BIG DATA ANALYTICS ASSIGNMENT

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Q. Write a program to implement real time sentiment analysis using python. Also explore the steps used in this application.

IMPORTING LIBRARIES

```
import numpy as np
import pandas as pd
```

DEFINING THE COLUMN NAMES, SPECIFYING THE TEXT ENCODING AND LOADING THE DATASET

```
dataset_cols=['target','ids','date','flag','user','text']
dataset_encoding="ISO-8859-1"
df=pd.read_csv('training.1600000.processed.noemoticon.csv',encoding=da
taset_encoding,names=dataset_cols)
df.sample(5)
```

```
         target         ids                              date      flag  \
1418261       4  2057748295  Sat Jun 06 13:35:15 PDT 2009  NO_QUERY
589453        0  2216990707  Wed Jun 17 20:14:32 PDT 2009  NO_QUERY
954465        4  1824843810  Sun May 17 03:11:13 PDT 2009  NO_QUERY
842625        4  1563716802  Sun Apr 19 23:57:34 PDT 2009  NO_QUERY
265442        0  1988802960  Sun May 31 23:25:10 PDT 2009  NO_QUERY

                    user
text
1418261  andygalloway93  Michael McIntyre's Comedy Roadshow on BBC
ONE....
589453          gdodson                                  Gots the
bronchitis
954465       LadyinSilk                      @What_A_Legend Start with
Me
842625         ShhhFood  This morning: a big mug of coffee w/skim milk
...
265442         tami4775  @ColorblindFish sleep well!  i'll be up with
m...
```

```
df.head()
```

```
   target         ids                              date      flag  \
0       0  1467810369  Mon Apr 06 22:19:45 PDT 2009  NO_QUERY
1       0  1467810672  Mon Apr 06 22:19:49 PDT 2009  NO_QUERY
2       0  1467810917  Mon Apr 06 22:19:53 PDT 2009  NO_QUERY
3       0  1467811184  Mon Apr 06 22:19:57 PDT 2009  NO_QUERY
4       0  1467811193  Mon Apr 06 22:19:57 PDT 2009  NO_QUERY
```

```
              user                                                 text
0  _TheSpecialOne_  @switchfoot http://twitpic.com/2y1zl - Awww, t...
1    scotthamilton  is upset that he can't update his Facebook by ...
2         mattycus  @Kenichan I dived many times for the ball. Man...
3          ElleCTF    my whole body feels itchy and like its on fire
4           Karoli  @nationwideclass no, it's not behaving at all....
```

FINDING NUMBER OF ENTRIES

```
print("data length = ",len(df))
```

```
data length =  1600000
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1600000 entries, 0 to 1599999
Data columns (total 6 columns):
 #   Column  Non-Null Count    Dtype 
---  ------  --------------    ----- 
 0   target  1600000 non-null  int64 
 1   ids     1600000 non-null  int64 
 2   date    1600000 non-null  object
 3   flag    1600000 non-null  object
 4   user    1600000 non-null  object
 5   text    1600000 non-null  object
dtypes: int64(2), object(4)
memory usage: 73.2+ MB
```

FINDING SHAPE AS WELL AS COUNT OF MISSING VALUES PER COLUMN

```
df.isna().sum
```

```
<bound method DataFrame.sum of          target    ids   date   flag
user   text
0         False  False  False  False  False  False
1         False  False  False  False  False  False
2         False  False  False  False  False  False
3         False  False  False  False  False  False
4         False  False  False  False  False  False
...         ...    ...    ...    ...    ...    ...
1599995   False  False  False  False  False  False
1599996   False  False  False  False  False  False
1599997   False  False  False  False  False  False
```

```
1599998   False  False  False  False  False  False
1599999   False  False  False  False  False  False

[1600000 rows x 6 columns]>
```

```
df['target'].value_counts
```

```
<bound method IndexOpsMixin.value_counts of 0          0
1          0
2          0
3          0
4          0
          ..
1599995    4
1599996    4
1599997    4
1599998    4
1599999    4
Name: target, Length: 1600000, dtype: int64>
```

