tweets-sentimental

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2 Submitted To

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[ ]:
```
import numpy as np
import pandas as pd

import matplotlib.pyplot as plt
import seaborn as sns

import warnings
```

[26]:
```
train = pd.read_csv('/kaggle/input/tweets-dataset/train_tweet.csv')
test = pd.read_csv('/kaggle/input/tweets-dataset/test_tweets.csv')

print(train.shape)
print(test.shape)
```

```
(31962, 3)
(17197, 2)
```

[27]:
```
train.head()
```

[27]:
```
   id  label                                              tweet
0   1      0   @user when a father is dysfunctional and is s…
1   2      0  @user @user thanks for #lyft credit i can't us…
2   3      0                                  bihday your majesty
3   4      0  #model   i love u take with u all the time in …
4   5      0             factsguide: society now    #motivation
```

[28]:
```
test.head()
```

[28]:
```
      id                                              tweet
0  31963  #studiolife #aislife #requires #passion #dedic…
1  31964   @user #white #supremacists want everyone to s…
2  31965  safe ways to heal your #acne!!    #altwaystohe…
3  31966  is the hp and the cursed child book up for res…
4  31967    3rd #bihday to my amazing, hilarious #nephew…
```

[29]:
```
train.isnull().any()
test.isnull().any()
```

[29]:
```
id       False
tweet    False
dtype: bool
```

[30]:
```
# checking out the negative comments from the train set

train[train['label'] == 0].head(10)
```

[30]:
```
   id  label                                              tweet
0   1      0   @user when a father is dysfunctional and is s…
1   2      0  @user @user thanks for #lyft credit i can't us…
2   3      0                                  bihday your majesty
3   4      0  #model   i love u take with u all the time in …
4   5      0             factsguide: society now    #motivation
5   6      0  [2/2] huge fan fare and big talking before the…
6   7      0   @user camping tomorrow @user @user @user @use…
7   8      0  the next school year is the year for exams.ð …
8   9      0  we won!!! love the land!!! #allin #cavs #champ…
9  10      0   @user @user welcome here !  i'm   it's so #gr…
```

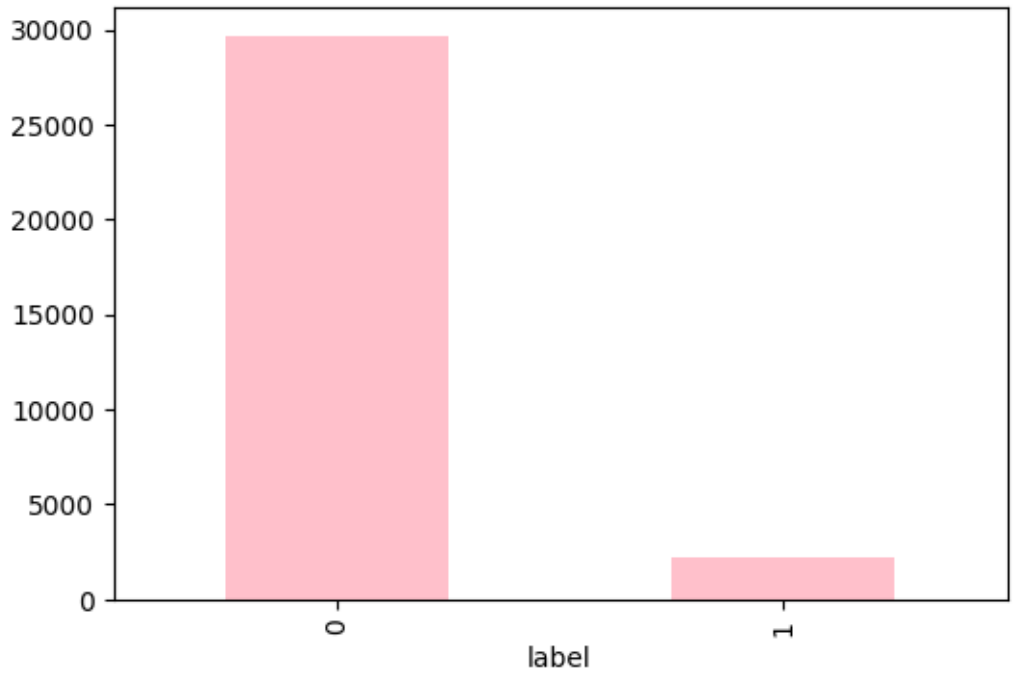
[31]:
```
# checking out the postive comments from the train set

train[train['label'] == 1].head(10)
```

[31]:
```
      id  label                                              tweet
13    14      1  @user #cnn calls #michigan middle school 'buil…
14    15      1  no comment!  in #australia   #opkillingbay #se…
17    18      1                             retweet if you agree!
```

