

```
In [1]:
         import pandas as pd
         import numpy as np
         true = pd.read csv('/content/sample data/True.csv')
In [3]:
         fake = pd.read csv('/content/sample data/Fake.csv')
In [4]:
In [5]:
         true.head()
                                   title
                                                                           subject
                                                                                          date
Out[5]:
                                                                 text
             As U.S. budget fight looms,
                                             WASHINGTON (Reuters) -
                                                                                     December
                                                                       politicsNews
                     Republicans flip t...
                                            The head of a conservat...
                                                                                      31, 2017
                                             WASHINGTON (Reuters) -
                  U.S. military to accept
                                                                                     December
         1
                                                                       politicsNews
                                            Transgender people will...
                                                                                      29, 2017
                transgender recruits o...
                  Senior U.S. Republican
                                             WASHINGTON (Reuters) -
                                                                                     December
         2
                                                                       politicsNews
                senator: 'Let Mr. Muell...
                                             The special counsel inv...
                                                                                      31, 2017
             FBI Russia probe helped by
                                             WASHINGTON (Reuters) -
                                                                                     December
         3
                                                                       politicsNews
                   Australian diplomat...
                                           Trump campaign adviser ...
                                                                                      30, 2017
             Trump wants Postal Service
                                               SEATTLE/WASHINGTON
                                                                                     December
                                                                       politicsNews
                  to charge 'much mor...
                                         (Reuters) - President Donal...
                                                                                      29, 2017
In [6]:
         fake.head()
                                      title
                                                                    text subject
                                                                                          date
Out[6]:
                  Donald Trump Sends Out
                                               Donald Trump just couldn t
                                                                                     December
         0
                                                                             News
                 Embarrassing New Year'...
                                                    wish all Americans ...
                                                                                      31, 2017
                                                       House Intelligence
             Drunk Bragging Trump Staffer
                                                                                     December
         1
                                              Committee Chairman Devin
                                                                             News
                         Started Russian ...
                                                                                      31, 2017
                                                                    Nu...
              Sheriff David Clarke Becomes
                                                On Friday, it was revealed
                                                                                     December
         2
                                                                             News
                                                    that former Milwauk...
                         An Internet Joke...
                                                                                      30, 2017
                  Trump Is So Obsessed He
                                                On Christmas day, Donald
                                                                                     December
         3
                                                                             News
                Even Has Obama's Name...
                                                Trump announced that ...
                                                                                      29, 2017
               Pope Francis Just Called Out
                                             Pope Francis used his annual
                                                                                     December
         4
                                                                             News
                       Donald Trump Dur...
                                                    Christmas Day mes...
                                                                                      25, 2017
         true['label']=1
In [7]:
In [8]:
         fake['label']=0
In [9]:
         true.head()
```

