CIS668_Data_Project_FinalCode

March 4, 2022

[42]:

```
#GETTING TWEETS FROM FIRST DATASET
tweets = []
for line in open('tweets_data_1.txt'):
        tweets.append(line)
print(tweets[21])
```

```
"US #CoronaVirus: To date, a total of 122,246 cases and 2,047 total deaths and
#COVID19 deaths have been confirmed in the United
States.\n\n#CoronaVirusOutbreak https://t.co/Uk3z6VTMGa"
```

[63]:

```
import re
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import string
import nltk
import warnings
warnings.filterwarnings("ignore", category=DeprecationWarning)

%matplotlib inline
```

[380]:

```
df = pd.DataFrame(columns=['tweet'])
for i in range(0,len(tweets)):
    df.loc[i,'tweet'] = tweets[i]
```

[381]:

```
print(df)
```

```
                                                   tweet
0      "USA reports 40 new cases and 9 new deaths bri…
1      "#Coronavirus | Tata Sons to contribute Rs 1,0…
2      "\ud83d\udce2 Treatment algorithm for #COVID19…
3      "This is becoming an evergreen tweet.\ud83e\ud…
4      "Beware stimulus check scams https://t.co/kFJr…
…                                                    …
49424  "Coronavirus killing more than one NYC residen…
49425  "#Boston Children\u2019s Hospital in critical …
```

```
49426  "When is the best time to sell in a #bearmarke…
49427  "10:20am (100 to go!)\n\nThis is not good.. it…
49428  "#Boston Children\u2019s Hospital in critical …

[49429 rows x 1 columns]
```

[382]:

```python
def remove_pattern(text, pattern):
    r = re.findall(pattern, text)
    for i in r:
        text = re.sub(i, '', text)

    return text
```

[383]:

```python
#Remove twitter handlers(@user)
df['cleaned_tweet'] = np.vectorize(remove_pattern)(df['tweet'], "@[\w]*")
print(df['tweet'][1])
print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus.  \n\n#COVID19
#StayHomeStaySafe https://t.co/sopiF0LnvJ"
```

[384]:

```python
#Remove newlines
df['cleaned_tweet'] = df['cleaned_tweet'].str.replace(r'\\n', ' ')
print(df['tweet'][1])
print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak   Earlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus.    #COVID19
#StayHomeStaySafe https://t.co/sopiF0LnvJ"
```

[385]:

```python
#Remove non-ascii characters
'''df['cleaned_tweet'] = df['cleaned_tweet'].str.replace(r'[^\x00-\x7F]+', '')
print(df['tweet'][2])
print(df['cleaned_tweet'][2])'''
```

```
[385]: "df['cleaned_tweet'] = df['cleaned_tweet'].str.replace(r'[^\x00-\x7f]+',
       '')\nprint(df['tweet'][2])\nprint(df['cleaned_tweet'][2])"
```

```
[386]: #Remove url links
       df['cleaned_tweet'] = df['cleaned_tweet'].str.replace("http\S+", "")
       print(df['tweet'][1])
       print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak   Earlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus.    #COVID19
#StayHomeStaySafe
```

```
[387]: #remove punctuations, numbers and special characters
       df['cleaned_tweet'] = df['cleaned_tweet'].str.replace("[^a-zA-Z#]", " ")
       print(df['tweet'][1])
       print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

 #Coronavirus   Tata Sons to contribute Rs       cr towards fighting the
#CoronavirusOutbreak   Earlier today  Tata Trusts had pledged Rs     cr to
protect  amp  empower communities affected by the virus     #COVID
#StayHomeStaySafe
```

```
[388]: #remove multiple whitespaces
       df['cleaned_tweet'] = df['cleaned_tweet'].str.replace("\s+", " ")
       print(df['tweet'][1])
       print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

 #Coronavirus Tata Sons to contribute Rs cr towards fighting the
#CoronavirusOutbreak Earlier today Tata Trusts had pledged Rs cr to protect amp
```

```
empower communities affected by the virus #COVID #StayHomeStaySafe
```

[389]:

```
#removing short words
df['cleaned_tweet'] = df['cleaned_tweet'].apply(lambda x: ' '.join([w for w in␣
 ↪x.split() if len(w) > 3]))
print(df['tweet'][1])
print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

#Coronavirus Tata Sons contribute towards fighting #CoronavirusOutbreak Earlier
today Tata Trusts pledged protect empower communities affected virus #COVID
#StayHomeStaySafe
```

