FAKE NEWS DETECTION USING NLP

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Input: **https://www.kaggle.com/datasets/clmentbisaillon/fake-and-real-news-dataset**

Processed code:

In [1]:

```
import numpy as np
import pandas as pd
import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

In [2]:

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

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from wordcloud import WordCloud, STOPWORDS
import nltk
import re
from nltk.corpus import stopwords
import seaborn as sns
import gensim
from gensim.utils import simple_preprocess
from gensim.parsing.preprocessing import STOPWORDS

import plotly.express as px
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import roc_auc_score
from sklearn.metrics import confusion_matrix
```

Import the data & Clean ups

In [3]:

```
fake_data = pd.read_csv('/kaggle/input/fake-and-real-news-dataset/Fa
ke.csv')
print("fake_data",fake_data.shape)

true_data= pd.read_csv('/kaggle/input/fake-and-real-news-dataset/Tru
e.csv')
print("true_data",true_data.shape)
```

In [4]:

```
fake_data.head(5)
```

Out[4]:

	Title	text	subject	date
0	Donald Trump Sends Out Embarrassing New Year'...	Donald Trump just couldn t wish all Americans ...	News	December 31, 2017
1	Drunk Bragging Trump Staffer Started Russian ...	House Intelligence Committee Chairman Devin Nu...	News	December 31, 2017
2	Sheriff David Clarke Becomes An Internet Joke...	On Friday, it was revealed that former Milwauk...	News	December 30, 2017

	Title	text	subject	date
3	Trump Is So Obsessed He Even Has Obama’s Name...	On Christmas day, Donald Trump announced that ...	News	December 29, 2017
4	Pope Francis Just Called Out Donald Trump Dur...	Pope Francis used his annual Christmas Day mes...	News	December 25, 2017

In [5]:

```
true_data.head(5)
```

Out[5]:

	Title	text	subject	date
0	As U.S. budget fight looms, Republicans flip t...	WASHINGTON (Reuters) - The head of a conservat...	politicsNews	December 31, 2017
1	U.S. military to accept transgender recruits o...	WASHINGTON (Reuters) - Transgender people will...	politicsNews	December 29, 2017
2	Senior U.S. Republican senator: 'Let Mr. Muell...	WASHINGTON (Reuters) - The special counsel inv...	politicsNews	December 31, 2017
3	FBI Russia probe helped by Australian diplomat...	WASHINGTON (Reuters) - Trump campaign adviser ...	politicsNews	December 30, 2017

	Title	text	subject	date
4	Trump wants Postal Service to charge 'much mor...	SEATTLE/WASHINGTON (Reuters) - President Donal...	politicsNews	December 29, 2017

In [6]:

```
true_data['target'] = 1
fake_data['target'] = 0
df = pd.concat([true_data, fake_data]).reset_index(drop = True)
df['original'] = df['title'] + ' ' + df['text']
df.head()
```

Out[6]:

	title	Text	subject	date	target	original
0	As U.S. budget fight looms, Republicans flip t...	WASHINGTON (Reuters) - The head of a conservat...	politicsNews	December 31, 2017	1	As U.S. budget fight looms, Republicans flip t...
1	U.S. military to accept transgender recruits o...	WASHINGTON (Reuters) - Transgender people will...	politicsNews	December 29, 2017	1	U.S. military to accept transgender recruits o...
2	Senior U.S. Republican senator: 'Let Mr. Muell...	WASHINGTON (Reuters) - The special counsel inv...	politicsNews	December 31, 2017	1	Senior U.S. Republican senator: 'Let Mr. Muell...

	title	Text	subject	date	target	original
3	FBI Russia probe helped by Australian diplomat...	WASHINGTON (Reuters) - Trump campaign adviser ...	politicsNews	December 30, 2017	1	FBI Russia probe helped by Australian diplomat...
4	Trump wants Postal Service to charge 'much mor...	SEATTLE/WASHINGTON (Reuters) - President Donal...	politicsNews	December 29, 2017	1	Trump wants Postal Service to charge 'much mor...