As U.S. budget fight looms, Republicans flip t WASHINGTON (Reuters) - The head of a conservat VHE politics News and the politics News and the politics News and the politics News and pol	Out[9]:		title	text		subject	date	label
1 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 5 Service to charge 'much mor 6 December 29, 2017 1 SEATTLE/WASHINGTON (Reuters) - Trump campaign adviser politicsNews oppositions and politicsNews oppositions and politicsNews oppositions of the politicsNews oppositions of the politicsNews oppositions of the politicsNews oppositions of the politicsNews oppositions		0	looms, Republicans flip	The head of a	pol	liticsNews		1
FBI Russia probe helped by Australian diplomat Trump wants Postal Service to charge 'much mor Trump wants Postal Service to charge 'much mor To Donald Trump Sends Out Embarrassing New Year' Trump Bragging Trump Staffer Started Russian Sheriff David Clarke Becomes An Internet Joke Trump Is So Obsessed He Even Has Obama's Name Pope Francis Just Called Out Donald Trump Dur On Comparison of Sheriff David Clarke annual Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day Pope Francis Just Called Out Donald Trump Dur Out Christmas Day		1		Transgender people		liticsNews		1
James and politics News are politics News and politics News and politics News and politics News are politics News and politics News and politics News are politics News and politics News and politics News are po		2			pol	liticsNews		1
4 Service to charge 'much mor (Reuters) - President Donal politicsNews 29, 2017 1 1 news = pd.concat([fake,true],axis=0) 1 news.head() 1		3	by Australian					1
title text subject date label Donald Trump Sends Out Embarrassing New Year' Donald Trump just couldn t wish all Americans Donald Trump just couldn t wish all Americans Donald Trump just couldn t wish all Americans News December 31, 2017 December 31, 2017 Sheriff David Clarke Becomes An Internet Joke Trump Is So Obsessed He Even Has Obama's Name Trump Is So Obsessed He Out Donald Trump Dur Pope Francis used his annual Christmas Day News December 29, 2017 News December 30, 2017 News December 29, 2017		4	Service to charge	(Reuters) - President	pol	liticsNews		1
Donald Trump Sends Out Embarrassing New Year' Donald Trump just couldn t wish all Americans Drunk Bragging Trump Staffer Started Russian Committee Chairman Devin Nu Sheriff David Clarke Becomes An Internet Joke Trump Is So Obsessed He Even Has Obama's Name Pope Francis Just Called Out Donald Trump Dur Pope Francis used his annual Christmas Day News December 30, 2017 News December 30, 2017 Pope Francis used his annual Christmas Day News December 29, 2017 News December 29, 2017	n [10]:	ne	ws = pd.concat([fake,t	rue],axis=0)				
O Donald Trump Sends Out Embarrassing New Year' Donald Trump just couldn t wish all Americans Drunk Bragging Trump Staffer Started Russian Sheriff David Clarke Becomes An Internet Joke Trump Is So Obsessed He Even Has Obama's Name Pope Francis Just Called Out Donald Trump Dur Pope Francis used his annual Christmas Day December 31, 2017 News December 31, 2017 News December 30, 2017 News December 29, 2017 Pope Francis used his annual Christmas Day News December 29, 2017		news.head()						
Drunk Bragging Trump Staffer Started Russian Sheriff David Clarke Becomes An Internet Joke Trump Is So Obsessed He Even Has Obama's Name Pope Francis Just Called Out Donald Trump Dur t wish all Americans House Intelligence Committee Chairman Devin Nu News News News News News News News New	n [11]:	ne	ws.head()					
1 Staffer Started Russian Committee Chairman Devin Nu 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. Pope Francis Just Called Out Donald Trump Dur. Committee Chairman News 31, 2017 On Friday, it was revealed that former Milwauk News December 30, 2017 On Christmas day, Donald Trump announced that Pope Francis used his annual Christmas Day News December 29, 2017 On Christmas day, Donald Trump Dur.		ne		e t	text	subject	date	label
Becomes An Internet Joke Trump Is So Obsessed He Even Has Obama's Name Pope Francis Just Called Out Donald Trump Dur. Pope Francis Just Called Out Donald Trump Dur. On Friday, it was revealed that revealed that former Milwauk On Friday, it was revealed that revealed that former Milwauk On Christmas day, Donald Trump announced that Pope Francis used his annual Christmas Day Pope Francis used his annual Christmas Day On Christmas day, Donald Trump Dur. On Christmas Day			titl Donald Trump Sends Ou	ut Donald Trump just co	uldn		December	
Pope Francis Just Called Out Donald Trump Dur Pope Francis Just Called Out Donald Trump Dur Pope Francis Used his annual Christmas Day		0	Donald Trump Sends Ou Embarrassing New Year'. Drunk Bragging Trum	ut Donald Trump just cou t wish all American House Intellige Committee Chair	uldn ns ence man	News	December 31, 2017 December	0
4 Out Donald Trump Dur annual Christmas Day News 25 2017		0	Donald Trump Sends Or Embarrassing New Year'. Drunk Bragging Trum Staffer Started Russian . Sheriff David Clark Becomes An Interne	Donald Trump just continued to wish all American House Intellige Committee Chairs Devin Notes On Friday, it was reveal that former Milway	uldn ns ence man Nu	News	December 31, 2017 December 31, 2017 December	0
		0 1 2	Donald Trump Sends Ou Embarrassing New Year'. Drunk Bragging Trum Staffer Started Russian . Sheriff David Clark Becomes An Interne Joke. Trump Is So Obsessed H Even Has Obama	Donald Trump just continued to wish all American House Intellige Committee Chairm Devin Market Chairm Devi	uldn ns ence man Nu aled uk	News News News	December 31, 2017 December 31, 2017 December 30, 2017	0 0