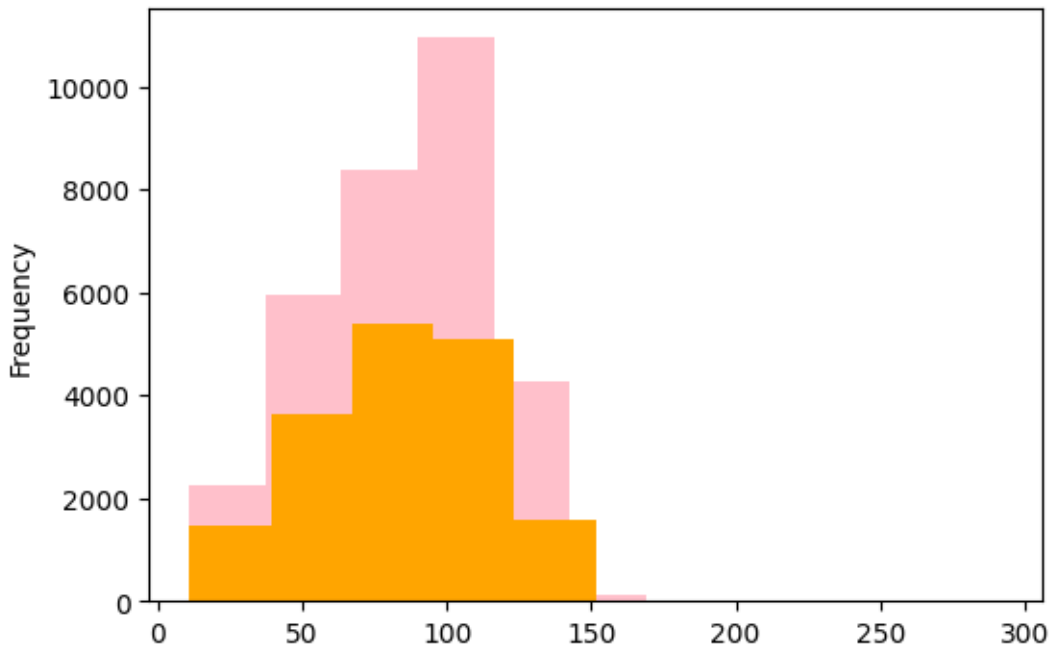
```
23    24      1    @user @user lumpy says i am a . prove it lumpy.
34    35      1  it's unbelievable that in the 21st century we'…
56    57      1            @user lets fight against  #love #peace
68    69      1  ð ©the white establishment can't have blk fol…
77    78      1  @user hey, white people: you can call people '…
82    83      1  how the #altright uses  &amp; insecurity to lu…
111  112      1  @user i'm not interested in a #linguistics tha…
```

[32]:
```
train['label'].value_counts().plot.bar(color = 'pink', figsize = (6, 4))
```

[32]:
```
<Axes: xlabel='label'>
```



[33]:
```
# checking the distribution of tweets in the data

length_train = train['tweet'].str.len().plot.hist(color = 'pink', figsize = (6,␣
↪4))
length_test = test['tweet'].str.len().plot.hist(color = 'orange', figsize = (6,␣
↪4))
```



[34]:
```
# adding a column to represent the length of the tweet

train['len'] = train['tweet'].str.len()
test['len'] = test['tweet'].str.len()

train.head(10)
```

[34]:

	id	label	tweet	len
0	1	0	@user when a father is dysfunctional and is s…	102
1	2	0	@user @user thanks for #lyft credit i can't us…	122
2	3	0	bihday your majesty	21
3	4	0	#model i love u take with u all the time in …	86
4	5	0	factsguide: society now #motivation	39
5	6	0	[2/2] huge fan fare and big talking before the…	116
6	7	0	@user camping tomorrow @user @user @user @use…	74
7	8	0	the next school year is the year for exams.ð …	143
8	9	0	we won!!! love the land!!! #allin #cavs #champ…	87
9	10	0	@user @user welcome here ! i'm it's so #gr…	50

[35]:
```
train.groupby('label').describe()
```

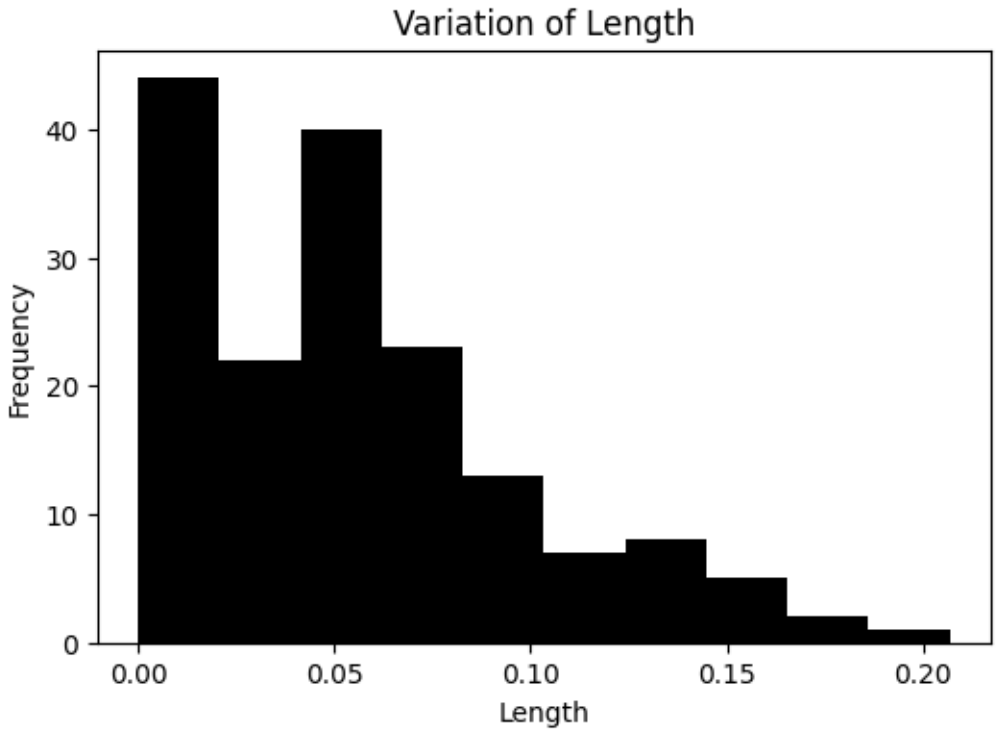
[35]:

