Hello Folks Myself Nirbhay Tiwari (Data Scientist) Lets Begin Our Amazon Review Project (Date: 11/17/2023)

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# Steps we will be following
# Importing Libraries and Datasets
# Preprocessing and cleaning the reviews
# Analysis of the Dataset
# Converting text into Vectors
# Model training, Evaluation, and Prediction

# Lets import all neccesary libraries we will use for this project

# we are using this library for getting ride of any unwanted warnings
during the process
import warnings
warnings.filterwarnings('ignore')
import pandas as pd
from sklearn.feature_extraction.text import TfidfVectorizer
import matplotlib.pyplot as plt
from wordcloud import WordCloud

# For NLP task we need various NLP toolkits and libraries lets
download it all

import nltk
nltk.download('punkt')
nltk.download('stopwords')
from nltk.corpus import stopwords
```

```
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\Nimbus\AppData\Roaming\nltk_data...
[nltk_data]   Package punkt is already up-to-date!
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\Nimbus\AppData\Roaming\nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```

```
data = pd.read_csv('AmazonReview.csv')
data.head(10)
```

```
                                              Review  Sentiment
0  Fast shipping but this product is very cheaply...          1
1  This case takes so long to ship and it's not e...          1
2  Good for not droids. Not good for iPhones. You...          1
3  The cable was not compatible between my macboo...          1
4  The case is nice but did not have a glow light...          1
5  The cable keeps coming up with message that th...          1
6  This pos broke off in my phone after 3 uses an...          1
7  This product suck its hard 2 hear wat other ar...          1
8  Music cuts off within 30 secs. I like Aukey's ...          1
9  Yeah when they say mirror screen they mean it ...          1
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25000 entries, 0 to 24999
Data columns (total 2 columns):
 #   Column     Non-Null Count  Dtype 
---  ------     --------------  ----- 
 0   Review     24999 non-null  object
 1   Sentiment  25000 non-null  int64 
dtypes: int64(1), object(1)
memory usage: 390.8+ KB
```

```
data.dropna(inplace=True)

# sentiment column containing less than 3 value will be considered 0
and value rated above 3 will be considered 1
#1,2,3->negative(i.e 0)
data.loc[data['Sentiment']<=3,'Sentiment'] = 0

#4,5->positive(i.e 1)
data.loc[data['Sentiment']>3,'Sentiment'] = 1

# Now we will clean the review column by removing the stopwords
# this function will iterate over words in review and
stp_words=stopwords.words('english')
def clean_review(review):
    cleanreview=" ".join(word for word in review.
                split() if word not in stp_words)
    return cleanreview

data['Review']=data['Review'].apply(clean_review)

# Lets have a look at improved dataset after cleaning
data.head()
```

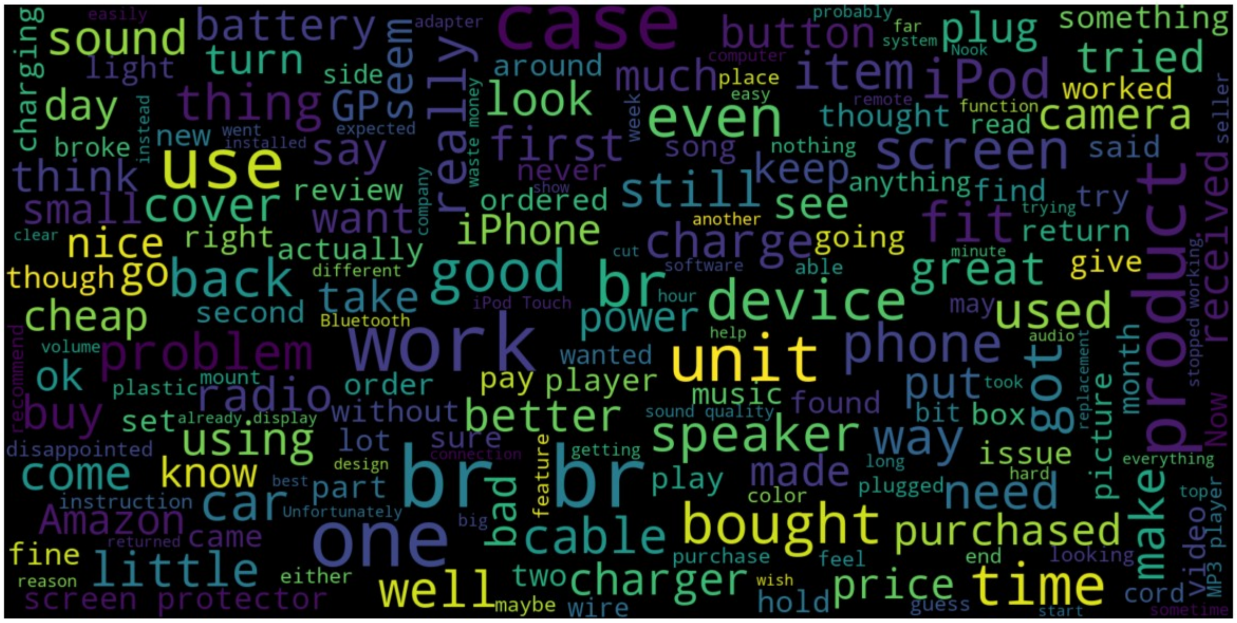
```
                                              Review  Sentiment
0  Fast shipping product cheaply made I brought g...          0
1  This case takes long ship even worth DONT BUY!!!!          0
2  Good droids. Not good iPhones. You cannot use ...          0
3  The cable compatible macbook iphone. Also conn...          0
4  The case nice glow light. I'm disappointed pro...          0
```

```
data['Sentiment'].value_counts()
```

```
0    15000
1     9999
Name: Sentiment, dtype: int64
```

