A special thanks to all my mentors for helping me constantly to progress technically

Jupyter notebook prepared, arranged and executed by Karthi Balasundaram , sentimentally analysing emotions (anger, sadness, joy & fear) in English language using real tweet data from twitter.

In [3]:

```
# installing natural language toolkit(nltk)
#!pip install nltk
```

```
Defaulting to user installation because normal site-packages is not writeable
Collecting nltk
  Downloading nltk-3.7-py3-none-any.whl (1.5 MB)
     |████████████████████████████████| 1.5 MB 2.4 MB/s
Requirement already satisfied: click in ./Library/Python/3.9/lib/python/site-p
ackages (from nltk) (8.0.3)
Collecting regex>=2021.8.3
  Downloading regex-2022.3.15-cp39-cp39-macosx_10_9_x86_64.whl (288 kB)
     |████████████████████████████████| 288 kB 2.6 MB/s
Requirement already satisfied: tqdm in /Library/Frameworks/Python.framework/Ve
rsions/3.9/lib/python3.9/site-packages (from nltk) (4.62.3)
Requirement already satisfied: joblib in /Library/Frameworks/Python.framework/
Versions/3.9/lib/python3.9/site-packages (from nltk) (1.0.1)
Installing collected packages: regex, nltk
  WARNING: The script nltk is installed in '/Users/karthibalasundaram/Library/
Python/3.9/bin' which is not on PATH.
  Consider adding this directory to PATH or, if you prefer to suppress this wa
rning, use --no-warn-script-location.
Successfully installed nltk-3.7 regex-2022.3.15
WARNING: You are using pip version 21.3.1; however, version 22.0.4 is availabl
e.
You should consider upgrading via the '/Library/Frameworks/Python.framework/Ve
rsions/3.9/bin/python3.9 -m pip install --upgrade pip' command.
```

In [9]:

```
# installing openpyxl (a python library to read/write excel files)
#!pip install openpyxl
```

```
Defaulting to user installation because normal site-packages is not writeable
Collecting openpyxl
  Downloading openpyxl-3.0.9-py2.py3-none-any.whl (242 kB)
     |████████████████████████████████| 242 kB 1.7 MB/s
Collecting et-xmlfile
  Downloading et_xmlfile-1.1.0-py3-none-any.whl (4.7 kB)
Installing collected packages: et-xmlfile, openpyxl
Successfully installed et-xmlfile-1.1.0 openpyxl-3.0.9
WARNING: You are using pip version 21.3.1; however, version 22.0.4 is availabl
e.
You should consider upgrading via the '/Library/Frameworks/Python.framework/Ve
rsions/3.9/bin/python3.9 -m pip install --upgrade pip' command.
```

In [2]:

```python
#importing other default and necessary libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import string
import re
import nltk
from nltk.util import pr
from nltk.corpus import stopwords
import warnings
warnings.filterwarnings('ignore')
# stemmer = nltk.SnowballStemmer("english")
# nltk.download('stopwords')
# stopword=set(stopwords.words('english'))
```

In [4]:

```python
#reading the excel file using pandas library
data = pd.read_csv("/Users/karthibalasundaram/Desktop/rawCodesInMac/eng_datas
```

In [5]:

```python
#the below line calls last 5 rows from the excel
data.tail()
```

Out[5]:

	ID	sentiment	content
7097	40781	sadness	@VivienLloyd Thank you so much! Just home - st...
7098	40782	sadness	Just put the winter duvet on ☃️❄️🌬️☔
7099	40783	sadness	@SilkInSide @TommyJoeRatliff that's so pretty!...
7100	40784	sadness	@BluesfestByron second artist announcement loo...
7101	40785	sadness	I can literally eat creamy pesto pasta topped ...

In [6]:

```python
#the below line calls first 5 rows from the excel
data.head()
```

Out[6]:

	ID	sentiment	content
0	10941	anger	At the point today where if someone says somet...
1	10942	anger	@CorningFootball IT'S GAME DAY!!!! T MIN...
2	10943	anger	This game has pissed me off more than any othe...
3	10944	anger	@spamvicious I've just found out it's Candice ...
4	10945	anger	@moocowward @mrsajhargreaves @Melly77 @GaryBar...

In [7]:

```
#understanding rows and columns present in the excel
data.shape
```

Out[7]:

```
(7102, 3)
```

In [8]:

```
#retreives basic info about the excel data
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7102 entries, 0 to 7101
Data columns (total 3 columns):
 #   Column     Non-Null Count  Dtype 
---  ------     --------------  ----- 
 0   ID         7102 non-null   int64 
 1   sentiment  7102 non-null   object
 2   content    7102 non-null   object
dtypes: int64(1), object(2)
memory usage: 166.6+ KB
```

In [9]:

```
#a brief description about the data
data.describe()
```

Out[9]:

	ID
count	7102.000000
mean	25106.966207
std	10692.625426
min	10000.000000
25%	20074.250000
50%	21849.500000
75%	31372.750000
max	41532.000000