In [12]: news.tail()

```
title
Out[12]:
                                                               text
                                                                        subject
                                                                                   date label
                    'Fully committed' NATO
                                               BRUSSELS (Reuters) -
                                                                                  August
          21412
                            backs new U.S.
                                             NATO allies on Tuesday worldnews
                                                                                     22,
                                                                                              1
                                approach...
                                                                                   2017
                                                               we...
                   LexisNexis withdrew two
                                                LONDON (Reuters) -
                                                                                  August
                     products from Chinese
          21413
                                              LexisNexis, a provider worldnews
                                                                                     22,
                                                                                              1
                                                                                   2017
                                            MINSK (Reuters) - In the
                         Minsk cultural hub
                                                                                  August
          21414
                                                                     worldnews
                      becomes haven from
                                                  shadow of disused
                                                                                     22,
                                                                                              1
                                authorities
                                                              Sov...
                                                                                   2017
                         Vatican upbeat on
                                                MOSCOW (Reuters) -
                                                                                  August
          21415
                         possibility of Pope
                                                Vatican Secretary of worldnews
                                                                                              1
                                                                                     22,
                                                                                   2017
                                 Francis ...
                                                            State ...
                                                 JAKARTA (Reuters) -
                                                                                  August
                    Indonesia to buy $1.14
          21416
                                               Indonesia will buy 11 worldnews
                                                                                     22,
                                                                                              1
                    billion worth of Russia...
                                                             Sukh...
                                                                                   2017
In [13]:
          news.isnull().sum()
                    0
Out[13]:
                   0
              title
              text 0
          subject 0
             date 0
             label 0
          dtype: int64
In [14]:
          news = news.drop(['title','subject','date'],axis= 1)
          news.head()
In [15]:
Out[15]:
                                                           text label
          0
                 Donald Trump just couldn t wish all Americans ...
                                                                     0
             House Intelligence Committee Chairman Devin Nu...
                                                                     0
          2
                 On Friday, it was revealed that former Milwauk...
                                                                     0
          3
              On Christmas day, Donald Trump announced that ...
                                                                     0
               Pope Francis used his annual Christmas Day mes...
                                                                     0
In [16]:
          news = news.sample(frac=1)
```

```
news.head()
In [17]:
                                                                text label
Out[17]:
           13506
                   TEGUCIGALPA (Reuters) - Honduras faced a growi...
                                                                          1
            2082
                       Congress is chest-deep in their leak investiga...
                                                                          0
            2171
                     The following statements were posted to the ve...
                                                                          1
           17073
                     Will the new 3-story Islamic Museum include pi...
                                                                          0
           16479
                      Listen up people! This is great! Lou Dobbs get...
                                                                          0
In [18]:
          news.reset index(inplace=True)
In [19]:
          news.head()
Out[19]:
              index
                                                                   text label
             13506
                     TEGUCIGALPA (Reuters) - Honduras faced a growi...
                                                                             1
               2082
                                                                             0
           1
                          Congress is chest-deep in their leak investiga...
           2
               2171
                       The following statements were posted to the ve...
                                                                             1
           3 17073
                        Will the new 3-story Islamic Museum include pi...
                                                                             0
             16479
                         Listen up people! This is great! Lou Dobbs get...
                                                                             0
In [20]:
          news.drop(['index'],axis=1,inplace=True)
          news.head()
In [21]:
                                                          text label
Out[21]:
             TEGUCIGALPA (Reuters) - Honduras faced a growi...
                                                                     1
           1
                  Congress is chest-deep in their leak investiga...
                                                                     0
          2
               The following statements were posted to the ve...
                                                                     1
           3
                Will the new 3-story Islamic Museum include pi...
                                                                     0
           4
                 Listen up people! This is great! Lou Dobbs get...
                                                                     0
In [22]:
          import re
In [23]: def wordopt(text):
               #convert into lowercase
               text = text.lower()
```

```
#remove html tags
               text = re.sub(r'[^\w\s]', '', text)
               #remove digits
               text = re.sub(r'\d','',text)
               #remove newline characters
               text = re.sub(r'\n', '', text)
               return text
          news['text'] = news['text'].apply(wordopt)
In [24]:
In [25]:
          news['text']
Out[25]:
                                                               text
                0
                    tegucigalpa reuters honduras faced a growing ...
                1
                      congress is chestdeep in their leak investigat...
                    the following statements were posted to the ve...
                3
                    will the new story islamic museum include pict...
                4
                       listen up people this is great lou dobbs gets ...
           44893
                      war veteran johnny joey jones praised presid...
           44894
                       united nations reuters russia vetoed on frida...
           44895 when loretta lynch was confirmed as the new di...
           44896
                      thanks to george soros at least couches in th...
           44897
                     washington reuters any tax reform plan that i...
          44898 \text{ rows} \times 1 \text{ columns}
          dtype: object
In [26]: x = news['text']
          y = news['label']
In [27]: x
```

text = re.sub(r'https?://\s+|www\.\s+','',text)

#remove URLs

Out[27]:		text
	0	tegucigalpa reuters honduras faced a growing
	1	congress is chestdeep in their leak investigat
	2	the following statements were posted to the ve
	3	will the new story islamic museum include pict
	4	listen up people this is great lou dobbs gets
	44893	war veteran johnny joey jones praised presid
	44894	united nations reuters russia vetoed on frida
	44895	when loretta lynch was confirmed as the new di
	44896	thanks to george soros at least couches in th
	44897	washington reuters any tax reform plan that i