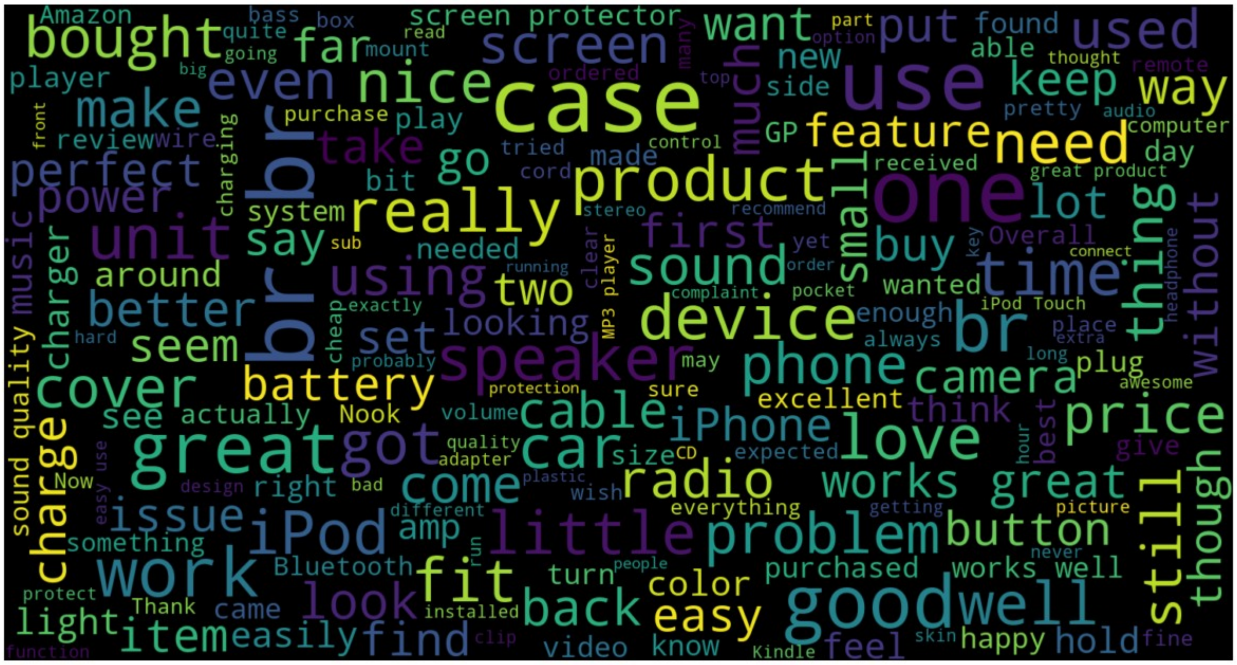
```
# In order to have the better picture of the importance of the words
# let’s create the Wordcloud of all the words with sentiment = 0 i.e.
negative
```

```
consolidated=' '.join(word for word in data['Review']
[data['Sentiment']==0].astype(str))
wordCloud=WordCloud(width=1600,height=800,random_state=21,max_font_siz
e=110)
plt.figure(figsize=(15,10))
plt.imshow(wordCloud.generate(consolidated),interpolation='bilinear')
plt.axis('off')
plt.show()
```



```
# Now we will create Wordcloud for the words with sentiment = 1 i.e.
positive

consolidated = ' '.join(word for word in data['Review']
[data['Sentiment']==1].astype(str))
wordCloud = WordCloud(width = 1500, height = 800, random_state = 20,
max_font_size=110)
plt.figure(figsize=(15,10))
plt.imshow(wordCloud.generate(consolidated), interpolation =
'bilinear')
plt.axis('off')
plt.show()
```



```
# TF-IDF calculates that how relevant a word in a series or corpus is
to a text.
# The meaning increases proportionally to the number of times in the
text a word appears but is compensated by the word frequency in the
corpus (data-set).
# We will be implementing this with the code below.

cv = TfidfVectorizer(max_features=2500)
