6 Unnamed: 7 Unnamed: 8 Unnamed: 9 Unnamed:
      10 \
16097 NaN NaN NaN NaN NaN NaN
2842 NaN NaN NaN NaN NaN NaN
5912 NaN NaN NaN NaN NaN NaN
21886 NaN NaN NaN NaN NaN NaN
5629 NaN NaN NaN NaN NaN NaN
      Unnamed: 11 Unnamed: 12 ... Unnamed: 163 Unnamed: 164 Unnamed: 165
      \
16097 NaN NaN ... NaN NaN NaN
2842 NaN NaN ... NaN NaN NaN
5912 NaN NaN ... NaN NaN NaN
21886 NaN NaN ... NaN NaN NaN
5629 NaN NaN ... NaN NaN NaN
      Unnamed: 166 Unnamed: 167 Unnamed: 168 Unnamed: 169 Unnamed: 170
      \
16097 NaN NaN NaN NaN NaN
```

2842	NaN	NaN	NaN	NaN	NaN
5912	NaN	NaN	NaN	NaN	NaN
21886	NaN	NaN	NaN	NaN	NaN
5629	NaN	NaN	NaN	NaN	NaN

Unnamed: 171 class

16097	NaN	1
2842	NaN	0
5912	NaN	1
21886	NaN	0
5629	NaN	1

[5 rows x 170 columns]

```
[23]: df.reset_index(inplace = True)
df.drop(["index"], axis = 1, inplace = True)
```

```
[24]: df.columns
```

```
[24]: Index(['text', 'Unnamed: 4', 'Unnamed: 5', 'Unnamed: 6', 'Unnamed: 7',
            'Unnamed: 8', 'Unnamed: 9', 'Unnamed: 10', 'Unnamed: 11',
            'Unnamed: 12', ...,
            'Unnamed: 163', 'Unnamed: 164', 'Unnamed: 165', 'Unnamed: 166',
            'Unnamed: 167', 'Unnamed: 168', 'Unnamed: 169', 'Unnamed: 170',
            'Unnamed: 171', 'class'],
            dtype='object', length=170)
```

```
[25]: df.head()
```

```
[25]:
```

	text	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7	Unnamed: 8	Unnamed: 9	Unnamed: 10	Unnamed: 11
0	BUENOS AIRES (Reuters) - Argentina s President...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	I woke up this morning completely unfazed over...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2	BERLIN (Reuters) - German Chancellor Angela Me...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
3	If you have a system that rewards you for bei...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
4	WASHINGTON (Reuters) - U.S. Republicans on Fri...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

```

Unnamed: 12 ... Unnamed: 163 Unnamed: 164 Unnamed: 165 Unnamed: 166 \
0      NaN ...      NaN      NaN      NaN      NaN
1      NaN ...      NaN      NaN      NaN      NaN
2      NaN ...      NaN      NaN      NaN      NaN
3      NaN ...      NaN      NaN      NaN      NaN
4      NaN ...      NaN      NaN      NaN      NaN
Unnamed: 167 Unnamed: 168 Unnamed: 169 Unnamed: 170 Unnamed: 171 class
0      NaN      NaN      NaN      NaN      NaN      1
1      NaN      NaN      NaN      NaN      NaN      0
2      NaN      NaN      NaN      NaN      NaN      1
3      NaN      NaN      NaN      NaN      NaN      0
4      NaN      NaN      NaN      NaN      NaN      1

[5 rows x 170 columns]

```

**Creating a function to convert the text in lowercase, remove the extra space, special chr., ulr and links.**

```

[46]: def word_drop(text):
      text = text.lower()
      text = re.sub('\[.*?\]', '', text)
      text = re.sub("\W", " ", text)
      text = re.sub('https?://\S+|www\.\S+', '', text)
      text = re.sub('<.*?>+', '', text)
      text = re.sub('[%s]' % re.escape(string.punctuation), '', text)
      text = re.sub('\n', '', text)
      text = re.sub('\w*\d\w*', '', text)
      return text

```

```

[47]: df["text"] = df["text"].apply(word_drop)

```

**Defining dependent and independent variable as x and y**

```

[48]: x = df["text"]
      y = df["class"]

```

**Splitting the dataset into training set and testing set.**

```

[49]: x_train, x_test, y_train, y_test = train_test_split(x, y,
test_size=0.25)

```

**Convert text to vectors**

```

[71]: from sklearn.feature_extraction.text import TfidfVectorizer

```

```
[72]: vectorization = TfidfVectorizer()
      xv_train =
      vectorization.fit_transform(x_train)
      xv_test =
      vectorization.transform(x_test)
```

### 1.0.3 1. Logistic Regression

```
[73]: from sklearn.linear_model import LogisticRegression
```

```
[78]: LR = LogisticRegression()
      LR.fit(xv_train, y_train)
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):
```

```
[78]: LogisticRegression()
```

```
[75]: pred_lr=LR.predict(xv_test)
```

```
[76]: LR.score(xv_test, y_test)
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype) or not is_extension_array_dtype(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
```

```

packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):

```

```
[76]: 0.985924276169265
```

```
[77]: print(classification_report(y_test, pred_lr))
```

```

          precision    recall  f1-score   support

         0          0.99      0.99      0.99         5821
         1          0.98      0.99      0.99         5404

    accuracy                  0.99      11225
   macro avg          0.99      0.99      0.99      11225
weighted avg          0.99      0.99      0.99      11225
avg

```