In [10]:

```
data.isnull().sum()
```

Out[10]:

```
ID           0
sentiment    0
content      0
dtype: int64
```

In [11]:

```
#retreives all the columns
data.columns
```

Out[11]:

```
Index(['ID', 'sentiment', 'content'], dtype='object')
```

In [14]:

```
#lists first 10 data(emotions) listed under the column "sentiment"
data[["sentiment"]].tail(10)
```

Out[14]:

	sentiment
7092	sadness
7093	sadness
7094	sadness
7095	sadness
7096	sadness
7097	sadness
7098	sadness
7099	sadness
7100	sadness
7101	sadness

In [17]:

```
#lists first 5 data(content) listed under the column "content"
data[["content"]].head()
```

Out[17]:

	content
0	At the point today where if someone says somet...
1	@CorningFootball IT'S GAME DAY!!!! T MIN...
2	This game has pissed me off more than any othe...
3	@spamvicious I've just found out it's Candice ...
4	@moocowward @mrsajhargreaves @Melly77 @GaryBar...

In [18]:

```
# #lists first 5 data(langauge) listed under the column "language"
# data[["language"]].head()
```

In [20]:

```
#displays the number of emotions accordingly
data["sentiment"].value_counts()
```

Out[20]:

```
fear       2252
anger      1701
joy        1616
sadness    1533
Name: sentiment, dtype: int64
```

In [22]:

```
#lists first 5 ID's listed under the column "ID"
data[["ID"]].head()
```

Out[22]:

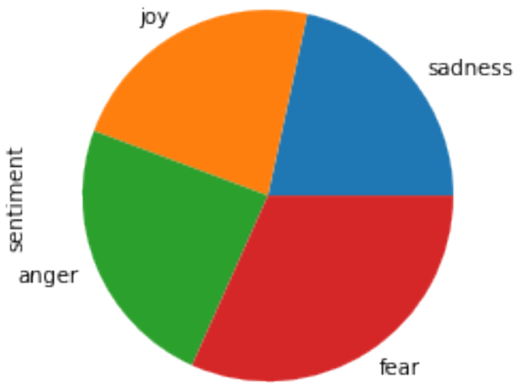
	ID
0	10941
1	10942
2	10943
3	10944
4	10945

In [24]:

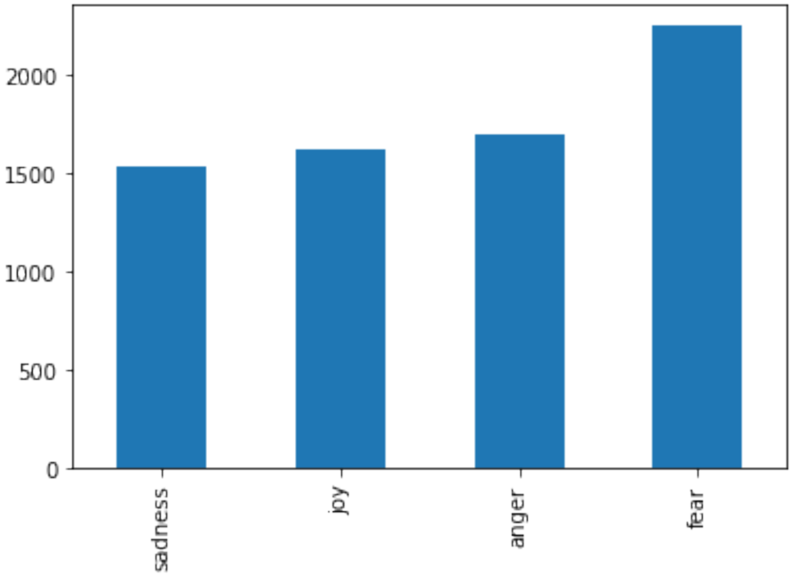
```
#sorting the languages
pi = data.sentiment.value_counts().sort_values()
```

In [25]:

```
#displaying the sorted lanuages in a pie chart
displ = pi.plot(kind = 'pie')
```



In [28]:
```
#displaying the sorted lanuages in a bar chart
displ1 = pi.plot(kind = 'bar')
```



In [44]:
```
#displays the 369th content
data["content"][369]
```

Out[44]:
```
'@Bell @Bell_Support Cancelling home Fibe, Internet and TV this afternoon - as
soon as I can arrange alternate Internet. 2/2 #angry #fedup'
```

In [45]:
```
# defining function for twitter hashtag extraction to classify sentiment anal
def hashtag_extract(text_list):
    hashtags = []
    for text in text_list:
        ht = re.findall(r"#(\w+)", text)
        hashtags.append(ht)
    return hashtags
```

In [62]:
```
def generate_hashtag_freqdist(hashtags):
    a = nltk.FreqDist(hashtags)
    b = pd.DataFrame({'Hashtag': list(a.keys()),'Count': list(a.values())})
    # selecting top 60 most frequent hashtags
    b = b.nlargest(columns="Count", n = 60)
    plt.figure(figsize=(16,7))
    ax = sns.barplot(data=b, x= "Hashtag", y = "Count")
    plt.xticks(rotation=80)
    ax.set(ylabel = 'Count')
    plt.show()
```