[390]:

```
#making lowercase
df['cleaned_tweet'] = df['cleaned_tweet'].str.lower()
print(df['tweet'][1])
print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

#coronavirus tata sons contribute towards fighting #coronavirusoutbreak earlier
today tata trusts pledged protect empower communities affected virus #covid
#stayhomestaysafe
```

[391]:

```
#tokenizing tweets
tokenized_tweet = df['cleaned_tweet'].apply(lambda x: x.split())
```

[392]:

```
tokenized_tweet.head()
```

[392]:

```
0    [reports, cases, deaths, bringing, total, conf…
1    [#coronavirus, tata, sons, contribute, towards…
2    [udce, treatment, algorithm, #covid, udce, ple…
3    [this, becoming, evergreen, tweet, #coronaviru…
4    [beware, stimulus, check, scams, #secops, #sec…
Name: cleaned_tweet, dtype: object
```

[393]:

```
print(tokenized_tweet[1])
```

```
['#coronavirus', 'tata', 'sons', 'contribute', 'towards', 'fighting',
'#coronavirusoutbreak', 'earlier', 'today', 'tata', 'trusts', 'pledged',
'protect', 'empower', 'communities', 'affected', 'virus', '#covid',
'#stayhomestaysafe']
```

[394]:

```
#stemming tweets
'''from nltk.stem.porter import *
stemmer = PorterStemmer()

tokenized_tweet = tokenized_tweet.apply(lambda x: [stemmer.stem(i) for i in␣
 ↪x])'''
```

[394]:

```
'from nltk.stem.porter import *\nstemmer = PorterStemmer()\n\ntokenized_tweet =
tokenized_tweet.apply(lambda x: [stemmer.stem(i) for i in x])'
```

[396]:

```
#lemmatizing tweets
import nltk
from nltk.corpus import wordnet
from nltk import pos_tag
lemmatizer = nltk.stem.WordNetLemmatizer()

def get_wordnet_pos(pos_tag):
    if pos_tag.startswith('J'):
        return wordnet.ADJ
    elif pos_tag.startswith('V'):
        return wordnet.VERB
    elif pos_tag.startswith('N'):
        return wordnet.NOUN
    elif pos_tag.startswith('R'):
        return wordnet.ADV
    else:
        return wordnet.NOUN
def lemmatize_text(text):
    # lemmatize text
    pos_tags = pos_tag(text)
    text = [lemmatizer.lemmatize(t[0], get_wordnet_pos(t[1])) for t in pos_tags]
    return text
# tokenized_tweet = tokenized_tweet.apply(lambda x: [lemmatizer.lemmatize(i)␣
 ↪for i in x])
# tokenized_tweet = tokenized_tweet.apply(lambda x: [lemmatize_text(x)])
lemmatized_tweet = []
for tweet in tokenized_tweet:
    #print(tweet)
    tweet = lemmatize_text(tweet)
    #print("----")
    #print(tweet)
    lemmatized_tweet.append(tweet)
```

[397]:

```
'''for i in range(len(tokenized_tweet)):
    tokenized_tweet[i] = ' '.join(tokenized_tweet[i])'''
for i in range(len(lemmatized_tweet)):
    lemmatized_tweet[i] = ' '.join(lemmatized_tweet[i])
df['cleaned_tweet'] = lemmatized_tweet
print(df.head())
```

```
                                               tweet  \
0  "USA reports 40 new cases and 9 new deaths bri…
1  "#Coronavirus | Tata Sons to contribute Rs 1,0…
2  "\ud83d\udce2 Treatment algorithm for #COVID19…
3  "This is becoming an evergreen tweet.\ud83e\ud…
4  "Beware stimulus check scams https://t.co/kFJr…

                                       cleaned_tweet
0  report case death bring total confirmed case t…
1  #coronavirus tata son contribute towards fight…
2  udce treatment algorithm #covid udce please sh…
3  this become evergreen tweet #coronavirus #covi…
4  beware stimulus check scams #secops #security …
```

[398]:

```
print(df['tweet'][1])
print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

#coronavirus tata son contribute towards fight #coronavirusoutbreak earlier
today tata trust pledge protect empower community affect virus #covid
#stayhomestaysafe
```