	id							\
	count	mean	std	min	25%	50%	75%	
label								
0	29720.0	15974.454441	9223.783469	1.0	7981.75	15971.5	23965.25	

```
1       2242.0  16074.896075  9267.955758  14.0  8075.25  16095.0  24022.00
```

label	len max	len count	len mean	len std	len min	len 25%	len 50%	len 75%	len max
0	31962.0	29720.0	84.328634	29.566484	11.0	62.0	88.0	107.0	274.0
1	31961.0	2242.0	90.187779	27.375502	12.0	69.0	96.0	111.0	152.0

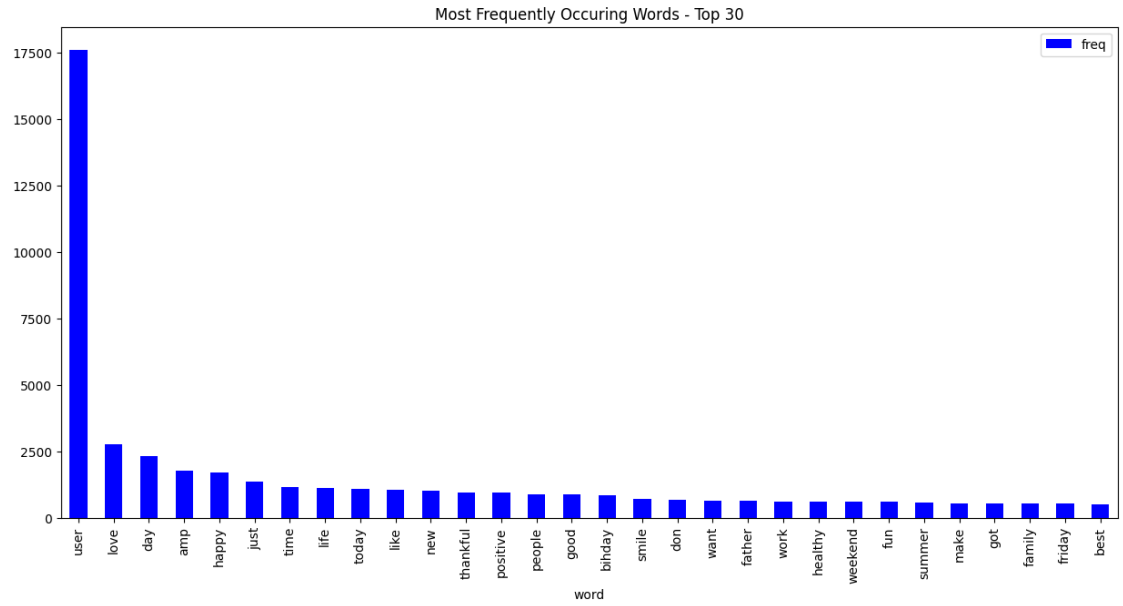
[36]:
```
train['label'] = pd.to_numeric(train['label'], errors='coerce')

# Group by 'len' column and calculate the mean of 'label'
mean_label_by_len = train.groupby('len')['label'].mean()

# Plot histogram
mean_label_by_len.plot.hist(color='black', figsize=(6, 4))
plt.title('Variation of Length')
plt.xlabel('Length')
plt.show()
```



[37]:
```
from sklearn.feature_extraction.text import CountVectorizer


cv = CountVectorizer(stop_words = 'english')
```