In [7]:

```
df.isnull().sum()
```

Out[7]:

```
title       0
text        0
subject     0
date        0
target      0
original    0
dtype: int64
```

Data Clean up

In [8]:

```
stop_words = stopwords.words('english')
stop_words.extend(['from', 'subject', 're', 'edu', 'use'])
def preprocess(text):
    result = []
    for token in gensim.utils.simple_preprocess(text):
        if token not in gensim.parsing.preprocessing.STOPWORDS and len(token) > 2 and token not in stop_words:
            result.append(token)

    return result
```

In [9]:

```
df.subject=df.subject.replace({'politics':'PoliticsNews','politicsNews':'PoliticsNews'})
```

In [10]:

```
sub_tf_df=df.groupby('target').apply(lambda x:x['title'].count()).reset_index(name='Counts')
sub_tf_df.target.replace({0:'False',1:'True'},inplace=True)
fig = px.bar(sub_tf_df, x="target", y="Counts",
             color='Counts', barmode='group',
             height=350)
```

In [11]:

```
sub_check=df.groupby('subject').apply(lambda x:x['title'].count()).reset_index(name='Counts')
fig=px.bar(sub_check,x='subject',y='Counts',color='Counts',title='Count of News Articles by Subject')
```

In [12]:

```
df['clean_title'] = df['title'].apply(preprocess)
df['clean_title'][0]
```

Out[12]:

```
['budget', 'fight', 'looms', 'republicans', 'flip', 'fiscal', 'script']
```

In [13]:

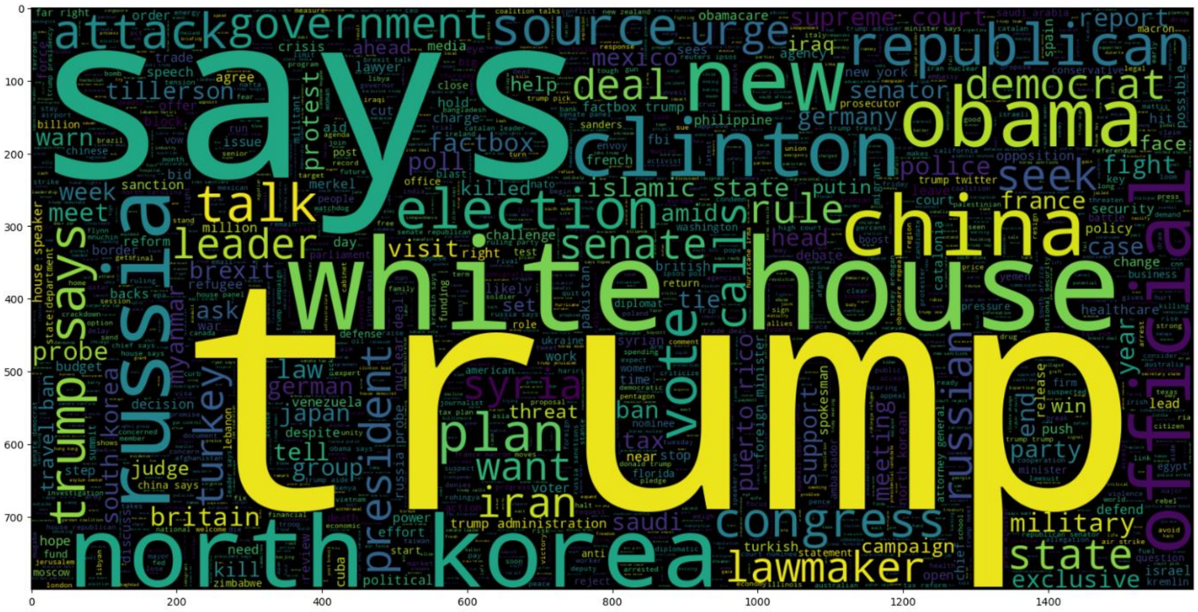
```
df['clean_joined_title']=df['clean_title'].apply(lambda x:" ".join(x))
```

In [14]:

```
plt.figure(figsize = (20,20))
wc = WordCloud(max_words = 2000 , width = 1600 , height = 800 , stopwords = stop_words).generate(" ".join(df[df.target == 1].clean_joined_title))
plt.imshow(wc, interpolation = 'bilinear')
```