[399]:

```
print(df['tweet'][1])
print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

#coronavirus tata son contribute towards fight #coronavirusoutbreak earlier
today tata trust pledge protect empower community affect virus #covid
#stayhomestaysafe
```

[400]:

```
print(df['tweet'][1])
print(df['cleaned_tweet'][1])
```

```
"#Coronavirus | Tata Sons to contribute Rs 1,000 cr towards fighting the
#CoronavirusOutbreak \n\nEarlier today, Tata Trusts had pledged Rs 500 cr to
protect &amp; empower communities affected by the virus. @RNTata2000
\n\n#COVID19 #StayHomeStaySafe https://t.co/sopiF0LnvJ"

#coronavirus tata son contribute towards fight #coronavirusoutbreak earlier
today tata trust pledge protect empower community affect virus #covid
#stayhomestaysafe
```

[401]:

```
df
```

[401]:

```
                                                   tweet  \
0      "USA reports 40 new cases and 9 new deaths bri…
1      "#Coronavirus | Tata Sons to contribute Rs 1,0…
2      "\ud83d\udce2 Treatment algorithm for #COVID19…
3      "This is becoming an evergreen tweet.\ud83e\ud…
4      "Beware stimulus check scams https://t.co/kFJr…
…                                                  …
49424  "Coronavirus killing more than one NYC residen…
49425  "#Boston Children\u2019s Hospital in critical …
49426  "When is the best time to sell in a #bearmarke…
49427  "10:20am (100 to go!)\n\nThis is not good.. it…
49428  "#Boston Children\u2019s Hospital in critical …

                                           cleaned_tweet
0      report case death bring total confirmed case t…
1      #coronavirus tata son contribute towards fight…
2      udce treatment algorithm #covid udce please sh…
3      this become evergreen tweet #coronavirus #covi…
4      beware stimulus check scams #secops #security …
…                                                  …
49424  coronavirus kill more than resident hour #coro…
49425  #boston child hospital critical need blood don…
49426  when best time sell #bearmarket when deal with…
49427  this good trending high prediction #covidfutur…
49428  #boston child hospital critical need blood don…

[49429 rows x 2 columns]
```

[402]:

```
#Getting emotion lexicon data
emolex_df = pd.read_csv("NRC-Emotion-Lexicon-Wordlevel-v0.92.txt",
                        names=["word","emotion","association"],
                        sep="\t")
print(emolex_df)
```

```
          word      emotion  association
0        aback        anger            0
1        aback  anticipation           0
```

```
2         aback     disgust            0
3         aback        fear            0
4         aback         joy            0
…         …           …           …
141815     zoom    negative            0
141816     zoom    positive            0
141817     zoom     sadness            0
141818     zoom    surprise            0
141819     zoom       trust            0

[141820 rows x 3 columns]
```

[403]:

```
emolex_words = emolex_df.pivot(index='word',
                                   columns='emotion',
                                  values='association').reset_index()
emotions = emolex_words.columns.drop('word')
emo_df = pd.DataFrame(0, index=df.index, columns=emotions)

print(emo_df.head(100))
```

```
emotion  anger  anticipation  disgust  fear  joy  negative  positive  sadness  \
0            0             0        0     0    0         0         0        0
1            0             0        0     0    0         0         0        0
2            0             0        0     0    0         0         0        0
3            0             0        0     0    0         0         0        0
4            0             0        0     0    0         0         0        0
..         …            …       …   …  …       …       …       …
95           0             0        0     0    0         0         0        0
96           0             0        0     0    0         0         0        0
97           0             0        0     0    0         0         0        0
98           0             0        0     0    0         0         0        0
99           0             0        0     0    0         0         0        0

emotion  surprise  trust
0               0      0
1               0      0
2               0      0
3               0      0
4               0      0
..            …    …
95              0      0
96              0      0
97              0      0
98              0      0
99              0      0

[100 rows x 10 columns]
```