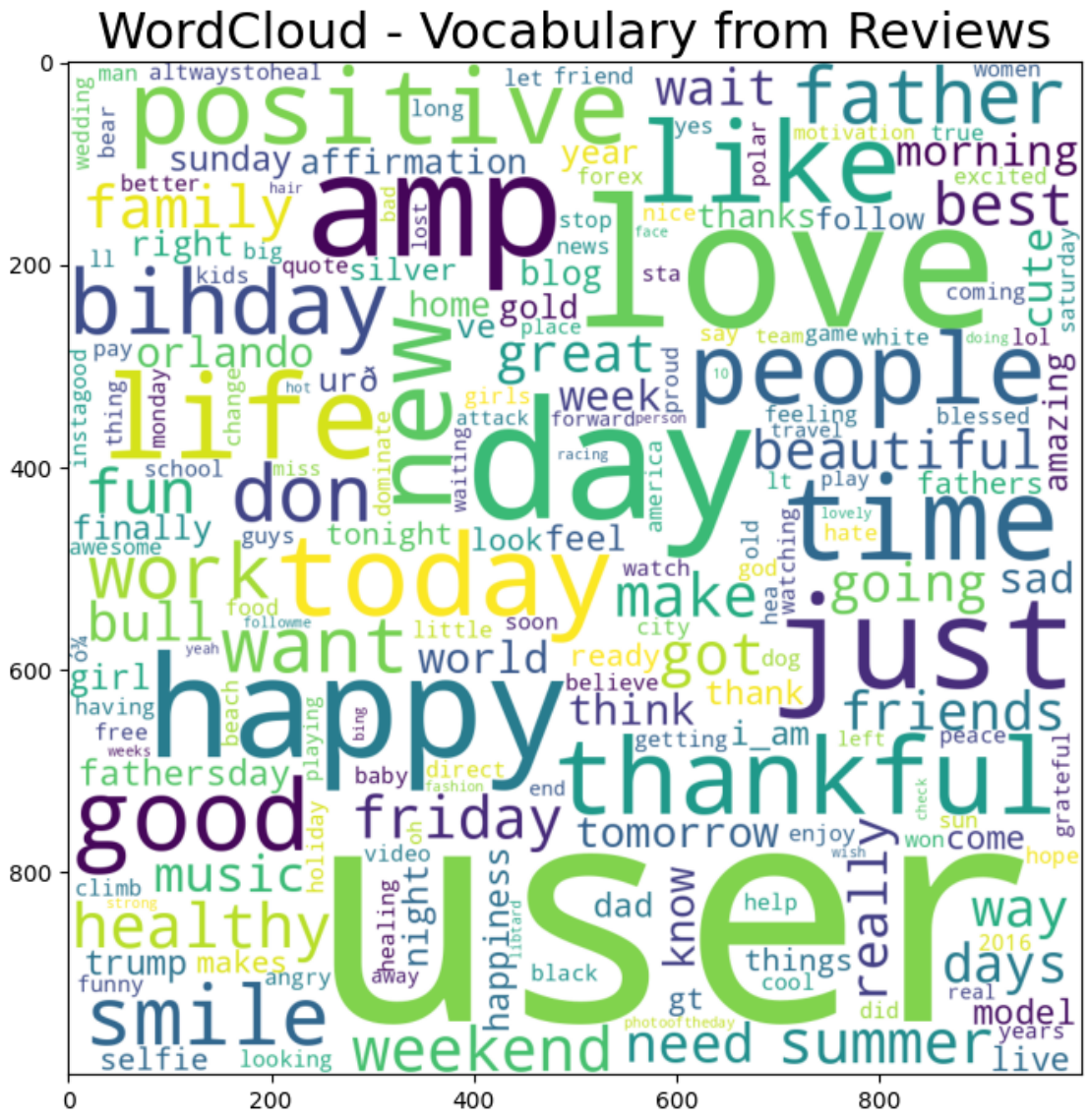
```
words = cv.fit_transform(train.tweet)

sum_words = words.sum(axis=0)

words_freq = [(word, sum_words[0, i]) for word, i in cv.vocabulary_.items()]
words_freq = sorted(words_freq, key = lambda x: x[1], reverse = True)

frequency = pd.DataFrame(words_freq, columns=['word', 'freq'])

frequency.head(30).plot(x='word', y='freq', kind='bar', figsize=(15, 7), color␣
 ↪= 'blue')
plt.title("Most Frequently Occuring Words - Top 30")
```

[37]: Text(0.5, 1.0, 'Most Frequently Occuring Words - Top 30')



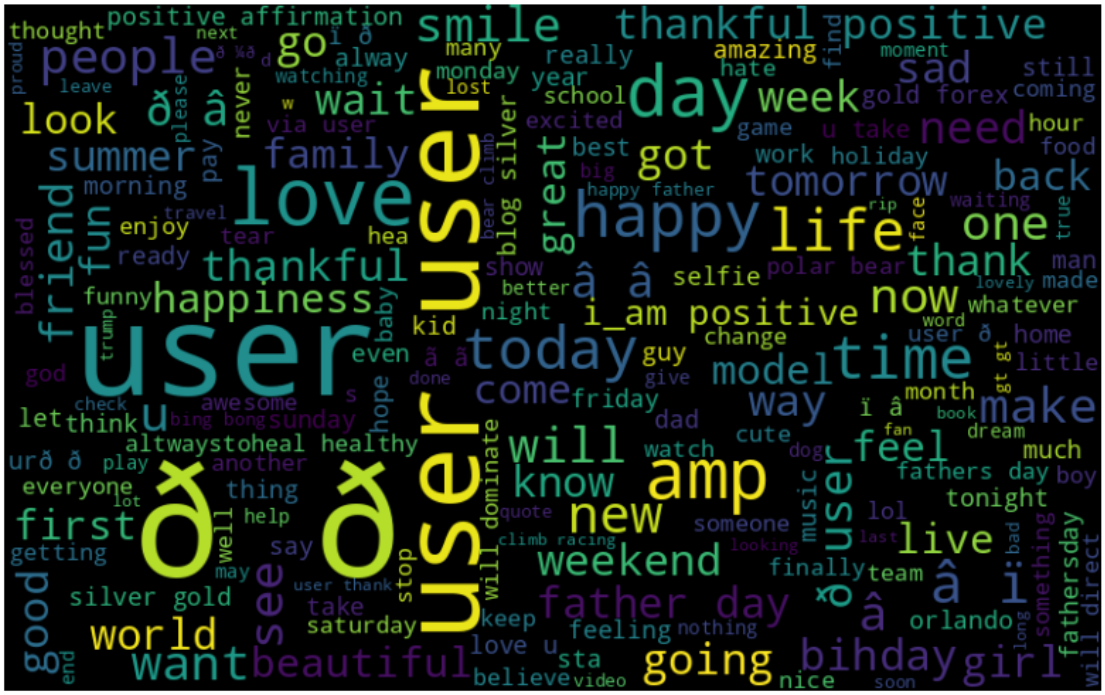
[38]:
```
from wordcloud import WordCloud

wordcloud = WordCloud(background_color = 'white', width = 1000, height = 1000).
 ↪generate_from_frequencies(dict(words_freq))

plt.figure(figsize=(10,8))
plt.imshow(wordcloud)
plt.title("WordCloud - Vocabulary from Reviews", fontsize = 22)
```