PLOTTING POSITIVE VS NEGATIVE SENTIMENT

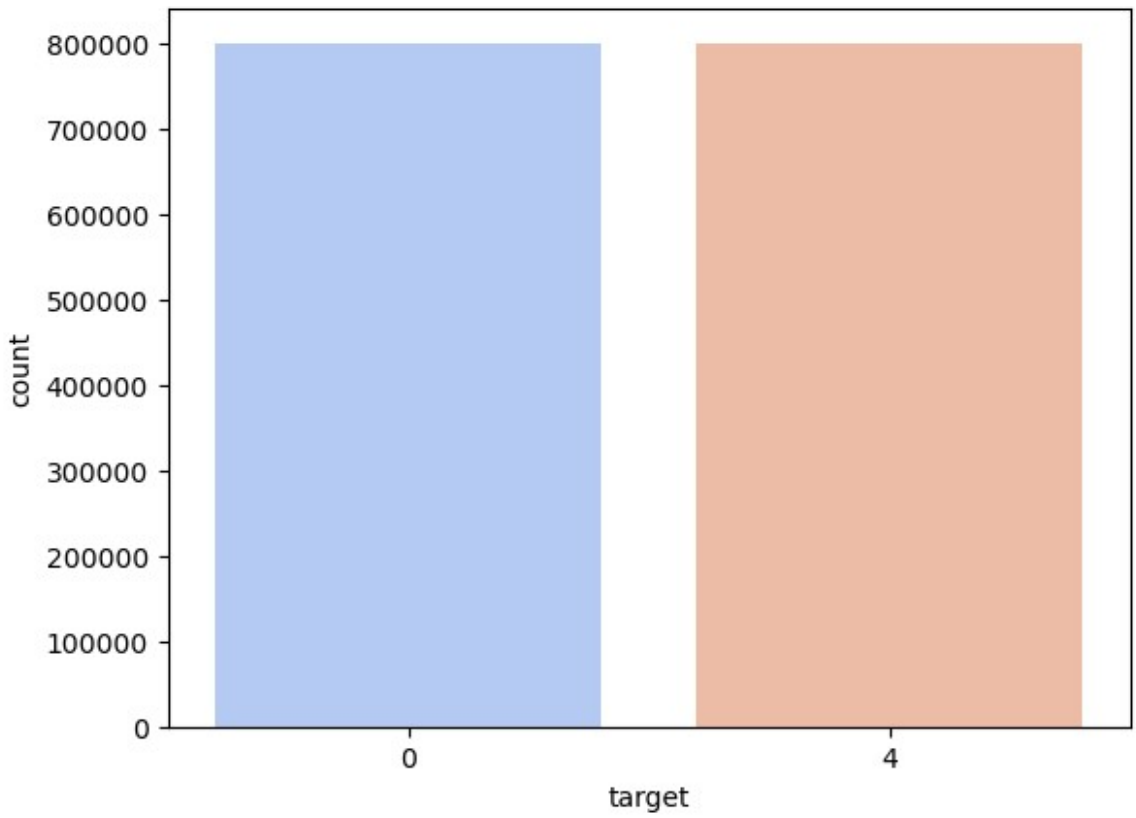
```
import seaborn as sns
sns.countplot(data=df,x='target', palette='coolwarm')
```

```
C:\Users\Kriti Rastogi\AppData\Local\Temp\
ipykernel_17984\493194497.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be
removed in v0.14.0. Assign the `x` variable to `hue` and set
`legend=False` for the same effect.

  sns.countplot(data=df,x='target', palette='coolwarm')
```

```
<Axes: xlabel='target', ylabel='count'>
```