[404]:

```
#len(df['cleaned_tweet'])
for i in range(0, 5):
    print(df['cleaned_tweet'][i])
```

```
report case death bring total confirmed case there total death with case death
report today #coronavirus #covid #coronavirusoutbreak
#coronavirus tata son contribute towards fight #coronavirusoutbreak earlier
today tata trust pledge protect empower community affect virus #covid
#stayhomestaysafe
udce treatment algorithm #covid udce please share treatment algorithm from
#coronavirus #coronavirusoutbreak #medtwitter udce include recommended med
reference
this become evergreen tweet #coronavirus #covid #coronavirusoutbreak
#coronaviruspandemic
beware stimulus check scams #secops #security #crypto #privacy #hackers #breach
#pii #cybersecurity #zeroday #malware #phishing #patches #exploit #coronavirus
#coronavirusoutbreak #covid #covid #medtwitter #coronaviruschallenge #corona
#pandemic
```

[405]:

```
print(df['cleaned_tweet'][0])
```

```
report case death bring total confirmed case there total death with case death
report today #coronavirus #covid #coronavirusoutbreak
```

[406]:

```
document = []
from nltk import word_tokenize
for i in range(0, len(lemmatized_tweet)):
    document = word_tokenize(df['cleaned_tweet'][i])
    for word in document:
        if len(word) > 1:
            #print(word)
            emo_score = emolex_words[emolex_words.word == word]
            if not emo_score.empty:
                for emotion in list(emotions):
                    emo_df.at[i, emotion] += emo_score[emotion]

new_df = pd.concat([df, emo_df], axis=1)
print(new_df)
```

```
                                                   tweet  \
0      "USA reports 40 new cases and 9 new deaths bri…
1      "#Coronavirus | Tata Sons to contribute Rs 1,0…
2      "\ud83d\udce2 Treatment algorithm for #COVID19…
3      "This is becoming an evergreen tweet.\ud83e\ud…
4      "Beware stimulus check scams https://t.co/kFJr…
…                                                  …
49424  "Coronavirus killing more than one NYC residen…
49425  "#Boston Children\u2019s Hospital in critical …
```

```
49426  "When is the best time to sell in a #bearmarke…
49427  "10:20am (100 to go!)\n\nThis is not good.. it…
49428  "#Boston Children\u2019s Hospital in critical …

                                           cleaned_tweet  anger  anticipation  \
0      report case death bring total confirmed case t…      3             3
1      #coronavirus tata son contribute towards fight…      1             0
2      udce treatment algorithm #covid udce please sh…      0             1
3      this become evergreen tweet #coronavirus #covi…      0             0
4      beware stimulus check scams #secops #security …      0             1
…                                                    …    …           …
49424  coronavirus kill more than resident hour #coro…      0             0
49425  #boston child hospital critical need blood don…      0             1
49426  when best time sell #bearmarket when deal with…      1             4
49427  this good trending high prediction #covidfutur…      0             3
49428  #boston child hospital critical need blood don…      0             1

       disgust  fear  joy  negative  positive  sadness  surprise  trust
0            3     6    0         6         1        6         3      1
1            0     1    1         2         5        0         0      2
2            0     0    1         0         2        0         0      1
3            0     0    1         0         1        0         0      1
4            0     2    0         3         0        1         0      0
…          …     …  …       …       …      …       …    …
49424        0     1    0         1         1        1         0      0
49425        0     1    1         0         2        1         0      1
49426        0     1    2         1         2        0         2      2
49427        0     1    1         1         1        1         1      1
49428        0     1    1         0         2        1         0      1

[49429 rows x 12 columns]
```

[407]:

```
new_df
```

[407]:

```
                                                   tweet  \
0      "USA reports 40 new cases and 9 new deaths bri…
1      "#Coronavirus | Tata Sons to contribute Rs 1,0…
2      "\ud83d\udce2 Treatment algorithm for #COVID19…
3      "This is becoming an evergreen tweet.\ud83e\ud…
4      "Beware stimulus check scams https://t.co/kFJr…
…                                                    …
49424  "Coronavirus killing more than one NYC residen…
49425  "#Boston Children\u2019s Hospital in critical …
49426  "When is the best time to sell in a #bearmarke…
49427  "10:20am (100 to go!)\n\nThis is not good.. it…
49428  "#Boston Children\u2019s Hospital in critical …
```

```
                                          cleaned_tweet  anger  anticipation  \
0      report case death bring total confirmed case t…      3             3
1      #coronavirus tata son contribute towards fight…      1             0
2      udce treatment algorithm #covid udce please sh…      0             1
3      this become evergreen tweet #coronavirus #covi…      0             0
4      beware stimulus check scams #secops #security …      0             1
…                                                   …    …           …
49424  coronavirus kill more than resident hour #coro…      0             0
49425  #boston child hospital critical need blood don…      0             1
49426  when best time sell #bearmarket when deal with…      1             4
49427  this good trending high prediction #covidfutur…      0             3
49428  #boston child hospital critical need blood don…      0             1

       disgust  fear  joy  negative  positive  sadness  surprise  trust
0            3     6    0         6         1        6         3      1
1            0     1    1         2         5        0         0      2
2            0     0    1         0         2        0         0      1
3            0     0    1         0         1        0         0      1
4            0     2    0         3         0        1         0      0
…          …   …  …       …       …       …       …    …
49424        0     1    0         1         1        1         0      0
49425        0     1    1         0         2        1         0      1
49426        0     1    2         1         2        0         2      2
49427        0     1    1         1         1        1         1      1
49428        0     1    1         0         2        1         0      1

[49429 rows x 12 columns]
```