In [63]:

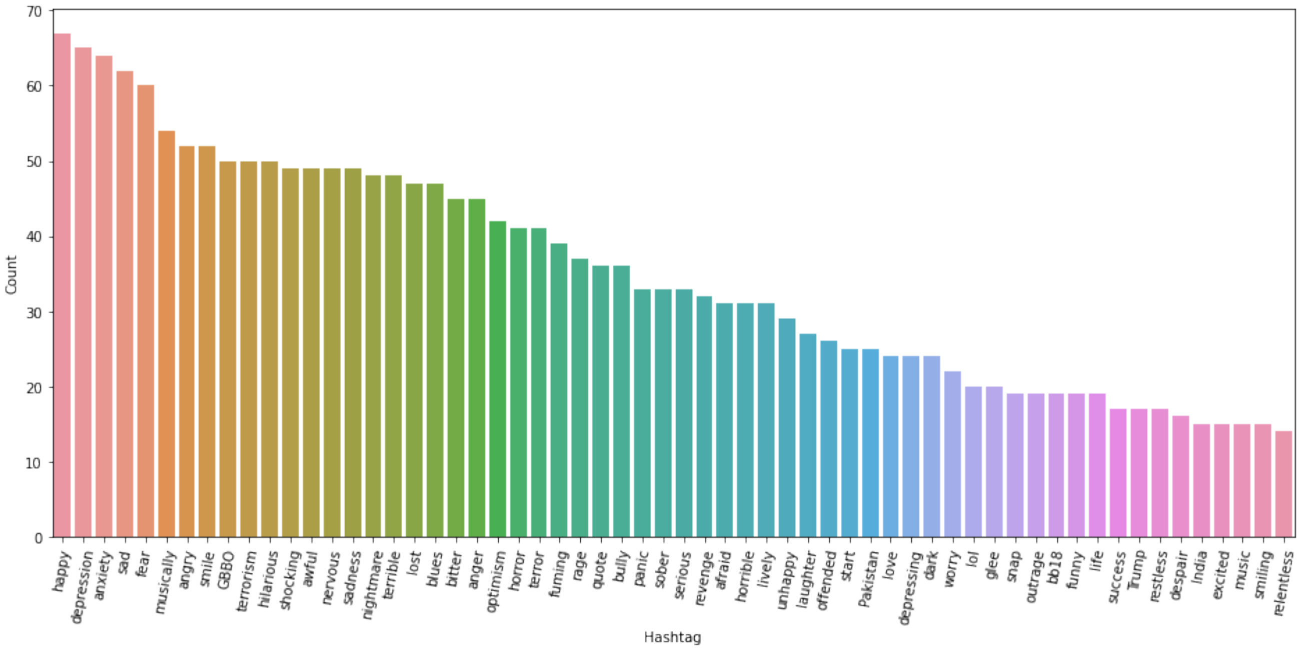
```
hashtags = hashtag_extract(data["content"])
hashtags = sum(hashtags, [])
```

In [64]:

```
import seaborn as sns
```

In [65]:

```
generate_hashtag_freqdist(hashtags)
```



In [68]:

```
# retrieving the lengths o
data['total_length_characters'] = data['content'].str.len()
print(data['total_length_characters'])
total_length_characters = data['total_length_characters'].sum()
print(total_length_characters)
count = 0
for y in data["content"]:
    count = count + 1
print(count)
average_length = (total_length_characters / count)
print (average_length)
```

```
0       109
1        67
2       115
3       101
4       135
       ... 
7097    102
7098     37
7099    135
7100     94
7101    139
Name: total_length_characters, Length: 7102, dtype: int64
680776
7102
95.85694170656153
```

In [69]:

```
data['total_count_words'] = data['sentiment'].str.split().str.len()
print(data['total_count_words'])
total_words = data['total_count_words'].sum()
print(total_words)
count = 0
for y in data["sentiment"]:
    count = count + 1
print(count)
average_words = total_words / count
print (average_words)
```

```
0       1
1       1
2       1
3       1
4       1
       ..
7097    1
7098    1
7099    1
7100    1
7101    1
Name: total_count_words, Length: 7102, dtype: int64
7102
7102
1.0
```

In [71]:

```
stemmer = nltk.SnowballStemmer("english")
nltk.download('stopwords')
stopword=set(stopwords.words('english'))
```

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

In [72]:

```
def clean(text):
    text = str(text).lower()
    text = re.sub('\[.*?\]', '', text)
    text = re.sub('https?://\S+|www\.\S+', '', text)
    text = re.sub('<.*?>+', '', text)
    text = re.sub('[%s]' % re.escape(string.punctuation), '', text)
    text = re.sub('\n', '', text)
    text = re.sub('\w*\d\w*', '', text)
    text = [word for word in text.split(' ') if word not in stopword]
    text=" ".join(text)
    text = [stemmer.stem(word) for word in text.split(' ')]
    text=" ".join(text)
    return text
data["content"] = data["content"].apply(clean)
```