X = cv.fit_transform(data['Review'] ).toarray()

X.shape

(24999, 2500)

# Model training, Evaluation, and Prediction
# Once analysis and vectorization is done. We can now explore any
machine learning model to train the data.

from sklearn.model_selection import train_test_split
x_train ,x_test,y_train,y_test=train_test_split(X,data['Sentiment'],
                                                test_size=0.25 ,
                                                random_state=42)

from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score

# Lets create instance for linear regression
model=LogisticRegression()

#Model fitting
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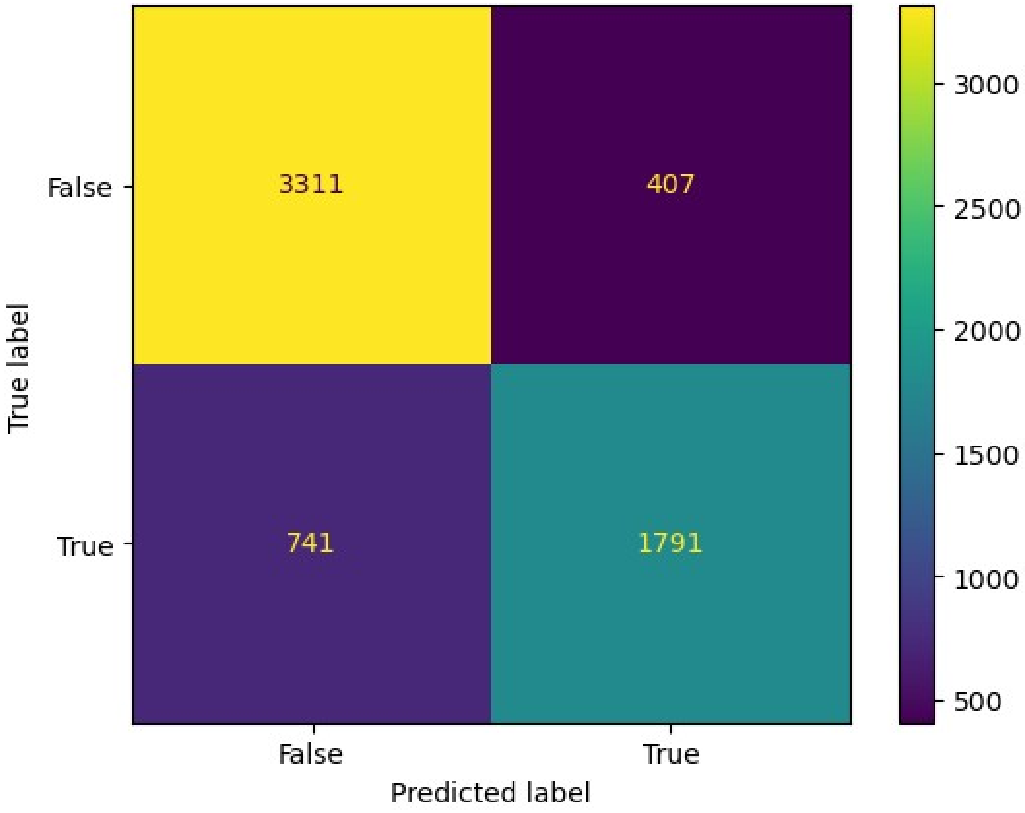
```
model.fit(x_train,y_train)

#testing the model
pred=model.predict(x_test)

#model accuracy
print(accuracy_score(y_test,pred)*100)


81.632

# Lets plot the confusion matrix now

from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test,pred)

cm_display = metrics.ConfusionMatrixDisplay(confusion_matrix = cm,
                                            display_labels = [False,
True])

cm_display.plot()
plt.show()
```


False
True
True label
False
True
Predicted label