PRE PROCESSING OF THE DATA

```
data=df[['text','target']]
data.head()
```

	text	target
0	@switchfoot http://twitpic.com/2y1zl - Awww, t...	0
1	is upset that he can't update his Facebook by ...	0
2	@Kenichan I dived many times for the ball. Man...	0
3	my whole body feels itchy and like its on fire	0
4	@nationwideclass no, it's not behaving at all....	0

STANDARDISING THE SENTIMENT LABELS

```
data['target']=data['target'].replace(4,1)
data['target'].value_counts()
```

```
C:\Users\Kriti Rastogi\AppData\Local\Temp\
ipykernel_17984\389418106.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
```

```
returning-a-view-versus-a-copy
  data['target']=data['target'].replace(4,1)

target
0    800000
1    800000
Name: count, dtype: int64
```

PREPARING A BALANCED, SMALLER DATASET & COMBINING BOTH POSOTIVE AND NEGATIVE SUBSETS INTO SINGLE DATAFRAME

```
data_pos=data[data['target']==1]
data_neg=data[data['target']==0]
data_pos=data_pos.iloc[:int(20000)]
data_neg=data_neg.iloc[:int(20000)]
dataset=pd.concat([data_pos,data_neg])
dataset.shape

(40000, 2)

dataset.head()

                                                     text  target
800000       I LOVE @Health4UandPets u guys r the best!!         1
800001  im meeting up with one of my besties tonight! ...       1
800002  @DaRealSunisaKim Thanks for the Twitter add, S...       1
800003  Being sick can be really cheap when it hurts t...       1
800004    @LovesBrooklyn2 he has that effect on everyone        1
```

CONVERTING SENTIMENTS TO LOWER CASE

```
dataset['text']=dataset['text'].str.lower()
dataset.head()

                                                     text  target
800000       i love @health4uandpets u guys r the best!!         1
800001  im meeting up with one of my besties tonight! ...       1
800002  @darealsunisakim thanks for the twitter add, s...       1
800003  being sick can be really cheap when it hurts t...       1
800004    @lovesbrooklyn2 he has that effect on everyone        1
```

LIST OF STOPWORDS WHICH DON'T CARRY MUCH MEANING FOR SENTIMENT ANALYSIS

```
stopwordlist = ['a', 'about', 'above', 'after', 'again', 'ain', 'all',
'am', 'an',
             'and','any','are', 'as', 'at', 'be', 'because', 'been',
'before',
             'being', 'below', 'between','both', 'by', 'can', 'd',
'did', 'do',
```

```
            'does', 'doing', 'down', 'during', 'each','few', 'for',
'from',
            'further', 'had', 'has', 'have', 'having', 'he', 'her',
'here',
            'hers', 'herself', 'him', 'himself', 'his', 'how', 'i',
'if', 'in',
            'into','is', 'it', 'its', 'itself', 'just', 'll', 'm',
'ma',
            'me', 'more', 'most','my', 'myself', 'now', 'o', 'of',
'on', 'once',
            'only', 'or', 'other', 'our', 'ours','ourselves', 'out',
'own', 're','s', 'same', 'she', "shes", 'should', "shouldve",'so',
'some', 'such',
            't', 'than', 'that', "thatll", 'the', 'their', 'theirs',
'them',
            'themselves', 'then', 'there', 'these', 'they', 'this',
'those',
            'through', 'to', 'too','under', 'until', 'up', 've',
'very', 'was',
            'we', 'were', 'what', 'when', 'where','which','while',
'who', 'whom',
            'why', 'will', 'with', 'won', 'y', 'you', "youd","youll",
"youre",
            "youve", 'your', 'yours', 'yourself', 'yourselves']
```