[38]: Text(0.5, 1.0, 'WordCloud - Vocabulary from Reviews')



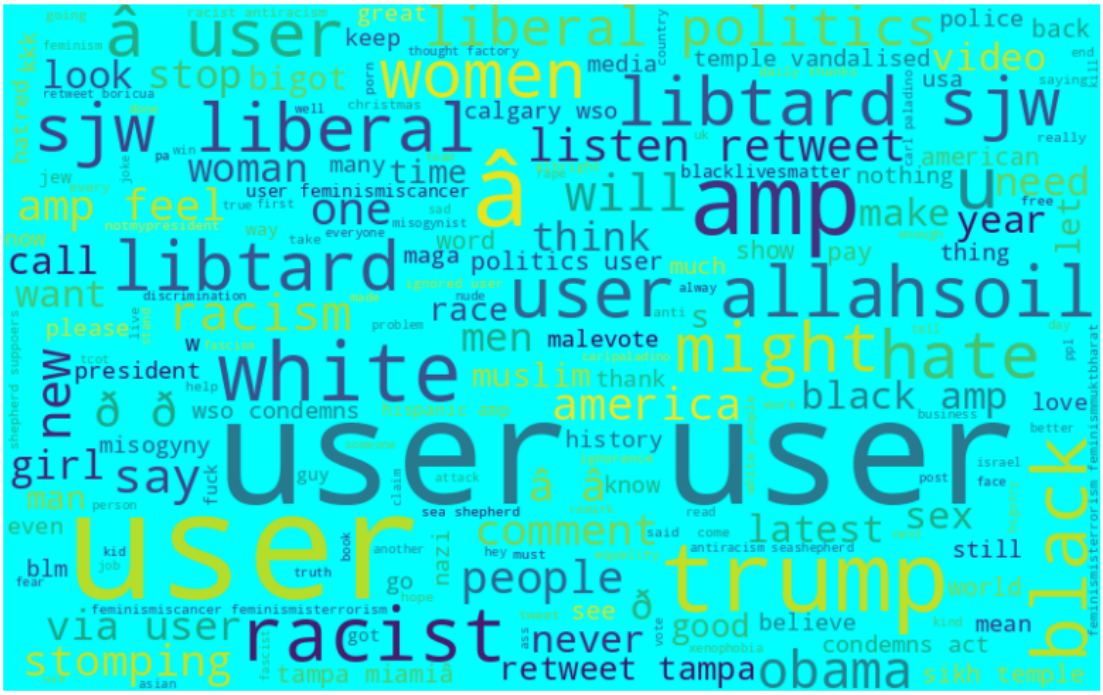
[39]:
```
normal_words =' '.join([text for text in train['tweet'][train['label'] == 0]])

wordcloud = WordCloud(width=800, height=500, random_state = 0, max_font_size =␣
↪110).generate(normal_words)
plt.figure(figsize=(10, 7))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis('off')
plt.title('The Neutral Words')
plt.show()
```

The Neutral Words



[40]:
```
negative_words =' '.join([text for text in train['tweet'][train['label'] == 1]])

wordcloud = WordCloud(background_color = 'cyan', width=800, height=500,␣
 ↪random_state = 0, max_font_size = 110).generate(negative_words)
plt.figure(figsize=(10, 7))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis('off')
plt.title('The Negative Words')
plt.show()
```

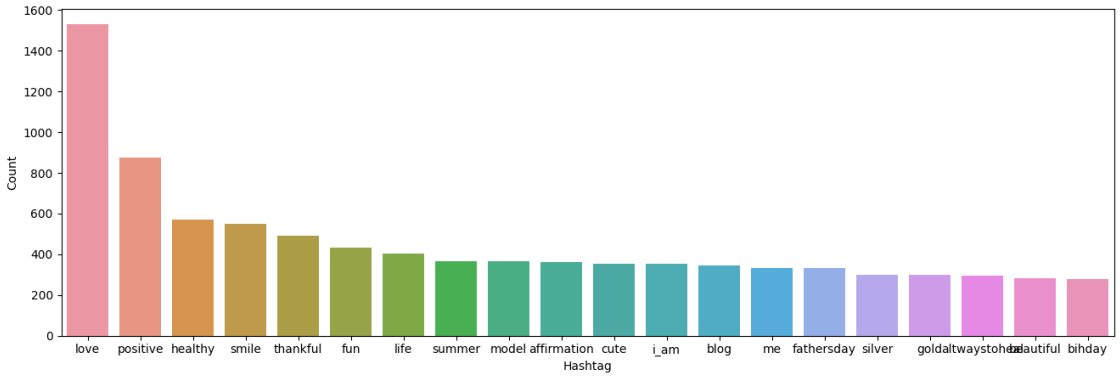
The Negative Words



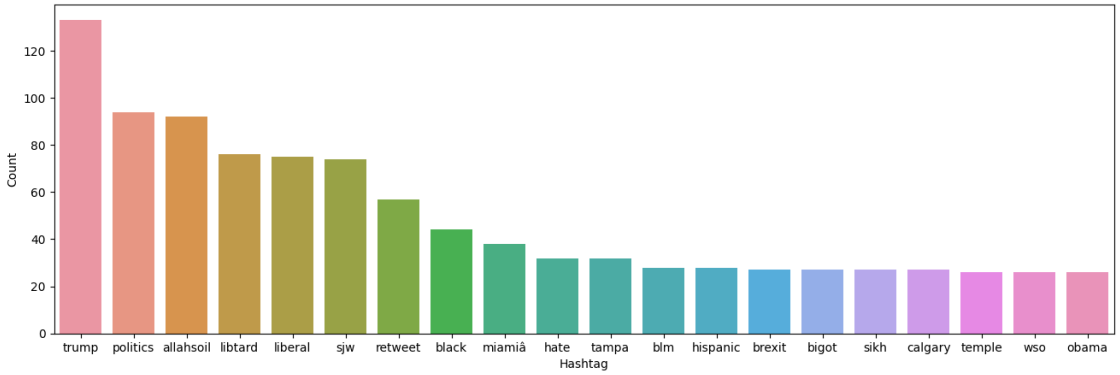
[41]:
```
# collecting the hashtags

def hashtag_extract(x):
    hashtags = []

    for i in x:
        ht = re.findall(r"#(\w+)", i)
        hashtags.append(ht)

    return hashtags
```

[42]:
```
import re
# extracting hashtags from non racist/sexist tweets
HT_regular = hashtag_extract(train['tweet'][train['label'] == 0])

# extracting hashtags from racist/sexist tweets
HT_negative = hashtag_extract(train['tweet'][train['label'] == 1])

# unnesting list
HT_regular = sum(HT_regular,[])
HT_negative = sum(HT_negative,[])
```

[43]:
```
import nltk
from nltk import FreqDist
a = nltk.FreqDist(HT_regular)
d = pd.DataFrame({'Hashtag': list(a.keys()),
                  'Count': list(a.values())})

# selecting top 20 most frequent hashtags
d = d.nlargest(columns="Count", n = 20)
plt.figure(figsize=(16,5))
ax = sns.barplot(data=d, x= "Hashtag", y = "Count")
ax.set(ylabel = 'Count')
plt.show()
```



[44]:
```
a = nltk.FreqDist(HT_negative)
d = pd.DataFrame({'Hashtag': list(a.keys()),
                  'Count': list(a.values())})

# selecting top 20 most frequent hashtags
d = d.nlargest(columns="Count", n = 20)
plt.figure(figsize=(16,5))
ax = sns.barplot(data=d, x= "Hashtag", y = "Count")
ax.set(ylabel = 'Count')
plt.show()
```



[45]:
```
import gensim
from gensim.models import Word2Vec
tokenized_tweet = train['tweet'].apply(lambda x: x.split())
# Assuming tokenized_tweet is your tokenized list of tweets

# Creating a Word2Vec model
model_w2v = Word2Vec(
    sentences=tokenized_tweet,
    vector_size=200,  # Desired number of features/independent variables
    window=5,         # Context window size
    min_count=2,
    sg=1,             # 1 for skip-gram model
    hs=0,
    negative=10,      # For negative sampling
    workers=2,        # Number of cores
    seed=34
)

# Training the Word2Vec model
model_w2v.train(tokenized_tweet, total_examples=len(train['tweet']), epochs=20)
```

[45]:
```
(6109793, 8411580)
```

[46]:
```
model_w2v.wv.most_similar(positive = "dinner")
```

[46]:
```
[('spaghetti', 0.6678438186645508),
 ('#prosecco', 0.6224561333656311),
 ('#wanderlust', 0.6045688986778259),
 ('fluffy', 0.5986981391906738),
 ('#deutschland', 0.5853589177131653),
 ('#restaurant', 0.5850751996040344),
 ('7!', 0.5825372338294983),
 ('#boardgames', 0.5781636238098145),
```

```
 ('#demoday', 0.5778859853744507),
 ('coaching', 0.5774686336517334)]
```