```

C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-

```

```

packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype) or not is_extension_array_dtype(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):

```

## 1.0.4 2. Decision Tree Classification

[79]:

[80]:

```
DT = DecisionTreeClassifier()
DT.fit(xv_train, y_train)
```

**from sklearn.tree import** DecisionTreeClassifier

```

C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.

```

```

    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype) or not is_extension_array_dtype(pd_dtype):

[80]: DecisionTreeClassifier()
[81]: pred_dt = DT.predict(xv_test)

[36]: DT.score(xv_test, y_test)

[36]: 0.9945632798573975

[82]: print(classification_report(y_test, pred_dt))
           precision    recall  f1-score   support

             0         1.00      1.00      1.00         5821
             1         1.00      1.00      1.00         5404

   accuracy                   1.00      11225
  macro avg              1.00      1.00      1.00      11225
weighted avg              1.00      1.00      1.00      11225

C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
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C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-

```



```

packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
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C:\Users\Admin\anaconda3\anaconda3\Lib\site-
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C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):

```

### 1.0.5 3. Gradient Boosting Classifier

```
[38]: from sklearn.ensemble import GradientBoostingClassifier
```

```
[39]: GBC = GradientBoostingClassifier(random_state=0)
      GBC.fit(xv_train, y_train)
```

```
[39]: GradientBoostingClassifier(random_state=0)
```

```
[40]: pred_gbc = GBC.predict(xv_test)
```

```
[41]: GBC.score(xv_test, y_test)
```

```
[41]: 0.9955436720142602
```

```
[42]: print(classification_report(y_test, pred_gbc))
      precision    recall  f1-score   support
```

0	1.00	0.99	1.00	5883
1	0.99	1.00	1.00	5337
accuracy			1.00	11220
macro avg	1.00	1.00	1.00	11220
weighted avg	1.00	1.00	1.00	11220
avg				

#### 1.0.6 4. Random Forest Classifier

```
[83]: from sklearn.ensemble import RandomForestClassifier
```

```
[84]: RFC = RandomForestClassifier(random_state=0)
      RFC.fit(xv_train, y_train)
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
```

```
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
```

```
    if is_sparse(pd_dtype):
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
```

```
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
```

```
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):
```

```
[84]: RandomForestClassifier(random_state=0)
```

```
[85]: pred_rfc = RFC.predict(xv_test)
```

```
[88]: RFC.score(xv_test, y_test)
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
```

```
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
```

```
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype):
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
```

```
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
```

```
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
```

```
    if is_sparse(pd_dtype) or not is_extension_array_dtype(pd_dtype):
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
```

```
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
deprecated
```

```
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
```

```
    if is_sparse(pd_dtype):
```

```
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
```

```

packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
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C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
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and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):

```

```
[88]: 0.9882405345211581
```

```
[89]: print(classification_report(y_test, pred_rfc))
```

	precision	recall	f1-score	support
0	0.99	0.99	0.99	5821
1	0.99	0.98	0.99	5404
accuracy			0.99	11225
macro avg	0.99	0.99	0.99	11225
weighted avg	0.99	0.99	0.99	11225

```

C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
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C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check `isinstance(dtype,
pd.SparseDtype)` instead.
    if is_sparse(pd_dtype) or not is_extension_array_dtype(pd_dtype):
C:\Users\Admin\anaconda3\anaconda3\Lib\site-

```

```

packages\sklearn\utils\validation.py:605: FutureWarning: is_sparse is
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and will be removed in a future version. Check `isinstance(dtype,
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C:\Users\Admin\anaconda3\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
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pd.SparseDtype)` instead.
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packages\sklearn\utils\validation.py:614: FutureWarning: is_sparse is
deprecated
and will be removed in a future version. Check
`isinstance(dtype, pd.SparseDtype)` instead. if
is_sparse(pd_dtype) or not
is_extension_array_dtype(pd_dtype):

```

## 2 Model Testing With Manual Entry

### 2.0.1 News

```
[8]: import pandas as pd

def output_lable(n):
    if n == 0:
        return "Fake News"
    elif n == 1:
        return "Not A Fake News "

def manual_testing(news):
    testing_news = {"text": [news]}
    new_def_test = pd.DataFrame(testing_news)
    new_def_test["text"] = new_def_test["text"].apply(word_drop)
    new_x_test = new_def_test["text"]
    new_xv_test = vectorization.transform(new_x_test)
    pred_LR = LR.predict(new_xv_test)
    pred_DT = DT.predict(new_xv_test)
    pred_GBC = GBC.predict(new_xv_test)
    pred_RFC = RFC.predict(new_xv_test)

    return print("\n\nLR Prediction: {} \nDT Prediction: {} \nGBC Prediction: {} \nRFC Prediction: {}".format(output_lable(pred_LR[0]),
↵                                     output_lable(pred_DT[0]),
↵                                     output_lable(pred_GBC[0]),
↵                                     output_lable(pred_RFC[0])))

[ ]: news = str(input())
manual_testing(news)
model = pickle.load(open("model.pkl", "rb"))
```

```
[ ]:
```