REMOVING STOPWORDS FROM ALL TWEETS

```
stopwords=set(stopwordlist)
def cleaning_stopwords(text):
    return " ".join([word for word in str(text).split() if word not in
stopwords])
dataset['text']=dataset['text'].apply(lambda
text:cleaning_stopwords(text))
dataset['text'].head()
```

```
800000                love @health4uandpets u guys r best!!
800001    im meeting one besties tonight! cant wait!! - ...
800002    @darealsunisakim thanks twitter add, sunisa! g...
800003    sick really cheap hurts much eat real food plu...
800004                      @lovesbrooklyn2 effect everyone
Name: text, dtype: object
```

REMOVING PUNCTUATION AND CREATING A TRANSLATION TABLE MAPPING PUNCTUATION MARK TO 'NOTHING'

```
import string
english_punctuations=string.punctuation
punctuations_list=english_punctuations
def cleaning_punctuations(text):
```

```
    translator = str.maketrans('', '', punctuations_list)
    return text.translate(translator)
dataset['text']= dataset['text'].apply(lambda x:
cleaning_punctuations(x))
dataset['text'].tail()
```

```
19995    not much time off weekend work trip malmï¿½ fr...
19996                                      one day holidays
19997                    feeling right  hate damn humprey
19998    geezi hv read whole book personality types emb...
19999    threw sign donnie bent over get but thingee ma...
Name: text, dtype: object
```

CLEANING OF REPEATED CHARACTERS IN THE TWEETS

```
import re
def cleaning_repeating_char(text):
    return re.sub(r'(.)1+', r'1', text)
dataset['text'] = dataset['text'].apply(lambda x:
cleaning_repeating_char(x))
dataset['text'].tail()
```

```
19995    not much time off weekend work trip malmï¿½ fr...
19996                                      one day holidays
19997                    feeling right  hate damn humprey
19998    geezi hv read whole book personality types emb...
19999    threw sign donnie bent over get but thingee ma...
Name: text, dtype: object
```

CLEANING THE URLs FROM THE TWEETS

```
def cleaning_URLs(data):
    return re.sub('((www.[^s]+)|(https?://[^\s]+))',' ',data)
dataset['text'] = dataset['text'].apply(lambda x: cleaning_URLs(x))
dataset['text'].tail()
```

```
<>:2: SyntaxWarning: invalid escape sequence '\s'
<>:2: SyntaxWarning: invalid escape sequence '\s'
C:\Users\Kriti Rastogi\AppData\Local\Temp\
ipykernel_17984\2667794635.py:2: SyntaxWarning: invalid escape
sequence '\s'
  return re.sub('((www.[^s]+)|(https?://[^\s]+))',' ',data)
```

```
19995    not much time off weekend work trip malmï¿½ fr...
19996                                      one day holidays
19997                    feeling right  hate damn humprey
19998    geezi hv read whole book personality types emb...
19999    threw sign donnie bent over get but thingee ma...
Name: text, dtype: object
```

```
def cleaning_numbers(data):
    return re.sub('[0-9]+', '', data)
dataset['text'] = dataset['text'].apply(lambda x: cleaning_numbers(x))
dataset['text'].tail()
```

```
19995    not much time off weekend work trip malmï¿½ fr...
19996                                    one day holidays
19997                      feeling right  hate damn humprey
19998    geezi hv read whole book personality types emb...
19999    threw sign donnie bent over get but thingee ma...
Name: text, dtype: object
```

CONVERTING EACH TWEET TO A TOKEN OF WORDS

```
from nltk.tokenize import RegexpTokenizer
tokenizer = RegexpTokenizer('\s+', gaps = True)
dataset['text'] = dataset['text'].apply(tokenizer.tokenize)
```

```
<>:2: SyntaxWarning: invalid escape sequence '\s'
<>:2: SyntaxWarning: invalid escape sequence '\s'
C:\Users\Kriti Rastogi\AppData\Local\Temp\
ipykernel_17984\262700751.py:2: SyntaxWarning: invalid escape sequence
'\s'
  tokenizer = RegexpTokenizer('\s+', gaps = True)
```

```
dataset['text'].tail()
```

```
19995    [not, much, time, off, weekend, work, trip, ma...
19996                                 [one, day, holidays]
19997                [feeling, right, hate, damn, humprey]
19998    [geezi, hv, read, whole, book, personality, ty...
19999    [threw, sign, donnie, bent, over, get, but, th...
Name: text, dtype: object
```

```
dataset['text'].head()
```

```
800000             [love, healthuandpets, u, guys, r, best]
800001    [im, meeting, one, besties, tonight, cant, wai...
800002    [darealsunisakim, thanks, twitter, add, sunisa...
800003    [sick, really, cheap, hurts, much, eat, real, ...
800004                    [lovesbrooklyn, effect, everyone]
Name: text, dtype: object
```