Out[14]:

```
<matplotlib.image.AxesImage at 0x7cc99e7d3130>
```



In [15]:

```
maxlen = -1
for doc in df.clean_joined_title:
    tokens = nltk.word_tokenize(doc)
    if(maxlen<len(tokens)):
        maxlen = len(tokens)
print("The maximum number of words in a title is =", maxlen)
fig = px.histogram(x = [len(nltk.word_tokenize(x)) for x in df.clean_joined
_title], nbins = 50)
fig.show()
```

```
The maximum number of words in a title is = 34
```

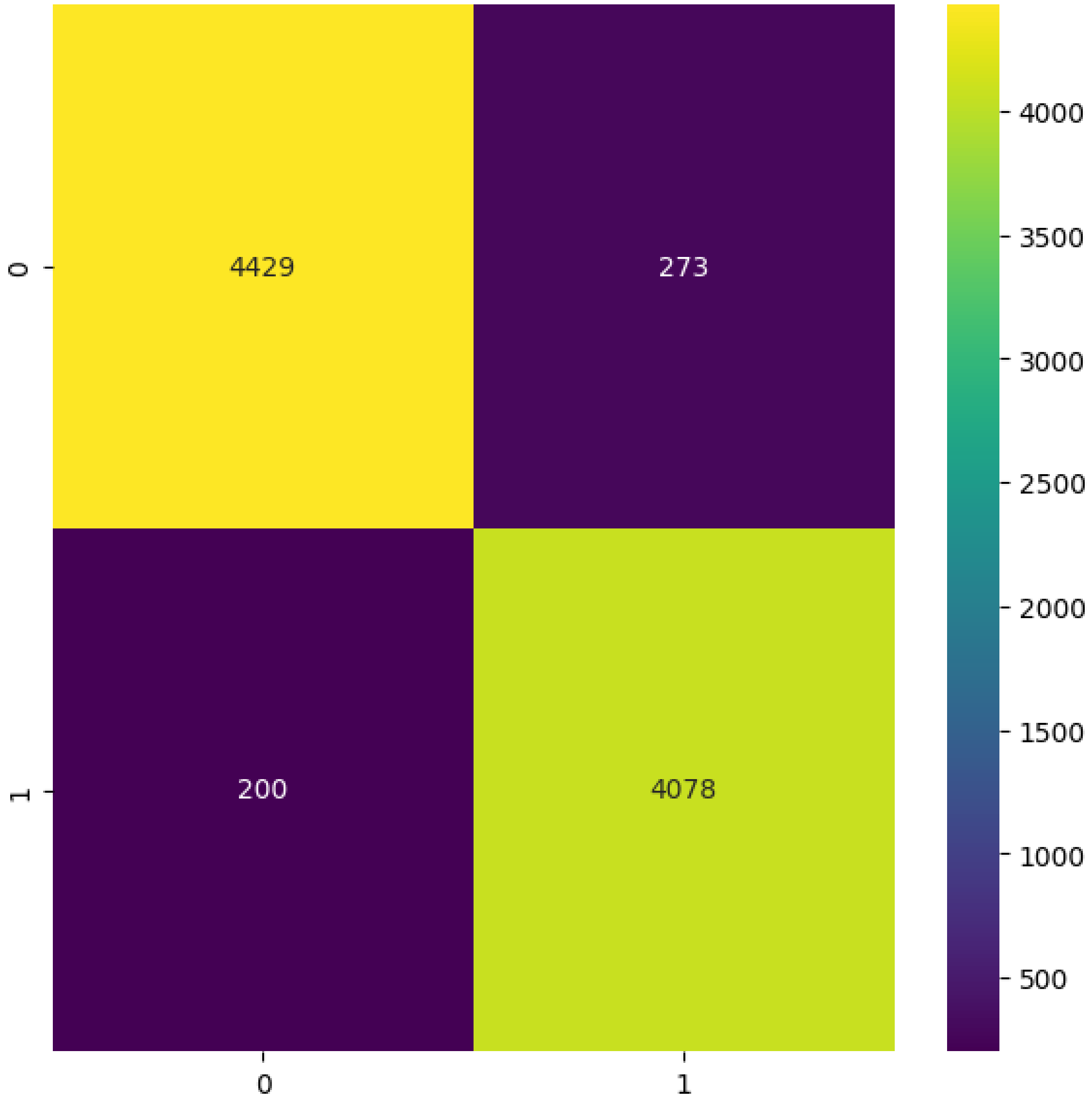
Create the confusion matrix

In [16]:

```
cm = confusion_matrix(list(y_test), predicted_value)
plt.figure(figsize = (7, 7))
sns.heatmap(cm, annot = True,fmt='g',cmap='viridis')
```