[47]:
```
model_w2v.wv.most_similar(positive = "cancer")
```

[47]:
```
[('champion,', 0.7055912017822266),
 ('level.', 0.6961607336997986),
 ('ways.', 0.6891152262687683),
 ('#merica', 0.6868944764137268),
 ('ownership', 0.6864113211631775),
 ('intelligent', 0.6856280565261841),
 ('tolerance', 0.6843158602714539),
 ('aol', 0.6814162135124207),
 ('spots.', 0.6808521151542664),
 ('law.', 0.6806308627128601)]
```

[48]:
```
model_w2v.wv.most_similar(positive = "apple")
```

[48]:
```
[('mytraining', 0.7102106809616089),
 ('"mytraining"', 0.7083417773246765),
 ('training"', 0.6870191693305969),
 ('app,', 0.6463671922683716),
 ('"my', 0.6045624017715454),
 ('app', 0.592377245426178),
 ('heroku', 0.5815081000328064),
 ('bees', 0.5762739181518555),
 ('ta', 0.5688378810882568),
 ('#expressjs', 0.5680015683174133)]
```

[49]:
```
model_w2v.wv.most_similar(negative = "hate")
```

[49]:
```
[('#staup', 0.017515383660793304),
 ('â\x9c\x88ï¸\x8f', 0.015509642660617828),
 ('#ireland', 0.005592217668890953),
 ('street,', 0.00165042863227427),
 ('#css', 0.00045058902469463646),
 ('#foodie', -0.007494824472814798),
 ('lion', -0.007937184534966946),
 ('#euro2016', -0.008117257617413998),
 ('de', -0.008449590764939785),
 ('#ebay', -0.008534024469554424)]
```

[50]:
```
from tqdm import tqdm
tqdm.pandas(desc="progress-bar")
from gensim.models.doc2vec import TaggedDocument

# Assuming tokenized_tweet is your tokenized list of tweets
```

```
# Tagging documents (sentences or tweets) with unique labels
tagged_data = [TaggedDocument(words=words, tags=[str(i)]) for i, words in␣
 ↪enumerate(tokenized_tweet)]
```

[51]:
```
def add_label(twt):
    output = []
    for i, s in zip(twt.index, twt):
        output.append(TaggedDocument(words=s, tags=["tweet_" + str(i)]))
    return output

# Label all the tweets
labeled_tweets = add_label(tokenized_tweet)

labeled_tweets[:6]
```

[51]:
```
[TaggedDocument(words=['@user', 'when', 'a', 'father', 'is', 'dysfunctional',
'and', 'is', 'so', 'selfish', 'he', 'drags', 'his', 'kids', 'into', 'his',
'dysfunction.', '#run'], tags=['tweet_0']),
 TaggedDocument(words=['@user', '@user', 'thanks', 'for', '#lyft', 'credit',
'i', "can't", 'use', 'cause', 'they', "don't", 'offer', 'wheelchair', 'vans',
'in', 'pdx.', '#disapointed', '#getthanked'], tags=['tweet_1']),
 TaggedDocument(words=['bihday', 'your', 'majesty'], tags=['tweet_2']),
 TaggedDocument(words=['#model', 'i', 'love', 'u', 'take', 'with', 'u', 'all',
'the', 'time', 'in', 'urð\x9f\x93±!!!',
'ð\x9f\x98\x99ð\x9f\x98\x8eð\x9f\x91\x84ð\x9f\x91',
'ð\x9f\x92¦ð\x9f\x92¦ð\x9f\x92¦'], tags=['tweet_3']),
 TaggedDocument(words=['factsguide:', 'society', 'now', '#motivation'],
tags=['tweet_4']),
 TaggedDocument(words=['[2/2]', 'huge', 'fan', 'fare', 'and', 'big', 'talking',
'before', 'they', 'leave.', 'chaos', 'and', 'pay', 'disputes', 'when', 'they',
'get', 'there.', '#allshowandnogo'], tags=['tweet_5'])]
```

[52]:
```
# removing unwanted patterns from the data

import re
import nltk

nltk.download('stopwords')
from nltk.corpus import stopwords
from nltk.stem.porter import PorterStemmer
```

```
[nltk_data] Downloading package stopwords to /usr/share/nltk_data…
[nltk_data]   Package stopwords is already up-to-date!
```

[53]:
```
train_corpus = []
```

```
for i in range(0, 31962):
  review = re.sub('[^a-zA-Z]', ' ', train['tweet'][i])
  review = review.lower()
  review = review.split()

  ps = PorterStemmer()

  # stemming
  review = [ps.stem(word) for word in review if not word in set(stopwords.
 ↪words('english'))]

  # joining them back with space
  review = ' '.join(review)
  train_corpus.append(review)
```

[54]:
```
test_corpus = []

for i in range(0, 17197):
  review = re.sub('[^a-zA-Z]', ' ', test['tweet'][i])
  review = review.lower()
  review = review.split()

  ps = PorterStemmer()

  # stemming
  review = [ps.stem(word) for word in review if not word in set(stopwords.
 ↪words('english'))]

  # joining them back with space
  review = ' '.join(review)
  test_corpus.append(review)
```