REDUCING WORDS TO ROOT FORM AND STEMMING THEM INDIVIDUALLY

```
import nltk
st = nltk.PorterStemmer()
def stemming_on_text(data):
    text = [st.stem(word) for word in data]
    return text
```

```
dataset['text']= dataset['text'].apply(lambda x: stemming_on_text(x))
dataset['text'].head()
```

```
800000               [love, healthuandpet, u, guy, r, best]
800001    [im, meet, one, besti, tonight, cant, wait, gi...
800002    [darealsunisakim, thank, twitter, add, sunisa,...
800003    [sick, realli, cheap, hurt, much, eat, real, f...
800004                      [lovesbrooklyn, effect, everyon]
Name: text, dtype: object
```

LEMMATIZATION OF THE WORDS

```
lm = nltk.WordNetLemmatizer()
def lemmatizer_on_text(data):
    text = [lm.lemmatize(word) for word in data]
    return text
dataset['text'] = dataset['text'].apply(lambda x:
lemmatizer_on_text(x))
dataset['text'].head()
```

```
800000               [love, healthuandpet, u, guy, r, best]
800001    [im, meet, one, besti, tonight, cant, wait, gi...
800002    [darealsunisakim, thank, twitter, add, sunisa,...
800003    [sick, realli, cheap, hurt, much, eat, real, f...
800004                      [lovesbrooklyn, effect, everyon]
Name: text, dtype: object
```

```
dataset.head()
```

	text	target
800000	[love, healthuandpet, u, guy, r, best]	1
800001	[im, meet, one, besti, tonight, cant, wait, gi...	1
800002	[darealsunisakim, thank, twitter, add, sunisa,...	1
800003	[sick, realli, cheap, hurt, much, eat, real, f...	1
800004	[lovesbrooklyn, effect, everyon]	1

DISPLAYING THE TEXT DATA FOR ROWS HAVING TARGET=0

```
dataset[dataset['target']==0]['text']
```

```
0        [switchfoot, httptwitpiccomzl, a, s, bummer, s...
1        [upset, cant, updat, facebook, text, it, might...
2        [kenichan, dive, mani, time, ball, manag, save...
3                  [whole, bodi, feel, itchi, like, fire]
4        [nationwideclass, no, it, not, behav, all, im,...
                               ...
19995    [not, much, time, off, weekend, work, trip, ma...
19996                                  [one, day, holiday]
19997                    [feel, right, hate, damn, humprey]
19998    [geezi, hv, read, whole, book, person, type, e...
```

```
19999    [threw, sign, donni, bent, over, get, but, thi...
Name: text, Length: 20000, dtype: object
```

```
import matplotlib.pyplot as plt

import sys
print(sys.executable)
```

```
c:\ProgramData\anaconda3\python.exe
```

GENERATING A WORD CLOUD SHOWING MOST FREQUENT WORDS FOR THE NEGATIVE TWEETS

BIGGER WORDS=MORE OFTENLY APPEARED

```
from wordcloud import WordCloud
data_neg = dataset[dataset['target']==0]['text'].apply(lambda x: '
'.join(x) )
plt.figure(figsize = (20,20))
wc = WordCloud(max_words = 1000 , width = 1600 , height = 800,
               collocations=False).generate(" ".join(data_neg))
plt.imshow(wc)
plt.axis('off')
```