[413]:

```
count = []
for i in range(0, len(lemmatized_tweet)):
    counter = 0
    document = word_tokenize(df['cleaned_tweet'][i])
    for word in document:
        if len(word) > 1:
            counter = counter + 1
    count.append(counter)
#print(count)
new_df['word_count'] = count
```

[416]:

```
#del new_df['tweet']
new_df
```

[416]:

```
                                          cleaned_tweet  anger  anticipation  \
0      report case death bring total confirmed case t…      3             3
1      #coronavirus tata son contribute towards fight…      1             0
2      udce treatment algorithm #covid udce please sh…      0             1
3      this become evergreen tweet #coronavirus #covi…      0             0
```

```
4      beware stimulus check scams #secops #security …      0             1
…                                                  …    …           …
49424  coronavirus kill more than resident hour #coro…      0             0
49425  #boston child hospital critical need blood don…      0             1
49426  when best time sell #bearmarket when deal with…      1             4
49427  this good trending high prediction #covidfutur…      0             3
49428  #boston child hospital critical need blood don…      0             1

       disgust  fear  joy  negative  positive  sadness  surprise  trust  \
0            3     6    0         6         1        6         3      1
1            0     1    1         2         5        0         0      2
2            0     0    1         0         2        0         0      1
3            0     0    1         0         1        0         0      1
4            0     2    0         3         0        1         0      0
…         …   …  …       …       …      …       …    …
49424        0     1    0         1         1        1         0      0
49425        0     1    1         0         2        1         0      1
49426        0     1    2         1         2        0         2      2
49427        0     1    1         1         1        1         1      1
49428        0     1    1         0         2        1         0      1

       word_count
0              18
1              19
2              18
3               8
4              25
…            …
49424          14
49425          13
49426          22
49427          21
49428          13

[49429 rows x 12 columns]
```

[417]:
```
emotion_set = ['anger', 'anticipation', 'disgust', 'fear', 'joy', 'negative',␣
 ↪'positive', 'sadness', 'surprise', 'trust']
```

[418]:
```
for emotion in emotion_set:
    new_df[emotion] = new_df[emotion] / new_df['word_count']
```

[419]:
```
new_df
```

[419]:
```
                                         cleaned_tweet     anger  \
0      report case death bring total confirmed case t…  0.166667
1      #coronavirus tata son contribute towards fight…  0.052632
```

```
2      udce treatment algorithm #covid udce please sh…  0.000000
3      this become evergreen tweet #coronavirus #covi…  0.000000
4      beware stimulus check scams #secops #security …  0.000000
…                                                  …       …
49424  coronavirus kill more than resident hour #coro…  0.000000
49425  #boston child hospital critical need blood don…  0.000000
49426  when best time sell #bearmarket when deal with…  0.045455
49427  this good trending high prediction #covidfutur…  0.000000
49428  #boston child hospital critical need blood don…  0.000000

       anticipation   disgust      fear       joy  negative  positive  \
0          0.166667  0.166667  0.333333  0.000000  0.333333  0.055556
1          0.000000  0.000000  0.052632  0.052632  0.105263  0.263158
2          0.055556  0.000000  0.000000  0.055556  0.000000  0.111111
3          0.000000  0.000000  0.000000  0.125000  0.000000  0.125000
4          0.040000  0.000000  0.080000  0.000000  0.120000  0.000000
…                 …       …       …       …       …       …
49424      0.000000  0.000000  0.071429  0.000000  0.071429  0.071429
49425      0.076923  0.000000  0.076923  0.076923  0.000000  0.153846
49426      0.181818  0.000000  0.045455  0.090909  0.045455  0.090909
49427      0.142857  0.000000  0.047619  0.047619  0.047619  0.047619
49428      0.076923  0.000000  0.076923  0.076923  0.000000  0.153846

        sadness  surprise     trust  word_count
0      0.333333  0.166667  0.055556          18
1      0.000000  0.000000  0.105263          19
2      0.000000  0.000000  0.055556          18
3      0.000000  0.000000  0.125000           8
4      0.040000  0.000000  0.000000          25
…          …       …       …         …
49424  0.071429  0.000000  0.000000          14
49425  0.076923  0.000000  0.076923          13
49426  0.000000  0.090909  0.090909          22
49427  0.047619  0.047619  0.047619          21
49428  0.076923  0.000000  0.076923          13

[49429 rows x 12 columns]
```