Out[16]:

```
<Axes: >
```



z

- 4465 Fake News have been Classified as Fake
- 4045 Real News have been classified as Real

Checking the content of news

In [17]:

```
df['clean_text'] = df['text'].apply(preprocess)
df['clean_joined_text']=df['clean_text'].apply(lambda x:" ".join(x))
```

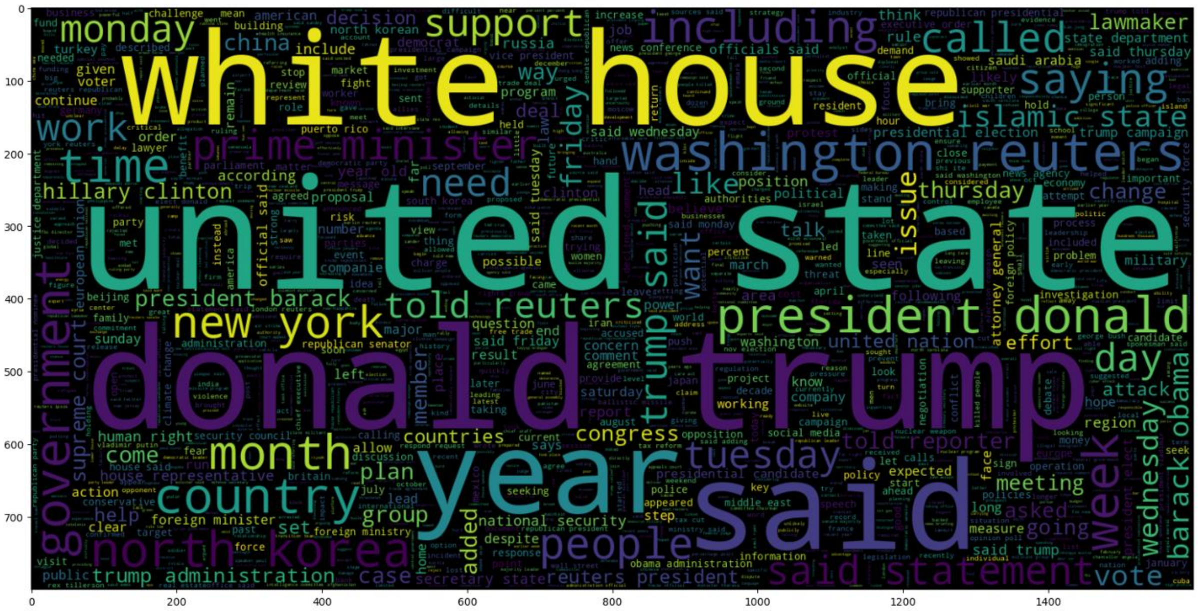
In [18]:

```
plt.figure(figsize = (20,20))
wc = WordCloud(max_words = 2000 , width = 1600 , height = 800 , stop
words = stop_words).generate(" ".join(df[df.target == 1].clean_joine
d_text))
```

```
plt.imshow(wc, interpolation = 'bilinear')
```

Out[18]:

```
<matplotlib.image.AxesImage at 0x7cc99e7d1db0>
```



In [19]:

```
maxlen = -1
for doc in df.clean_joined_text:
    tokens = nltk.word_tokenize(doc)
    if(maxlen<len(tokens)):
        maxlen = len(tokens)
print("The maximum number of words in a News Content is =", maxlen)
fig = px.histogram(x = [len(nltk.word_tokenize(x)) for x in df.clean
_joined_text], nbins = 50)
```

```
The maximum number of words in a News Content is = 4573
```

Accuracy and prediction:

In [20]:

```
X_train, X_test, y_train, y_test =
train_test_split(df.clean_joined_title, df.target, test_size =
0.2,random_state=2)

vec_train = CountVectorizer().fit(X_train)
X_vec_train = vec_train.transform(X_train)
X_vec_test = vec_train.transform(X_test)
```

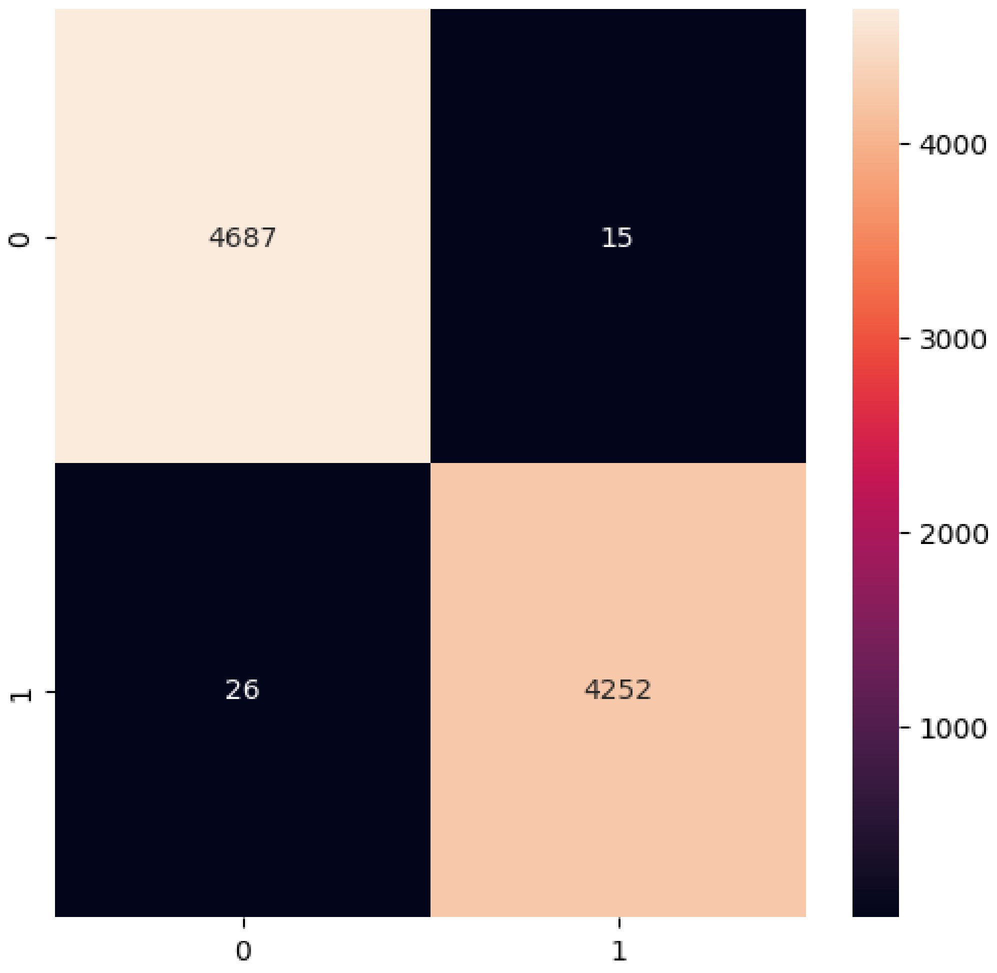
```
model = LogisticRegression(C=2)

model.fit(X_vec_train, y_train)
predicted_value = model.predict(X_vec_test)

accuracy_value = roc_auc_score(y_test, predicted_value)
print(accuracy_value)
```

```
0.9475943910154114
```

In [21]:

```
prediction = []
for i in range(len(predicted_value)):
    if predicted_value[i].item() > 0.5:
        prediction.append(1)
    else:
        prediction.append(0)
cm = confusion_matrix(list(y_test), prediction)
plt.figure(figsize = (6, 6))
sns.heatmap(cm, annot = True,fmt='g')
```

```
<Axes: >
```


4687
15
26
4252
0
1
0
1
4000
3000
2000
1000