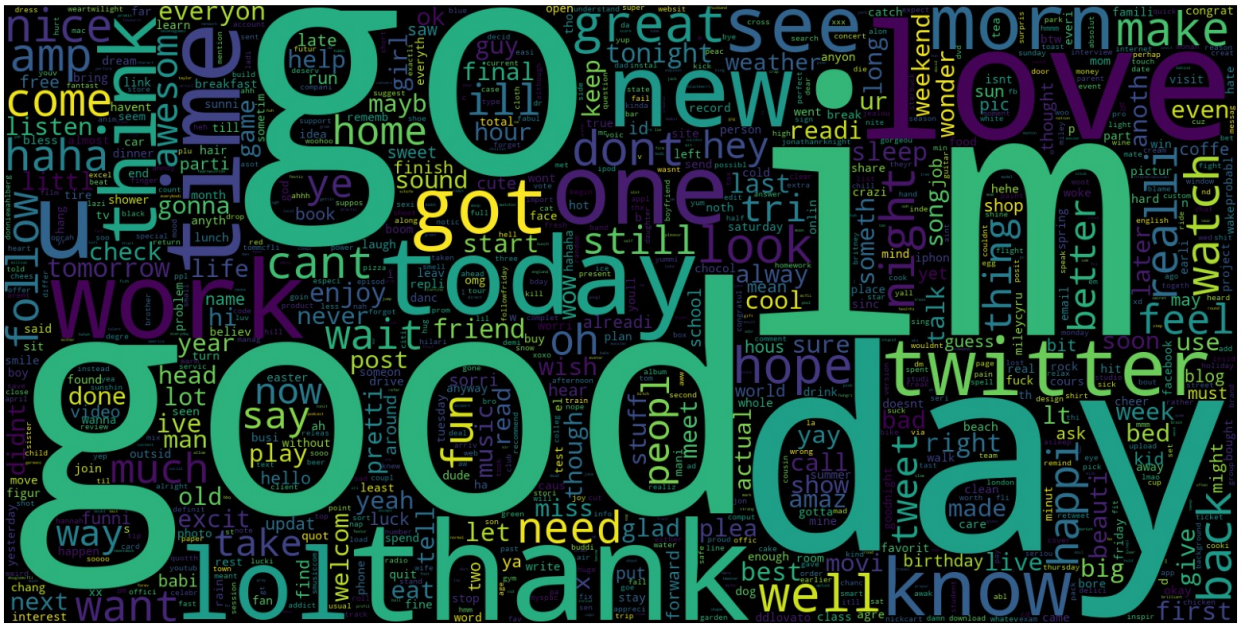
```
(-0.5, 1599.5, 799.5, -0.5)
```

WORD CLOUD FOR POSITIVE WORDS

```
data_neg = dataset[dataset['target']==1]['text'].apply(lambda x: '
'.join(x) )
plt.figure(figsize = (20,20))
```

```
wc = WordCloud(max_words = 1000 , width = 1600 , height = 800,
               collocations=False).generate(" ".join(data_neg))
plt.imshow(wc)
plt.axis('off')
```

```
(-0.5, 1599.5, 799.5, -0.5)
```




```
new_data=dataset
new_data['text'] = dataset['text'].apply(lambda x: ' '.join(x) )
new_data.head()
```

	text	target
800000	love healthuandpet u guy r best	1
800001	im meet one besti tonight cant wait girl talk	1
800002	darealsunisakim thank twitter add sunisa got m...	1
800003	sick realli cheap hurt much eat real food plu ...	1
800004	lovesbrooklyn effect everyon	1

```
X=new_data.text
y=new_data.target
```

SPLITTING INTO TRAINING AND TESTING DATA

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size =
0.10,random_state =0)
print(X.shape)
print(X_train.shape)
print(X_test.shape)
```

```
(40000,)
(36000,)
(4000,)
```

PREPARING DATA USING TF-IDF (Term Frequency–Inverse Document Frequency)

```
from sklearn.feature_extraction.text import TfidfVectorizer
vectoriser = TfidfVectorizer(ngram_range=(1,2), max_features=5000)
vectoriser.fit(X_train)
print('No. of feature_words: ',
len(vectoriser.get_feature_names_out()))
```

```
No. of feature_words:  5000
```

```
X_train = vectoriser.transform(X_train)
X_test  = vectoriser.transform(X_test)
print(X_train.shape)
print(X_test.shape)
```

```
(36000, 5000)
(4000, 5000)
```

USING SVM CLASSIFICATION

```
from sklearn.svm import SVC

clf=SVC()

clf.fit(X_train,y_train)
y_pred=clf.predict(X_test)
```

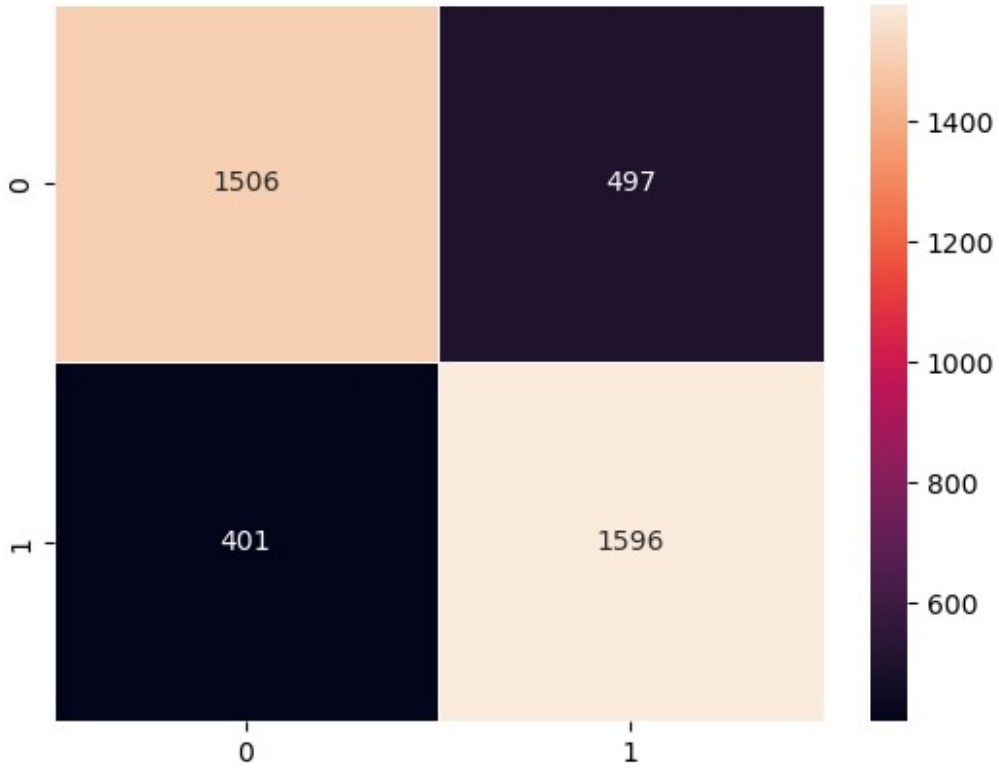
PREPARING THE CONFUSION MATRIX AND ACCURACY SCORE

```
from sklearn.metrics import accuracy_score,confusion_matrix
test_acc=accuracy_score(y_test,y_pred)
print(test_acc)
cfm=confusion_matrix(y_test,y_pred)
print(cfm)
```