44898 rows × 1 columns

dtype: object

In [28]:	У	
Out[28]:		label
	0	1
	1	0
	2	1
	3	0
	4	0
	44893	0
	44894	1
	44895	0

44898 rows \times 1 columns

0

1

dtype: int64

44896

44897

```
from sklearn.model selection import train test split
In [30]: x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.3)
In [31]:
         x train.shape
Out[31]: (31428,)
In [32]: x test.shape
Out[32]: (13470,)
In [34]: from sklearn.feature extraction.text import TfidfVectorizer
In [35]:
         vectorization = TfidfVectorizer()
In [36]:
         xv train = vectorization.fit transform(x train)
In [37]: xv test = vectorization.transform(x test)
In [38]: xv train
Out[38]: <Compressed Sparse Row sparse matrix of dtype 'float64'
                 with 6468162 stored elements and shape (31428, 177696)>
In [39]: xv test
Out[39]: <Compressed Sparse Row sparse matrix of dtype 'float64'
                 with 2716332 stored elements and shape (13470, 177696)>
In [40]: from sklearn.linear model import LogisticRegression
         LR = LogisticRegression() # define model
         LR.fit(xv train, y train) # train model
Out[40]:
         ▼ LogisticRegression
         LogisticRegression()
In [41]:
         pred_lr = LR.predict(xv_test)
In [42]:
         LR.score(xv_test,y_test)
Out[42]: 0.9861915367483296
In [43]: from sklearn.metrics import classification_report
         print(classification_report(y_test, pred_lr))
```

```
0
                           0.99
                                      0.99
                                                0.99
                                                          7002
                   1
                           0.98
                                      0.99
                                                0.99
                                                          6468
                                                0.99
                                                         13470
            accuracy
                           0.99
                                      0.99
                                                0.99
                                                         13470
           macro avq
        weighted avg
                           0.99
                                      0.99
                                                0.99
                                                         13470
In [44]: from sklearn.metrics import classification report
         print(classification report(y test, pred lr))
                      precision
                                   recall f1-score
                                                       support
                   0
                           0.99
                                      0.99
                                                0.99
                                                          7002
                   1
                           0.98
                                      0.99
                                                0.99
                                                          6468
                                                0.99
                                                         13470
            accuracy
           macro avg
                           0.99
                                      0.99
                                                0.99
                                                         13470
        weighted avg
                           0.99
                                      0.99
                                                0.99
                                                         13470
In [47]:
         from sklearn.tree import DecisionTreeClassifier
In [48]:
         DTC = DecisionTreeClassifier()
In [49]:
         DTC.fit(xv train,y train)
Out[49]:
          ▼ DecisionTreeClassifier
         DecisionTreeClassifier()
         pred dtc = DTC.predict(xv test)
In [50]:
In [51]:
         DTC.score(xv_test,y_test)
Out[51]: 0.9956198960653304
In [52]:
         print(classification_report(y_test,pred_dtc))
                      precision
                                    recall f1-score
                                                       support
                   0
                           1.00
                                      1.00
                                                1.00
                                                          7002
                           0.99
                                      1.00
                                                1.00
                                                          6468
                                                1.00
                                                         13470
            accuracy
                                                1.00
           macro avg
                           1.00
                                      1.00
                                                         13470
        weighted avg
                           1.00
                                      1.00
                                                1.00
                                                         13470
```

recall f1-score

support

precision

```
In [55]:
         from sklearn.ensemble import RandomForestClassifier
In [56]:
         rfc = RandomForestClassifier()
In [58]:
         rfc.fit(xv train,y train)
Out[58]:
          ▼ RandomForestClassifier
         RandomForestClassifier()
In [59]:
         predict rfc = rfc.predict(xv test)
In [60]:
         rfc.score(xv_test,y_test)
Out[60]: 0.9867854491462509
In [61]:
         print(classification_report(y_test,predict_rfc))
                      precision
                                   recall f1-score
                                                       support
                                     0.99
                                               0.99
                                                          7002
                           0.99
                   1
                                     0.99
                           0.99
                                               0.99
                                                          6468
                                               0.99
                                                         13470
            accuracy
                           0.99
                                     0.99
                                                         13470
           macro avg
                                               0.99
       weighted avg
                           0.99
                                     0.99
                                               0.99
                                                         13470
In [62]:
         from sklearn.ensemble import GradientBoostingClassifier
In [63]: gbc = GradientBoostingClassifier()
In [64]:
         gbc.fit(xv_train, y_train)
Out[64]:
         ▼ GradientBoostingClassifier
         GradientBoostingClassifier()
         pred_gbc = gbc.predict(xv_test)
In [67]:
In [68]:
         gbc.score(xv test, y test)
Out[68]: 0.9959910913140312
         print(classification report(y test, pred gbc))
```

	precision	recall	f1-score	support
0 1	1.00 0.99	0.99 1.00	1.00 1.00	7002 6468
accuracy macro avg weighted avg	1.00 1.00	1.00 1.00	1.00 1.00 1.00	13470 13470 13470

In []: