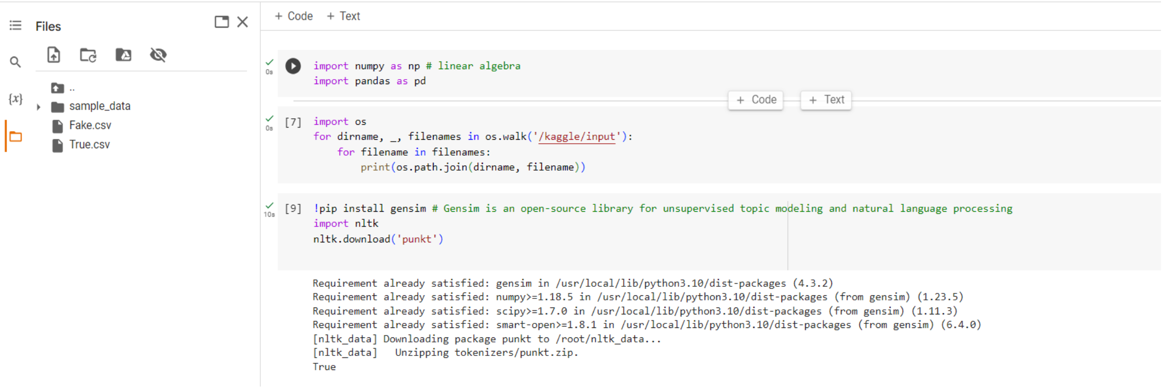
Phase 3: Development Part 1

In this part you will begin building your project by loading and preprocessing the dataset.
Begin building the fake news detection model by loading and preprocessing the dataset.
Load the fake news dataset and preprocess the textual data.

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

Fake News Detection

It has become humanly impossible to identify fake news on the online portals across the globe.The sheer volume and the pace at which news spreads calls the need to create a ML model to classify the fake from true news. The most crucial thing here is data which has been already available in the kaggle. We will be using different methods and compare the results.

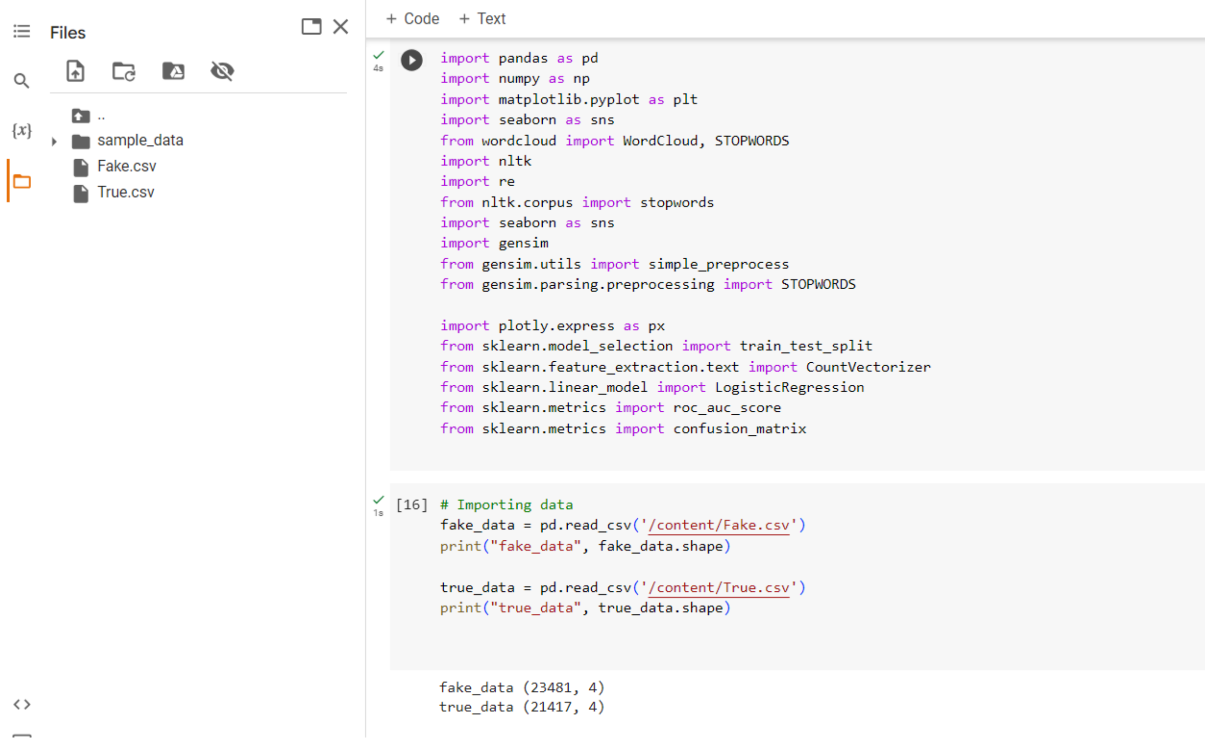


```
import numpy as np # linear algebra
import pandas as pd
```

```
[7] import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

```
[9] !pip install gensim # Gensim is an open-source library for unsupervised topic modeling and natural language processing
import nltk
nltk.download('punkt')
```

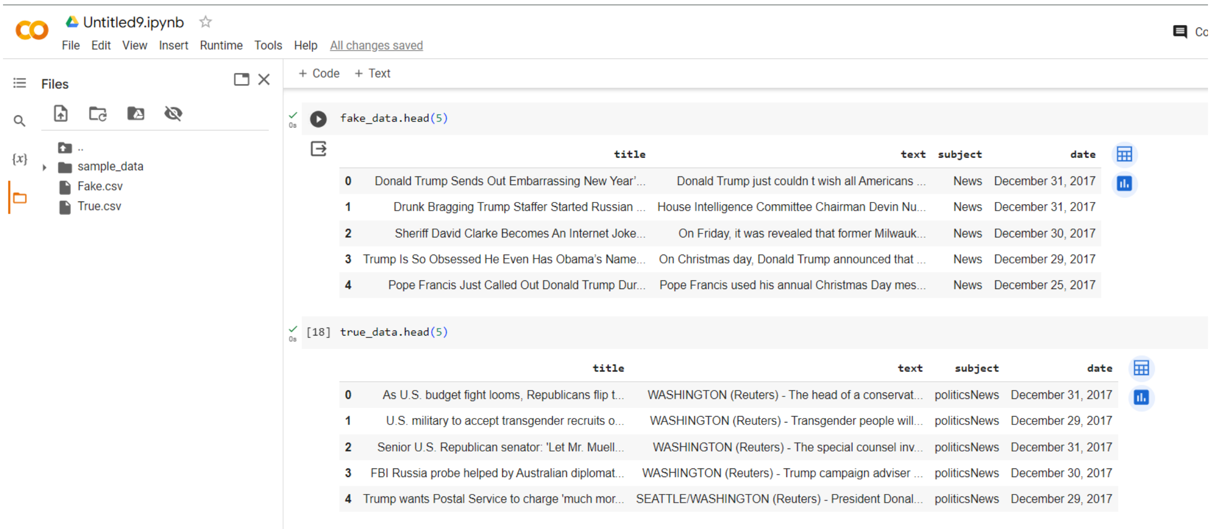
```
Requirement already satisfied: gensim in /usr/local/lib/python3.10/dist-packages (4.3.2)
Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.10/dist-packages (from gensim) (1.23.5)
Requirement already satisfied: scipy>=1.7.0 in /usr/local/lib/python3.10/dist-packages (from gensim) (1.11.3)
Requirement already satisfied: smart-open>=1.8.1 in /usr/local/lib/python3.10/dist-packages (from gensim) (6.4.0)
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
True
```



```
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
```

```
[16] # Importing data
fake_data = pd.read_csv('/content/Fake.csv')
print("fake_data", fake_data.shape)

true_data = pd.read_csv('/content/True.csv')
print("true_data", true_data.shape)
```

```
fake_data (23481, 4)
true_data (21417, 4)
```

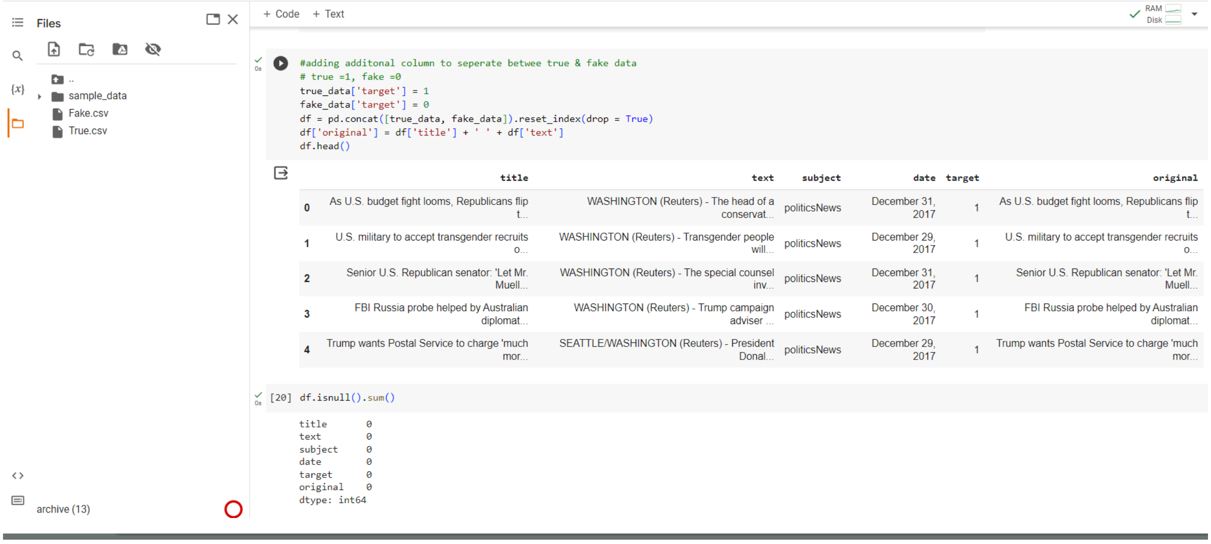


```
fake_data.head(5)
```

	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
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

```
[18] true_data.head(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
4	Trump wants Postal Service to charge 'much mor...	SEATTLE/WASHINGTON (Reuters) - President Donal...	politicsNews	December 29, 2017

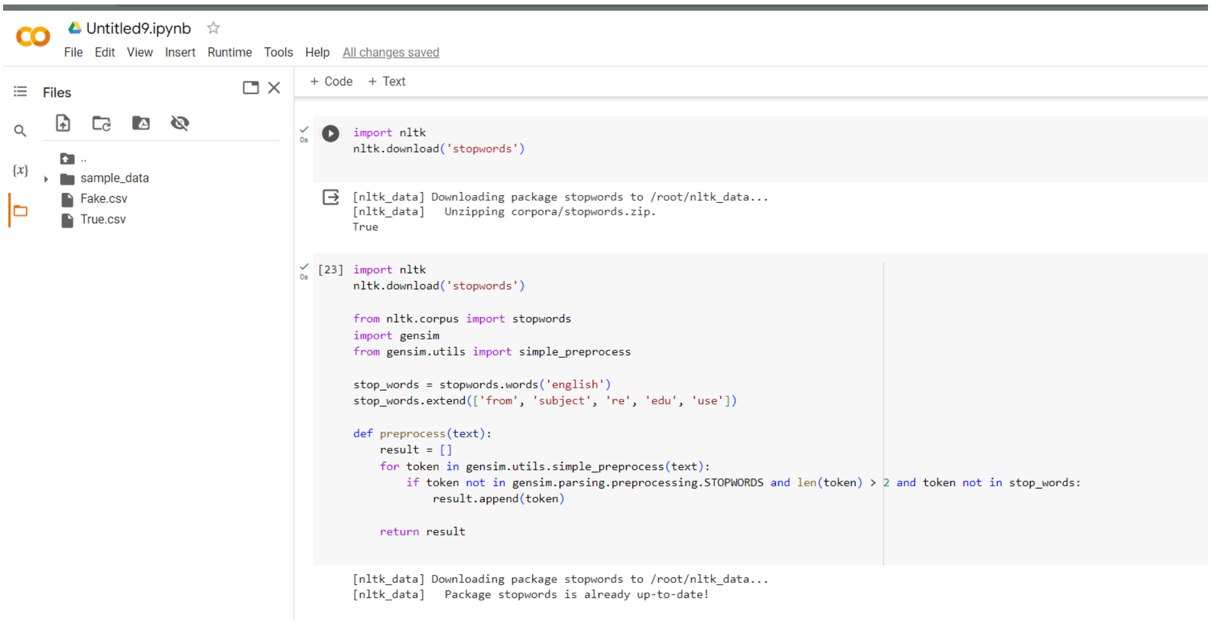


```
#adding additonal column to seperate betwee true & fake data
# true =1, fake =0
true_data['target'] = 1
fake_data['target'] = 0
df = pd.concat([true_data, fake_data]).reset_index(drop = True)
df['original'] = df['title'] + ' ' + df['text']
df.head()
```

	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...
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...

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

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

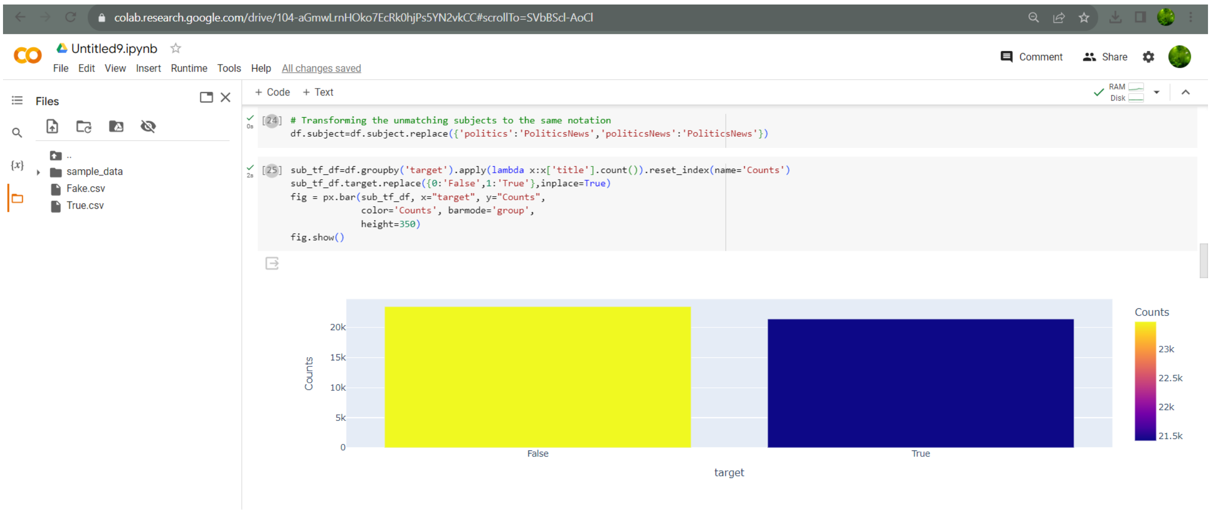


```
import nltk
nltk.download('stopwords')
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
True
```

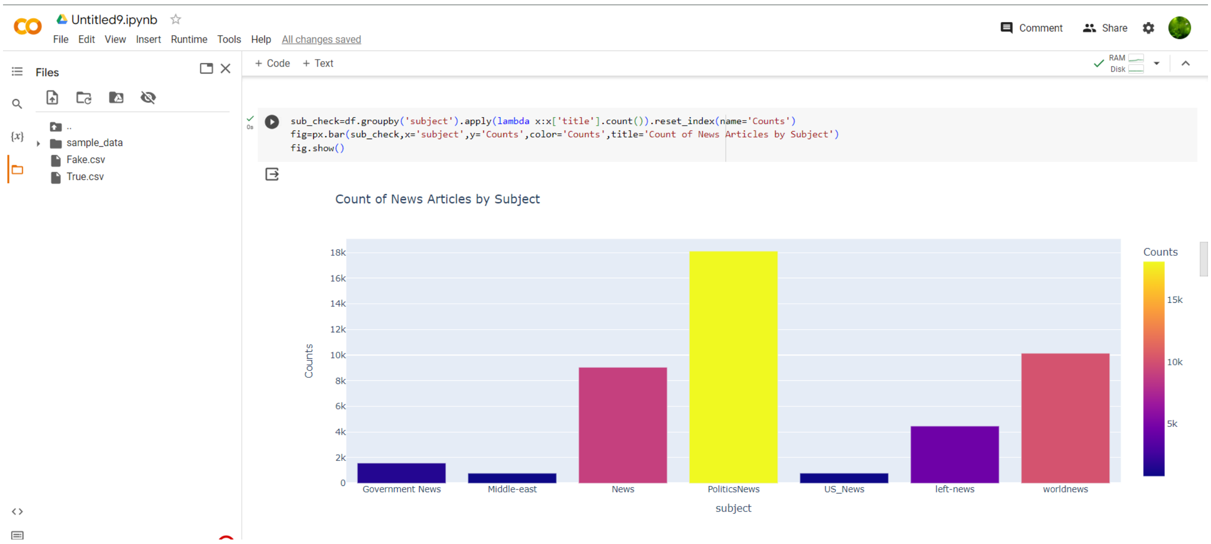
```
[23] import nltk
nltk.download('stopwords')

from nltk.corpus import stopwords
import gensim
from gensim.utils import simple_preprocess

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
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```



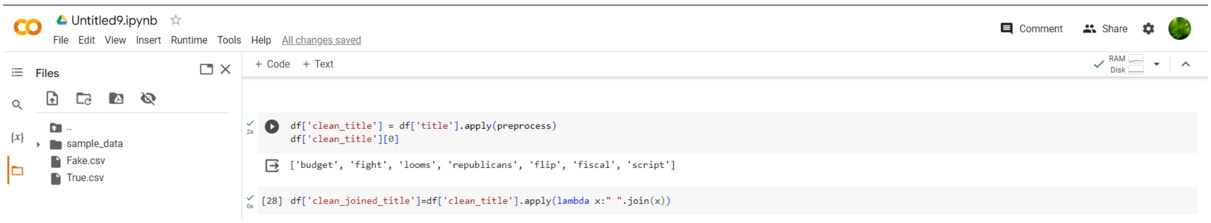
```
[24] # Transforming the unmatching subjects to the same notation
df.subject=df.subject.replace({'politics':'PoliticsNews','politicsNews':'PoliticsNews'})
```

```
[25] 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)
fig.show()
```



```
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')
fig.show()
```

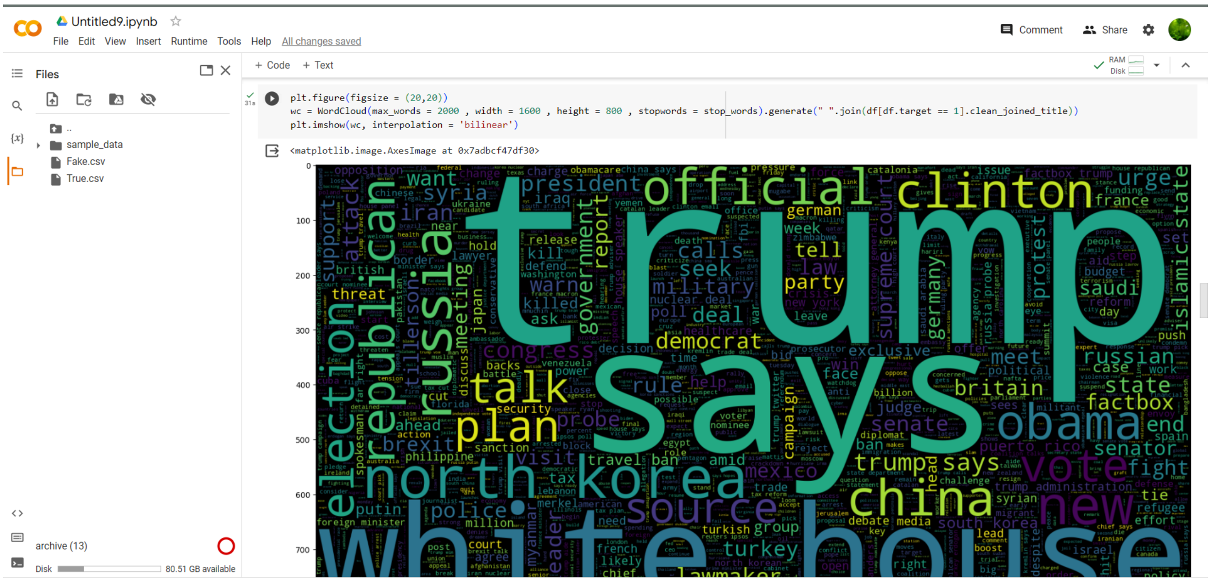
Count of News Articles by Subject



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

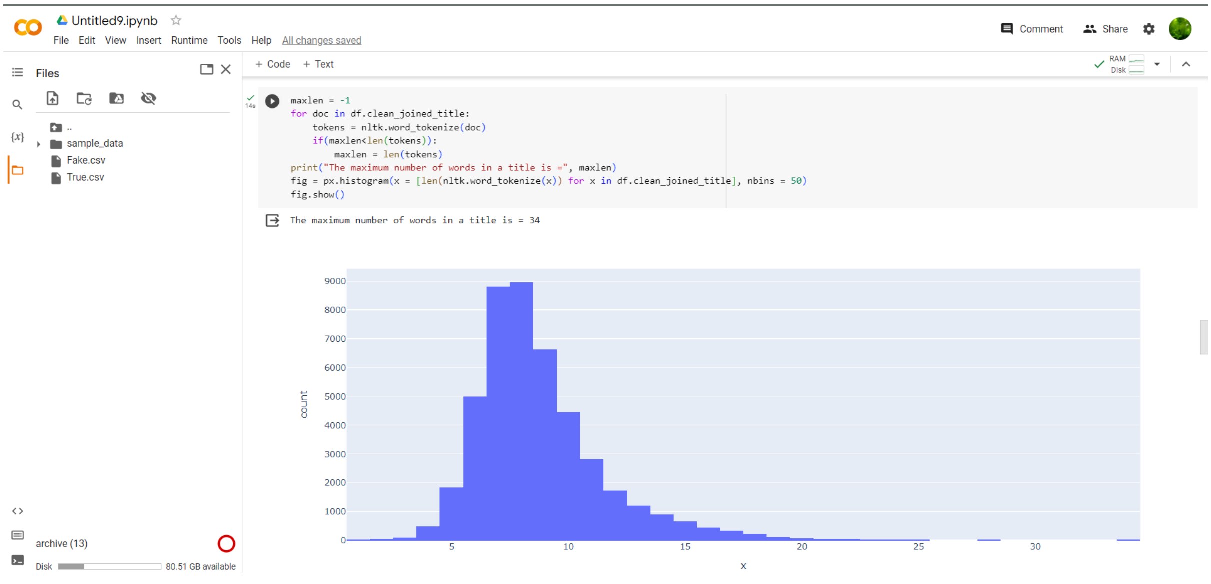
```
['budget', 'fight', 'looms', 'republicans', 'flip', 'fiscal', 'script']
```

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



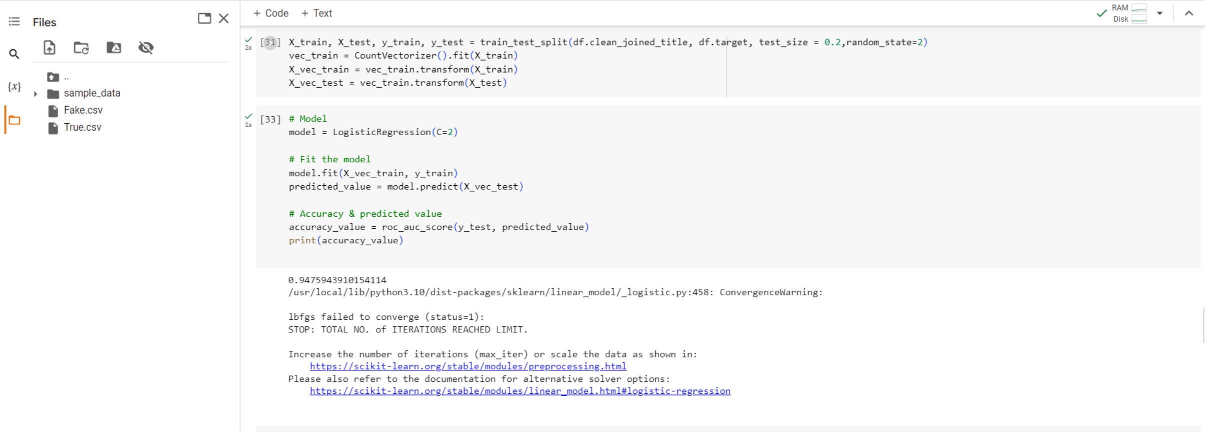
```
plt.figure(figsize = (20,20))
wc = WordCloud(max_words = 2000 , width = 1600 , height = 800 , stopwords = stop_words).generate(" ".join(df[df.target == 1].clean_joined_title))
plt.imshow(wc, interpolation = 'bilinear')
```

```
<matplotlib.image.AxesImage at 0x7adbcf47df30>
```



```
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()
```

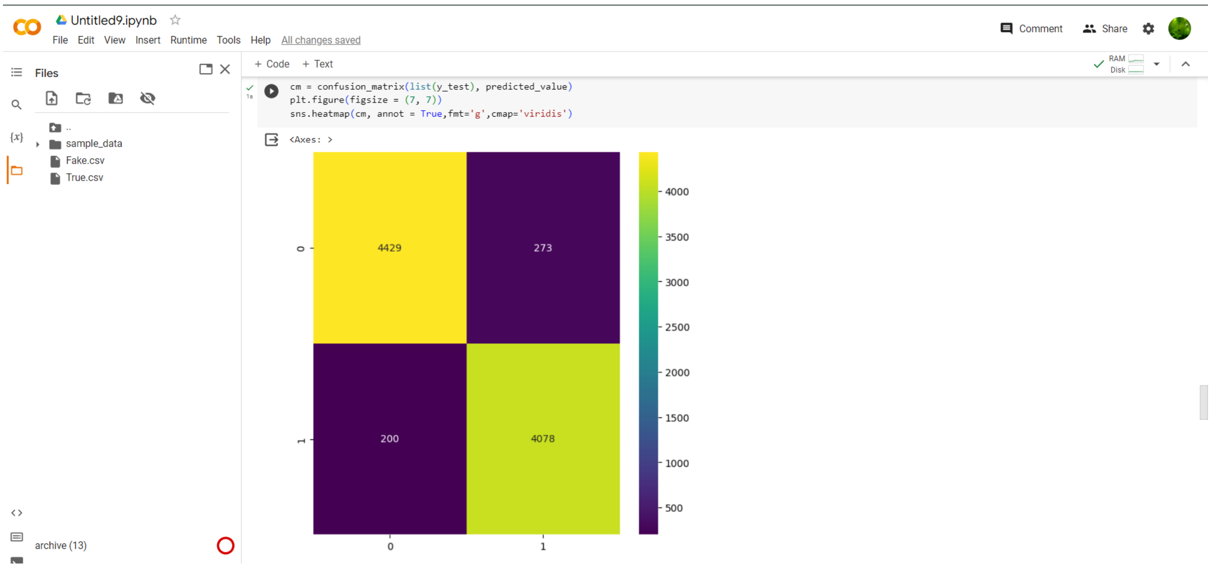
```
The maximum number of words in a title is = 34
```



```
[31] 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)
```

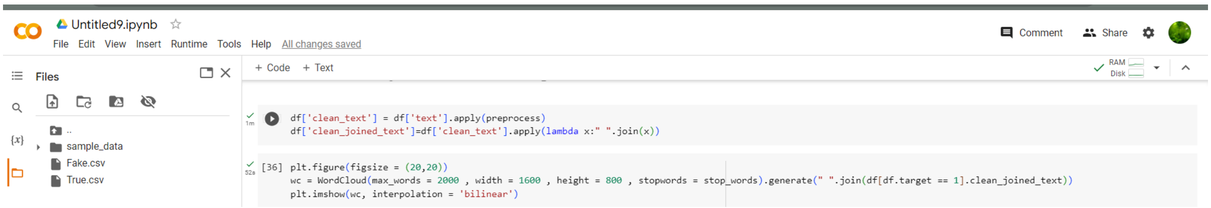
```
[33] # Model
     model = LogisticRegression(C=2)

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

     # Accuracy & predicted value
     accuracy_value = roc_auc_score(y_test, predicted_value)
     print(accuracy_value)
```

```
0.9475943910154114
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:458: ConvergenceWarning:

lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
```



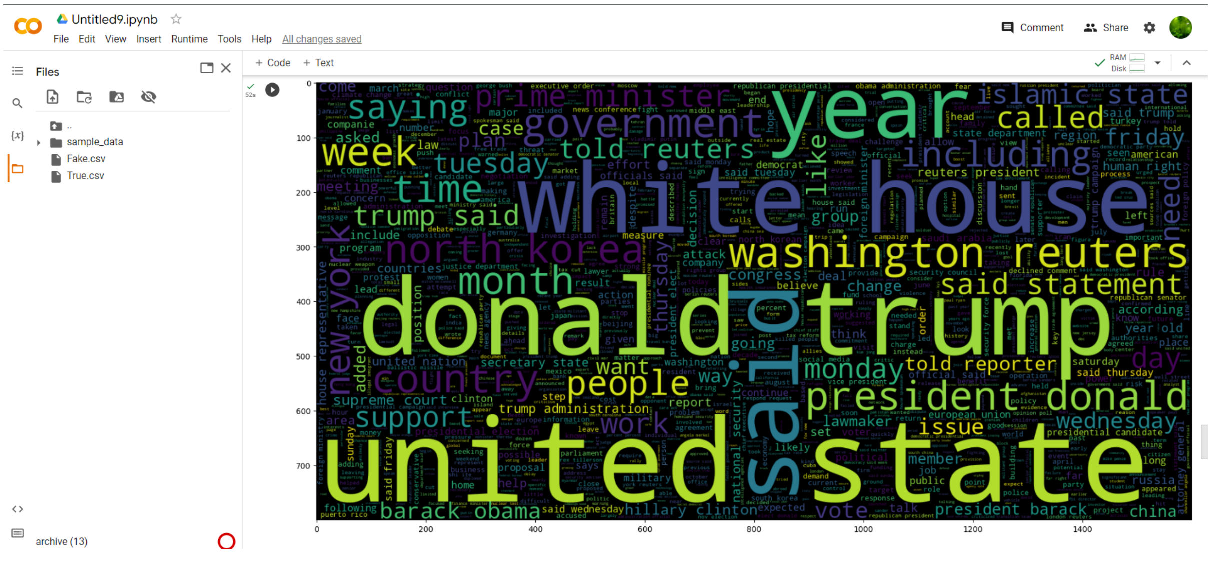
```
cm = confusion_matrix(list(y_test), predicted_value)
plt.figure(figsize = (7, 7))
sns.heatmap(cm, annot = True,fmt='g',cmap='viridis')
```

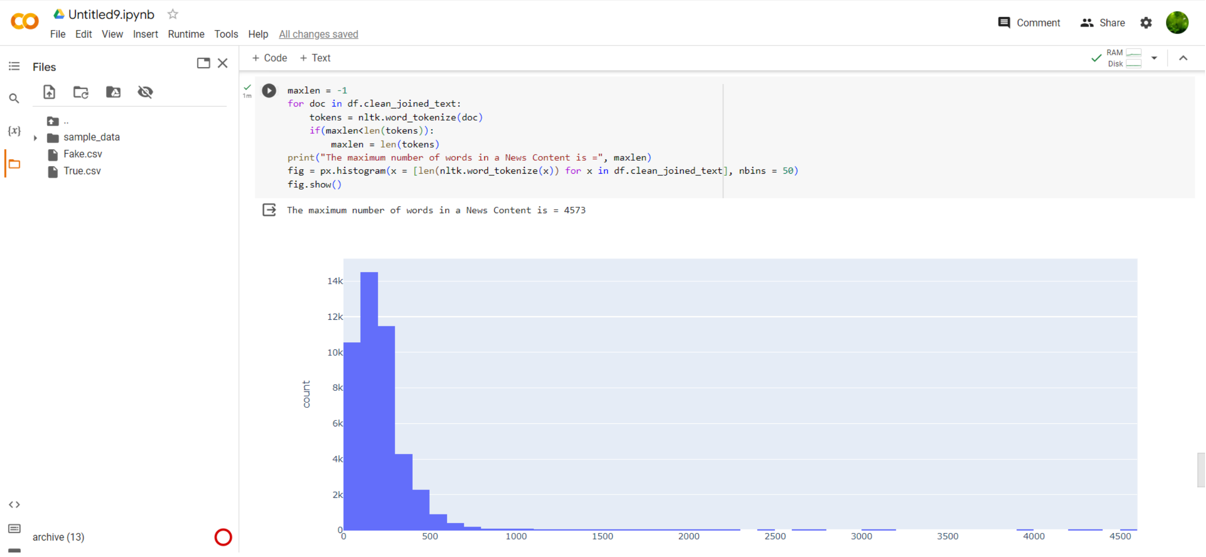
```
<Axes: >
```



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

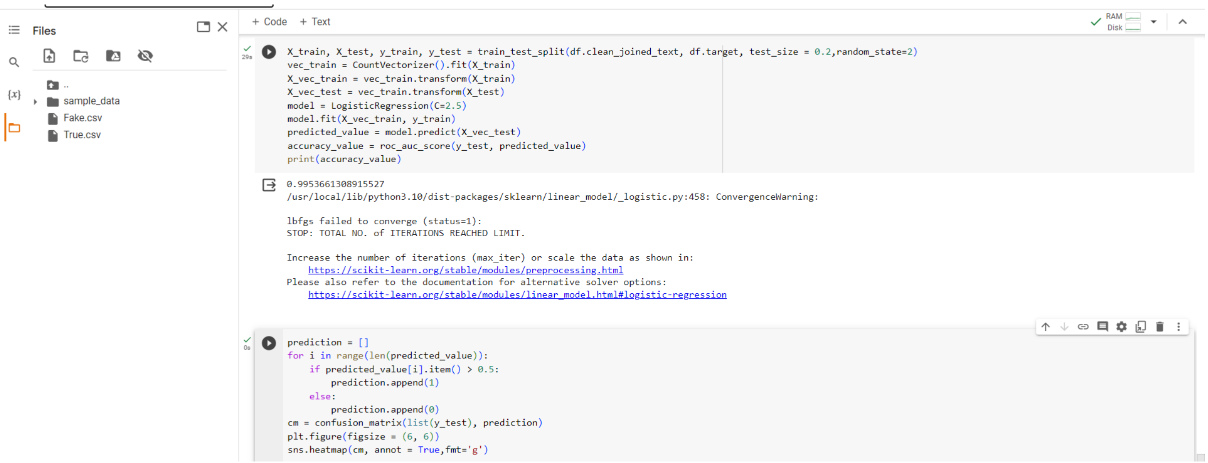
```
[36] plt.figure(figsize = (20,20))
     wc = WordCloud(max_words = 2000 , width = 1600 , height = 800 , stopwords = stop_words).generate(" ".join(df[df.target == 1].clean_joined_text))
     plt.imshow(wc, interpolation = 'bilinear')
```





```
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)
fig.show()
```

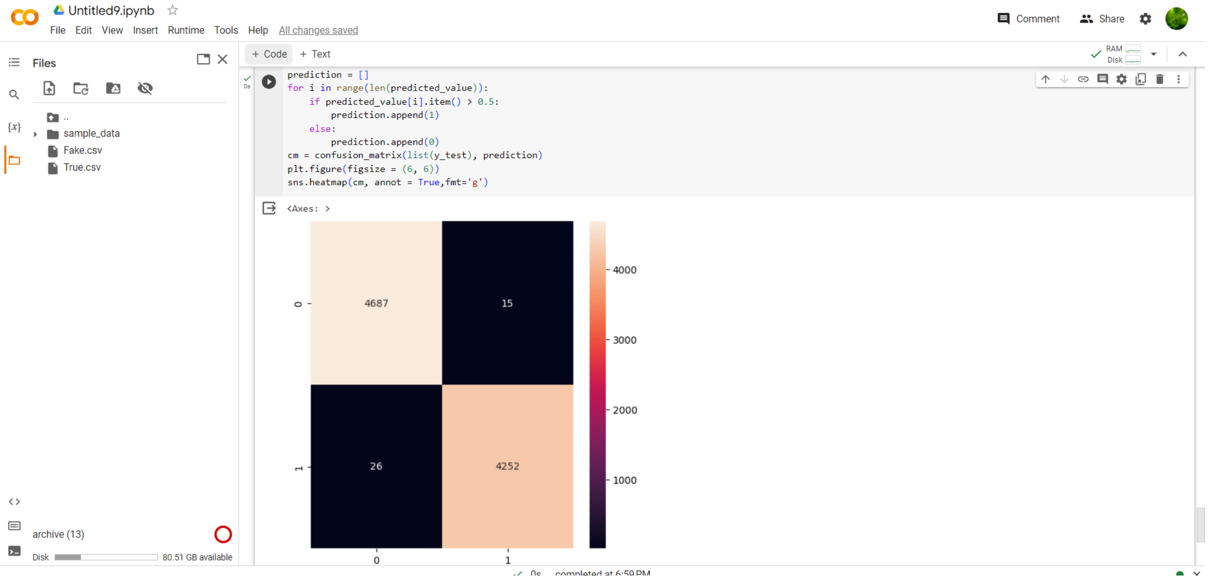
```
The maximum number of words in a News Content is = 4573
```



```
X_train, X_test, y_train, y_test = train_test_split(df.clean_joined_text, 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=2.5)
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)
```

```
0.9953661308915527
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:458: ConvergenceWarning:

lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
```

```
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')
```



```
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: >
```

CONCLUSION:

In this part we build our project by loading and preprocessing the dataset.