[55]:
```
# creating bag of words

from sklearn.feature_extraction.text import CountVectorizer

cv = CountVectorizer(max_features = 2500)
x = cv.fit_transform(train_corpus).toarray()
y = train.iloc[:, 1]

print(x.shape)
print(y.shape)
```

```
(31962, 2500)
(31962,)
```

[56]:
```
# creating bag of words

from sklearn.feature_extraction.text import CountVectorizer

cv = CountVectorizer(max_features = 2500)
x_test = cv.fit_transform(test_corpus).toarray()

print(x_test.shape)
```

```
(17197, 2500)
```

[57]:
```
# splitting the training data into train and valid sets

from sklearn.model_selection import train_test_split

x_train, x_valid, y_train, y_valid = train_test_split(x, y, test_size = 0.25,␣
 ↪random_state = 42)

print(x_train.shape)
print(x_valid.shape)
print(y_train.shape)
print(y_valid.shape)
```

```
(23971, 2500)
(7991, 2500)
(23971,)
(7991,)
```

[58]:
```
# standardization

from sklearn.preprocessing import StandardScaler

sc = StandardScaler()

x_train = sc.fit_transform(x_train)
x_valid = sc.transform(x_valid)
x_test = sc.transform(x_test)
```

[59]:
```
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import confusion_matrix
from sklearn.metrics import f1_score

model = RandomForestClassifier()
model.fit(x_train, y_train)

y_pred = model.predict(x_valid)
```

```
print("Training Accuracy :", model.score(x_train, y_train))
print("Validation Accuracy :", model.score(x_valid, y_valid))

# calculating the f1 score for the validation set
print("F1 score :", f1_score(y_valid, y_pred))

# confusion matrix
cm = confusion_matrix(y_valid, y_pred)
print(cm)
```

```
Training Accuracy : 0.9991656585040257
Validation Accuracy : 0.9525716430984857
F1 score : 0.6160081053698074
[[7308  124]
 [ 255  304]]
```

[60]:
```
from sklearn.linear_model import LogisticRegression

model = LogisticRegression()
model.fit(x_train, y_train)

y_pred = model.predict(x_valid)

print("Training Accuracy :", model.score(x_train, y_train))
print("Validation Accuracy :", model.score(x_valid, y_valid))

# calculating the f1 score for the validation set
print("f1 score :", f1_score(y_valid, y_pred))

# confusion matrix
cm = confusion_matrix(y_valid, y_pred)
print(cm)
```

```
Training Accuracy : 0.9851487213716574
Validation Accuracy : 0.9416843949443123
f1 score : 0.5933682373472949
[[7185  247]
 [ 219  340]]
```

```
/opt/conda/lib/python3.10/site-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
```

```
  n_iter_i = _check_optimize_result(
```

[61]:
```
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import f1_score, confusion_matrix

# Assuming x_train, x_valid, y_train, and y_valid are defined and contain your␣
 ↪training and validation data

# Instantiate Decision Tree classifier
model = DecisionTreeClassifier()

# Train the model
model.fit(x_train, y_train)

# Predictions on the validation set
y_pred = model.predict(x_valid)

# Print training and validation accuracy
print("Training Accuracy:", model.score(x_train, y_train))
print("Validation Accuracy:", model.score(x_valid, y_valid))

# Calculate the F1 score for the validation set
print("F1 score:", f1_score(y_valid, y_pred))

# Generate confusion matrix
cm = confusion_matrix(y_valid, y_pred)
print("Confusion Matrix:")
print(cm)
```

```
Training Accuracy: 0.9991656585040257
Validation Accuracy: 0.9343010887248154
F1 score: 0.5485812553740327
Confusion Matrix:
[[7147  285]
 [ 240  319]]
```

[62]:
```
from sklearn.svm import SVC

model = SVC()
model.fit(x_train, y_train)

y_pred = model.predict(x_valid)

print("Training Accuracy :", model.score(x_train, y_train))
print("Validation Accuracy :", model.score(x_valid, y_valid))

# calculating the f1 score for the validation set
```

```
print("f1 score :", f1_score(y_valid, y_pred))

# confusion matrix
cm = confusion_matrix(y_valid, y_pred)
print(cm)
```

```
Training Accuracy : 0.978181969880272
Validation Accuracy : 0.9521962207483419
f1 score : 0.4986876640419947
[[7419   13]
 [ 369  190]]
```

[63]:
```
from xgboost import XGBClassifier

model = XGBClassifier()
model.fit(x_train, y_train)

y_pred = model.predict(x_valid)

print("Training Accuracy :", model.score(x_train, y_train))
print("Validation Accuracy :", model.score(x_valid, y_valid))

# calculating the f1 score for the validation set
print("f1 score :", f1_score(y_valid, y_pred))

# confusion matrix
cm = confusion_matrix(y_valid, y_pred)t
print(cm)
```

```
Training Accuracy : 0.9608693838388053
Validation Accuracy : 0.9550744587661119
f1 score : 0.575147928994083
[[7389   43]
 [ 316  243]]
```