[479]:

```python
length = len(new_df)
#find average of anger sentiment accross tweets
avg_anger = 0.0
sum_anger = 0.0
for i in range(0, length-1):
    sum_anger = sum_anger + new_df['anger'][i]

avg_anger = sum_anger / length
print("Sum anger: ",sum_anger)
print("Avg anger: ",avg_anger)
print("--------------------------")
#find average of anticipation sentiment accross tweets
avg_anticipation = 0.0
sum_anticipation = 0.0
for i in range(0, length-1):
    sum_anticipation = sum_anticipation + new_df['anticipation'][i]

avg_anticipation = sum_anticipation / length
print("Sum anticipation: ",sum_anticipation)
print("Avg anticipation: ",avg_anticipation)
#find average of disgust sentiment accross tweets
avg_disgust = 0.0
sum_disgust = 0.0
for i in range(0, length-1):
    sum_disgust = sum_disgust + new_df['disgust'][i]

avg_disgust = sum_disgust / length
print("Sum disgust: ",sum_disgust)
print("Avg disgust: ",avg_disgust)
print("--------------------------")
#find average of fear sentiment accross tweets
avg_fear = 0.0
sum_fear = 0.0
for i in range(0, length-1):
    sum_fear = sum_fear + new_df['fear'][i]

avg_fear = sum_fear / length
print("Sum fear: ",sum_anticipation)
print("Avg fear: ",avg_anticipation)
################################################
#find average of joy sentiment accross tweets
avg_joy = 0.0
sum_joy = 0.0
for i in range(0, length-1):
    sum_joy = sum_joy + new_df['joy'][i]

avg_joy = sum_joy / length
print("Sum joy: ",sum_joy)
print("Avg joy: ",avg_joy)
print("--------------------------")
#find average of sadness sentiment accross tweets
avg_sadness = 0.0
sum_sadness = 0.0
for i in range(0, length-1):
    sum_sadness = sum_sadness + new_df['sadness'][i]
```