In [73]:

```
data['total_length_characters'] = data['content'].str.len()
print(data['total_length_characters'])
total_length_characters = data['total_length_characters'].sum()
print(total_length_characters)
count = 0
for y in data["content"]:
    count = count + 1
print(count)
average_length = total_length_characters / count
print (average_length)
```

```
0        59
1        48
2        48
3        47
4        73
        ...
7097     63
7098     25
7099     90
7100     67
7101    101
Name: total_length_characters, Length: 7102, dtype: int64
423548
7102
59.637848493382144
```

In [74]:

```
data['total_count_words'] = data['sentiment'].str.split().str.len()
print(data['total_count_words'])
total_words = data['total_count_words'].sum()
print(total_words)
count = 0
for y in data["sentiment"]:
    count = count + 1
print(count)
average_words = total_words / count
print (average_words)
```

```
0       1
1       1
2       1
3       1
4       1
       ..
7097    1
7098    1
7099    1
7100    1
7101    1
Name: total_count_words, Length: 7102, dtype: int64
7102
7102
1.0
```

In [68]:

```
# !pip3 install textblob
```

```
Defaulting to user installation because normal site-packages is not writeable
Collecting textblob
  Downloading textblob-0.17.1-py2.py3-none-any.whl (636 kB)
     |████████████████████████████████| 636 kB 1.7 MB/s
Requirement already satisfied: nltk>=3.1 in ./Library/Python/3.9/lib/python/si
te-packages (from textblob) (3.7)
Requirement already satisfied: joblib in /Library/Frameworks/Python.framework/
Versions/3.9/lib/python3.9/site-packages (from nltk>=3.1->textblob) (1.0.1)
Requirement already satisfied: click in ./Library/Python/3.9/lib/python/site-p
ackages (from nltk>=3.1->textblob) (8.0.3)
Requirement already satisfied: tqdm in /Library/Frameworks/Python.framework/Ve
rsions/3.9/lib/python3.9/site-packages (from nltk>=3.1->textblob) (4.62.3)
Requirement already satisfied: regex>=2021.8.3 in ./Library/Python/3.9/lib/pyt
hon/site-packages (from nltk>=3.1->textblob) (2022.3.15)
Installing collected packages: textblob
Successfully installed textblob-0.17.1
WARNING: You are using pip version 21.3.1; however, version 22.0.4 is availabl
e.
You should consider upgrading via the '/Library/Frameworks/Python.framework/Ve
rsions/3.9/bin/python3.9 -m pip install --upgrade pip' command.
```

In [75]:

```
from textblob import TextBlob
```

In [76]:

```
def analyze_sentiment(tweet):
    analysis = TextBlob(clean(tweet))
    if analysis.sentiment.polarity > 0:
        return 1
    elif analysis.sentiment.polarity == 0:
        return 0
    else:
        return -1
```

In [77]:

```
data['Sentiment'] = data['sentiment'].apply(lambda x:analyze_sentiment(x))
data['Source'] = 'random_user'
data['Length'] = data['content'].apply(len)
data['Word_counts'] = data['content'].apply(lambda x:len(str(x).split()))
```

In [83]:

```
data1=data[['content','sentiment', 'Source',
'Length','Word_counts']]
data1.head(680)
```

Out[83]:

	content	sentiment	Source	Length	Word_counts
0	point today someon say someth remot kind water...	anger	random_user	59	10
1	corningfootbal game day minus relentless	anger	random_user	48	5
2	game piss game year blood boil time turn stlcard	anger	random_user	48	9
3	spamvici ive found candic candac pout like ðÿ˜	anger	random_user	47	8
4	moocowward mrsajhargreav garybarlow cant come...	anger	random_user	73	9
...	...	...	...	...	...
675	last madden commerci ðÿ˜†ðÿ˜†ðÿ˜†ðÿ˜†ðÿ˜†ðÿ˜† tnf	anger	random_user	49	5
676	plasmaassassin armoureddov nno wrath	anger	random_user	37	4
677	dreamsandpocki like despit irrit toward ur shi...	anger	random_user	91	13
678	whenev pout want adrian appear tell stop pout els	anger	random_user	49	9
679	terenc got lot anger issu famili school	anger	random_user	40	7

680 rows × 5 columns

In [119…

```
# file_name = 'data1.xlsx'
# # saving the excel
# marks_data.to_excel(data1)
# print('DataFrame is written to Excel File successfully.')
```

In [84]:

```
# data1=data[['tweet','retweets_count', 'Sentiment', 'Source',
# 'Length','Word_counts']]
# data1.head()
```

In [85]:

```
data1['Clean tweet'] = data1['content'].apply(lambda x:clean(x))
```

In [87]:

```
data1[["Clean tweet","sentiment"]].iloc[100]
```

Out[87]:

```
Clean tweet    noth relentless dog beg food
sentiment                             anger
Name: 100, dtype: object
```

In [89]:

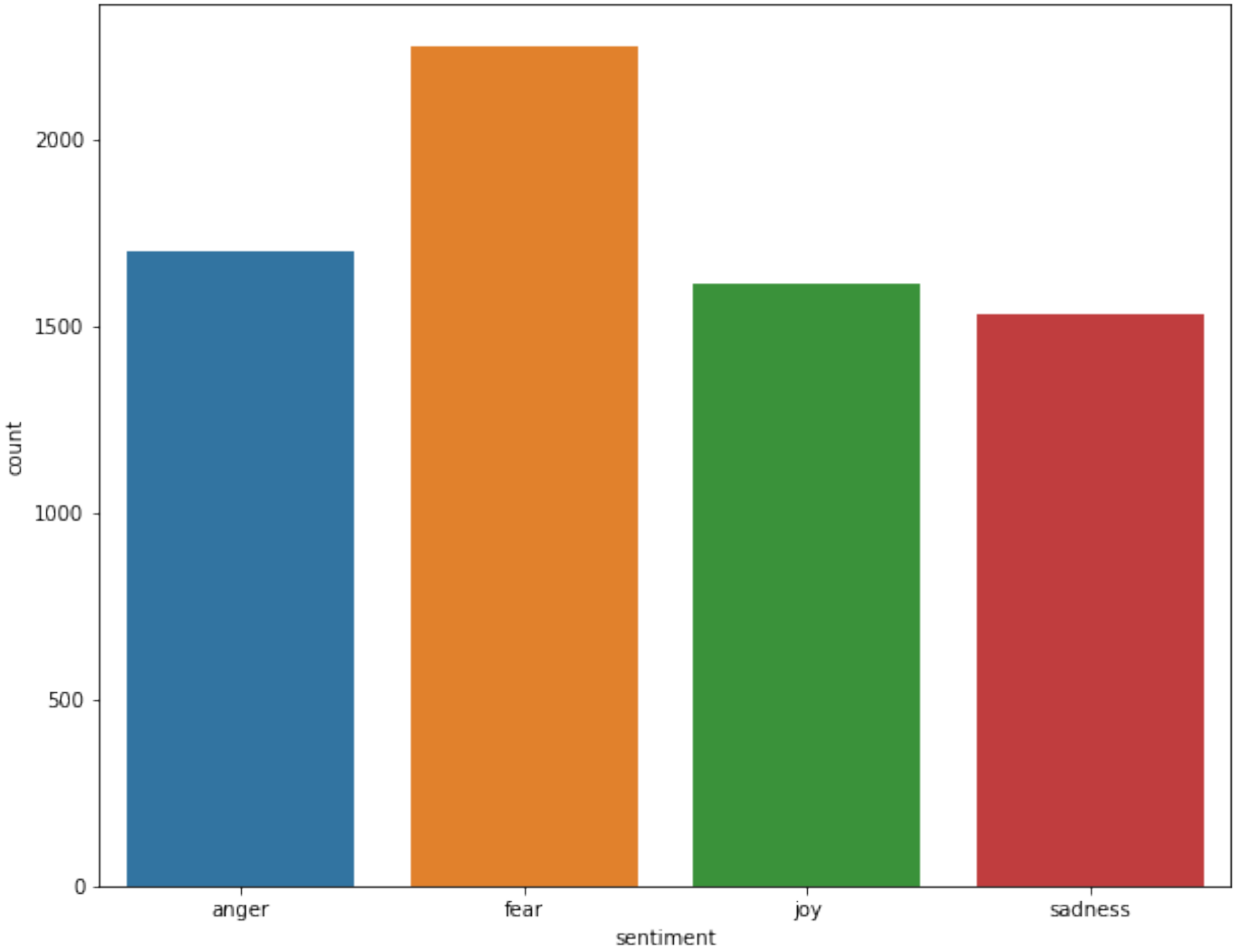
```
sentiment = data1['sentiment'].value_counts()
sentiment
```

Out[89]:

```
fear        2252
anger       1701
joy         1616
sadness     1533
Name: sentiment, dtype: int64
```

In [91]:

```
plt.figure(figsize = (10,8))
sns.countplot(data = data1, x = 'sentiment')
plt.show()
```



In [103…

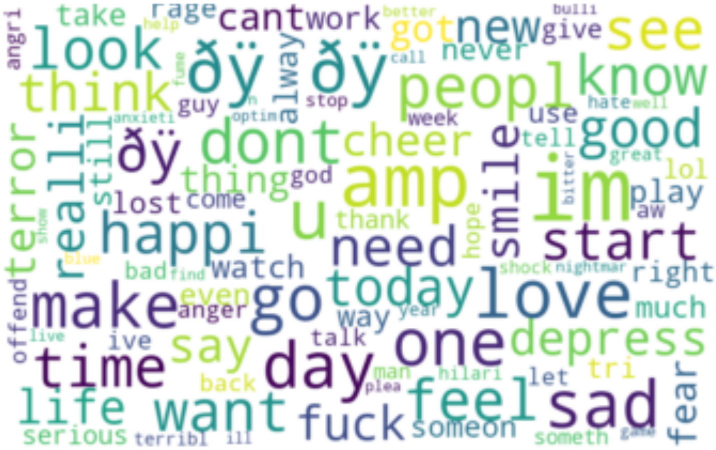
```
# #neutral_text
# print("Neutral tweet example :",neutral['content'].values[0])
# # Positive tweet
# print("Positive Tweet example :",positive['content'].values[0])
# #negative_text
# print("Negative Tweet example :",negative['content'].values[0])
```

In [104…

```
from wordcloud import WordCloud
```

In [105…

```
txt = ' '.join(text for text in data1['Clean tweet'])
wordcloud = WordCloud(
            background_color = 'white',
            max_font_size = 100,
            max_words = 100,
            width = 800,
            height = 500
            ).generate(txt)
plt.imshow(wordcloud,interpolation = 'bilinear')
plt.axis('off')
plt.show()
```

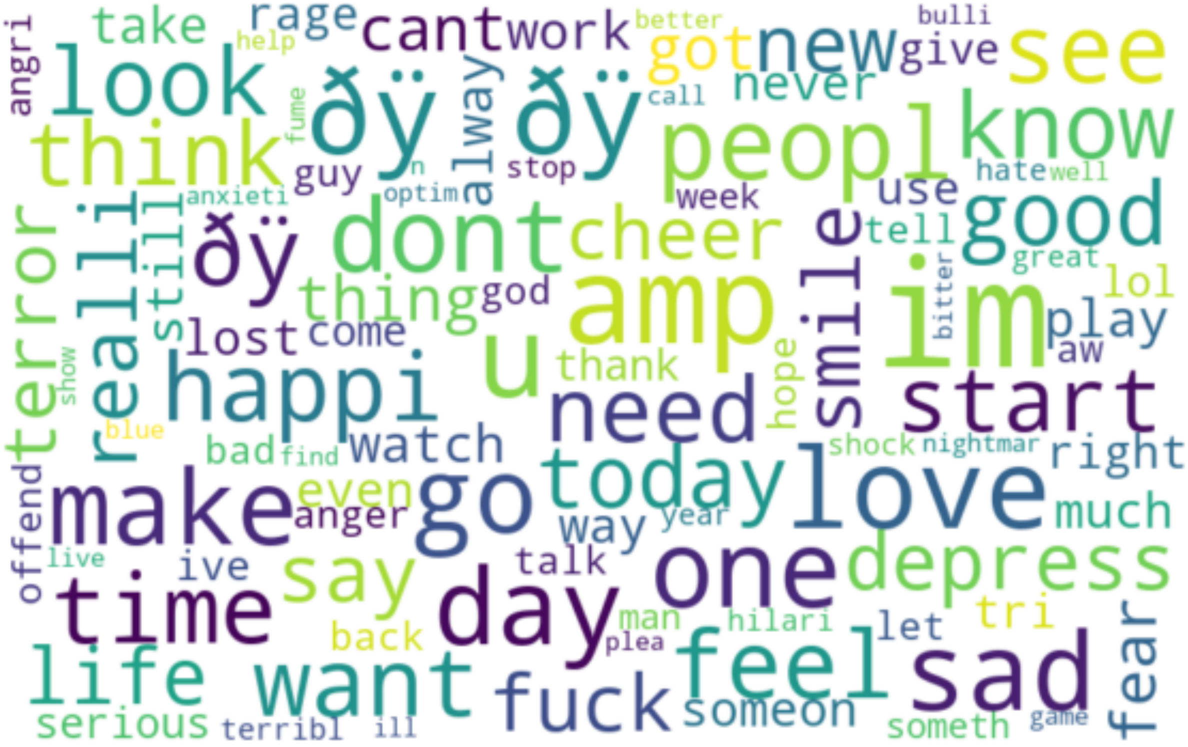


In [100…

```
# positive_words =' '.join([text for text in data1['Clean tweet'][data1['Sent
# #wordcloud = WordCloud(width=800, height=500, random_state=21, max_font_siz
# wordcloud1 = WordCloud(
#             random_state=21,
#             max_font_size = 110,
#             max_words = 100,
#             width = 800,
#             height = 500
#             ).generate(txt)
# plt.figure(figsize=(10, 7))
# plt.imshow(wordcloud, interpolation="bilinear")
# plt.axis('off')
# plt.show()
```

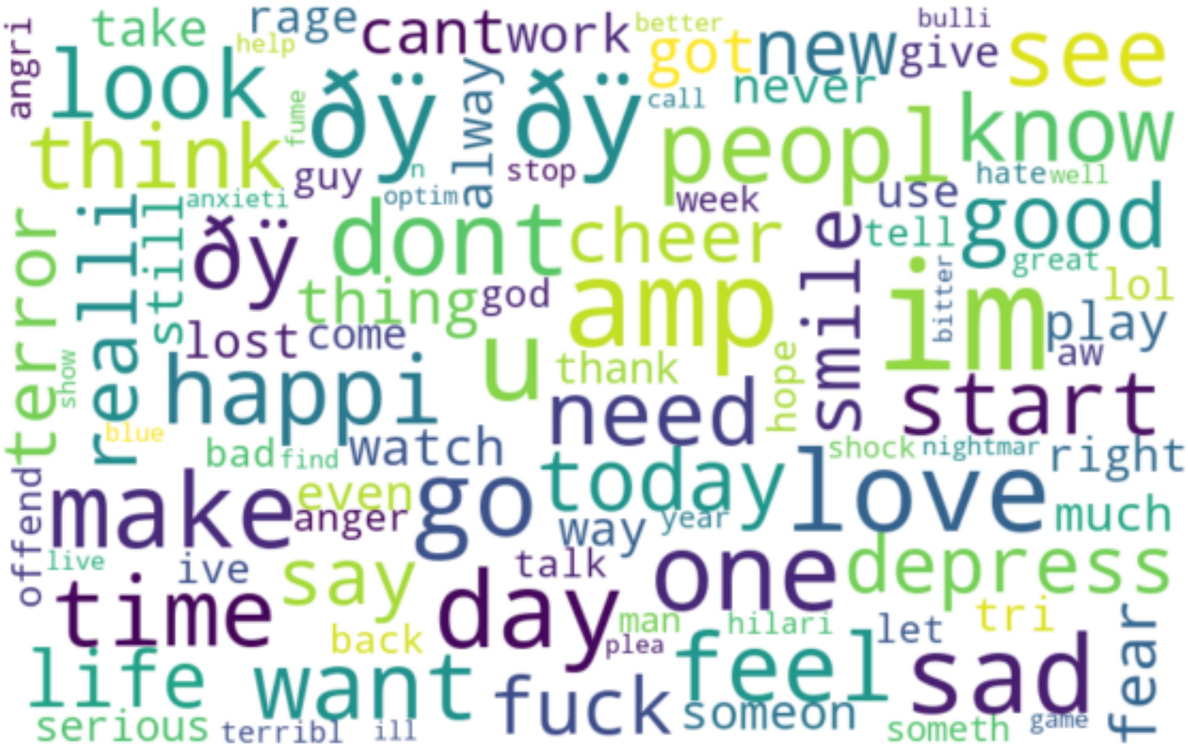
In [110…

```
positive_words =' '.join([text for text in data1['Clean tweet'][data1['sentim
#wordcloud = WordCloud(width=800, height=500, random_state=21, max_font_size=
wordcloud1 = WordCloud(
            random_state=21,
            max_font_size = 110,
            max_words = 100,
            width = 800,
            height = 500
            ).generate(positive_words)
plt.figure(figsize=(10, 7))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis('off')
plt.show()
```



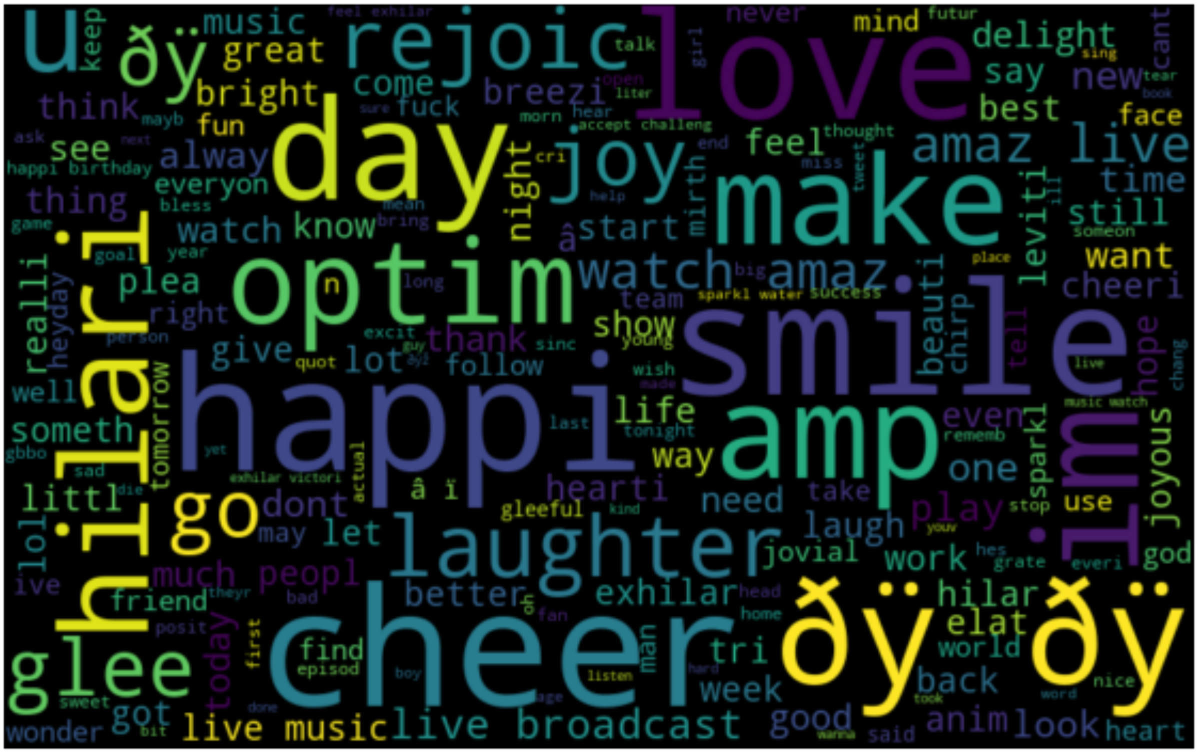
In [112…

```
negative_words =' '.join([text for text in data1['Clean tweet'][data1['sentim
#wordcloud = WordCloud(width=800, height=500, random_state=21, max_font_size=
wordcloud1 = WordCloud(
            random_state=21,
            max_font_size = 110,
            max_words = 100,
            width = 800,
            height = 500
            ).generate(negative_words)
plt.figure(figsize=(10, 7))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis('off')
plt.show()
```



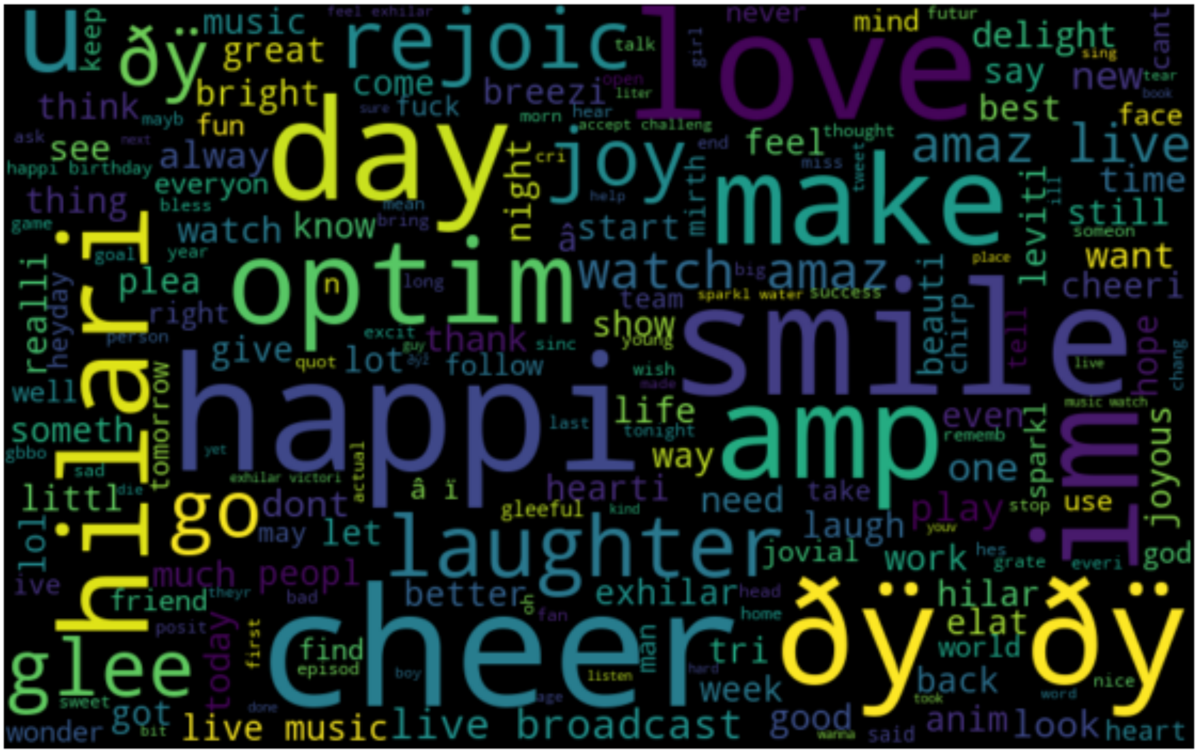
In [114…

```
neutral_words =' '.join([text for text in data1['Clean tweet'][data1['sentime
wordcloud = WordCloud(width=800, height=500, random_state=21, max_font_size=1
plt.figure(figsize=(10, 7))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis('off')
plt.show()
```



In [115…

```
sad1 =' '.join([text for text in data1['Clean tweet'][data1['sentiment'] == '
wordcloud = WordCloud(width=800, height=500, random_state=21, max_font_size=1
plt.figure(figsize=(10, 7))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis('off')
plt.show()
```



Thank you for time.

Dataset may be shared upon request.

```
In [ ]:
```