```
0.7755
[[1506  497]
 [ 401 1596]]
```

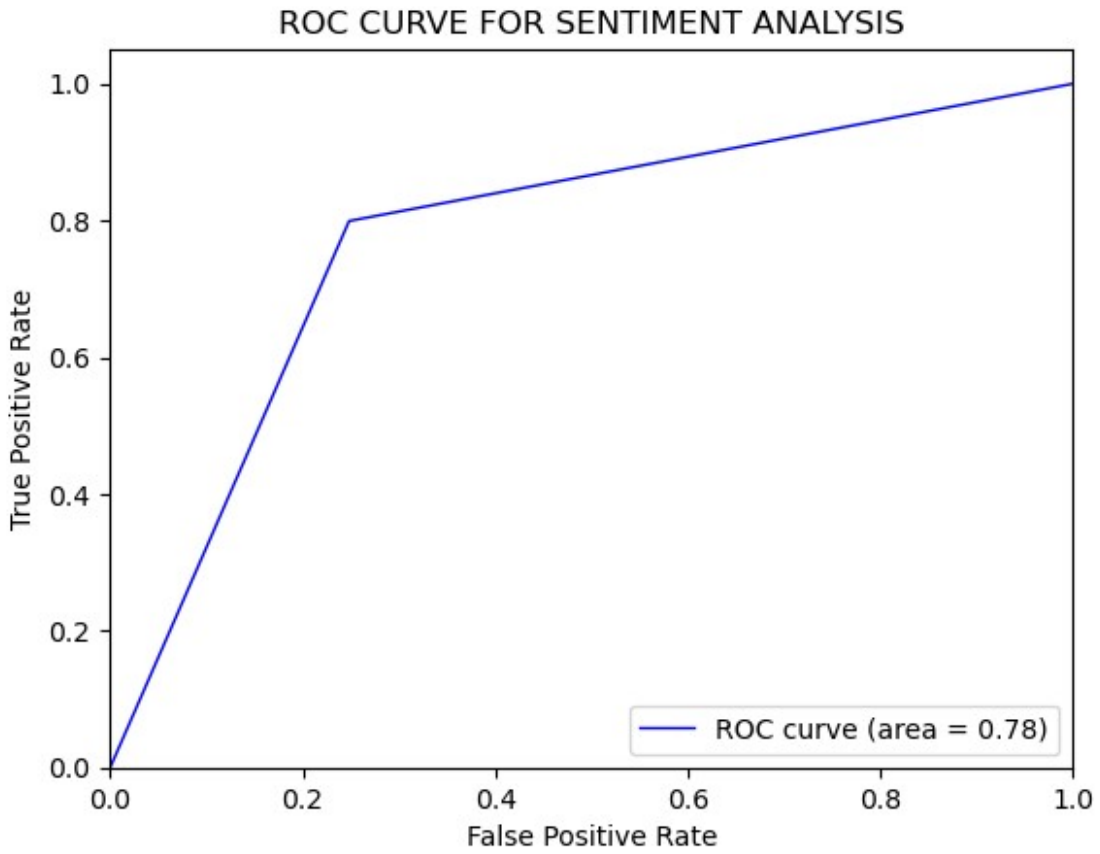
```
import seaborn as sns
sns.heatmap(cfm,annot=True,fmt='',linewidths=0.5)
```

```
<Axes: >
```



GETTING THE ROC CURVE FOR THE ANALYSED SENTIMENTS

```
from sklearn.metrics import roc_curve, auc
fpr, tpr, thresholds = roc_curve(y_test, y_pred)
roc_auc = auc(fpr, tpr)
plt.figure()
plt.plot(fpr, tpr, color='blue', lw=1, label='ROC curve (area =
%0.2f)' % roc_auc)
plt.xlim([0.0, 1.0])
plt.ylim([0.0, 1.05])
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive Rate')
plt.title('ROC CURVE FOR SENTIMENT ANALYSIS')
plt.legend(loc="lower right")
plt.show()
```



The model has a fairly good performance — it can correctly distinguish between positive and negative tweets about 77% of the time on average.

----- END OF CODE -----