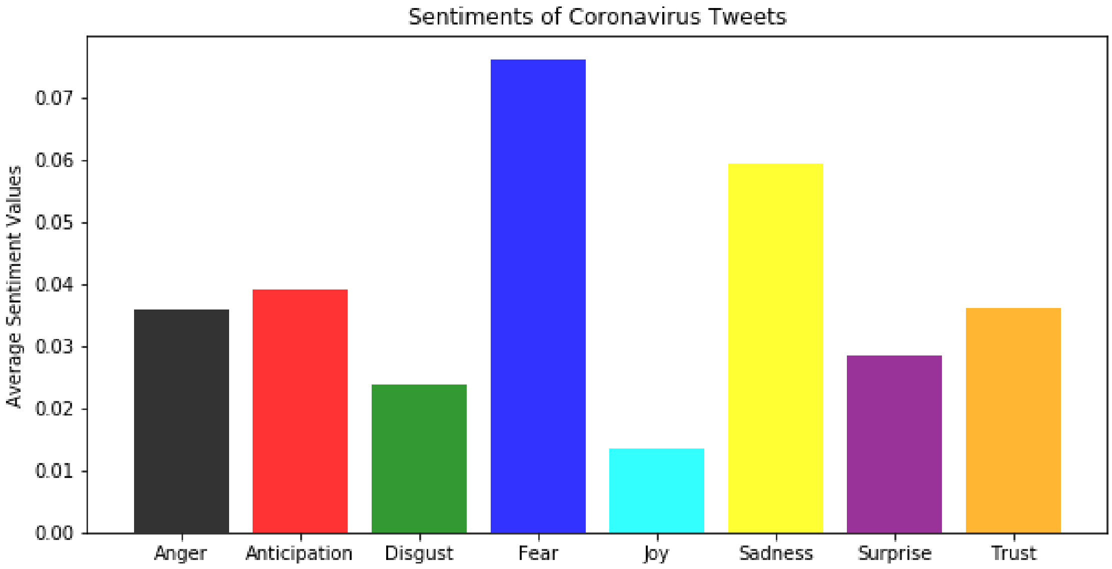
```
avg_sadness = sum_sadness / length
print("Sum sadness: ",sum_sadness)
print("Avg sadness: ",avg_sadness)
#find average of surprise sentiment accross tweets
avg_surprise = 0.0
sum_surprise = 0.0
for i in range(0, length-1):
    sum_surprise = sum_surprise + new_df['surprise'][i]

avg_surprise = sum_surprise / length
print("Sum surprise: ",sum_surprise)
print("Avg surprise: ",avg_surprise)
print("--------------------------")
#find average of fear sentiment accross tweets
avg_trust = 0.0
sum_trust = 0.0
for i in range(0, length-1):
    sum_trust = sum_trust + new_df['trust'][i]

avg_trust = sum_trust / length
print("Sum trust: ",sum_trust)
print("Avg trust: ",avg_trust)
```

```
Sum anger:  1777.0561931967818
Avg anger:  0.03595169218873094
--------------------------
Sum anticipation:  1928.1485814852217
Avg anticipation:  0.039008448107087375
Sum disgust:  1171.3856287025355
Avg disgust:  0.023698347704839983
--------------------------
Sum fear:  1928.1485814852217
Avg fear:  0.039008448107087375
Sum joy:  663.7012254347273
Avg joy:  0.013427365017190867
--------------------------
Sum sadness:  2927.767224689682
Avg sadness:  0.059231771322294235
Sum surprise:  1406.0724720341816
Avg surprise:  0.028446306258151723
--------------------------
Sum trust:  1788.2684415874414
Avg trust:  0.036178527617136524
```

[443]:

```
avg_sentiment = [avg_anger, avg_anticipation, avg_disgust, avg_fear, avg_joy,␣
 ↪avg_sadness, avg_surprise, avg_trust]
```

```
bars = ["Anger", "Anticipation", "Disgust", "Fear", "Joy", "Sadness",␣
↪"Surprise", "Trust"]
y_pos = np.arange(len(bars))

plt.figure(figsize=(10,5))
plt.bar(y_pos, avg_sentiment, color=['black', 'red', 'green', 'blue', 'cyan',␣
↪'yellow', 'purple', 'orange'], align='center', alpha=0.8)
plt.xticks(y_pos, bars)
plt.ylabel('Average Sentiment Values')
plt.title('Sentiments of Coronavirus Tweets')
plt.show()
```



[446]:

```
#---------------------------------------------------------------------------
#GETTING TWEETS FROM SECOND DATASET
tweets2 = []
for line in open('tweets_data_2.txt'):
        tweets2.append(line)
print(tweets2[0])
```

```
"Spain reports 2,579 new cases and 276 new deaths bringing total confirmed cases
there to 245,567 and 25,100 total deaths.\n\n#CoronaVirus #Covid19
#CoronaVirusOutbreak"
```

[447]:

```
df2 = pd.DataFrame(columns=['tweet'])
for i in range(0,len(tweets2)):
    df2.loc[i,'tweet'] = tweets2[i]
print(df2)
```

```
      tweet2                                              tweet
0        NaN  "Spain reports 2,579 new cases and 276 new dea…
1        NaN  "#CoronavirusOutbreak | The confirmed cases in…
2        NaN  "Brazil reports 428 new cases and 22 new death…
3        NaN  "California reports 58 new cases and 1 new dea…
4        NaN  "Ecuador reports 1,128 new cases and 308 new d…
…      …                                                …
49949    NaN  "Brazil reports 1,048 new cases and 34 new dea…
49950    NaN  "Watch special feature on #COVID19, this morni…
49951    NaN  "COVID-19: 11 individuals test positive in #Ma…
49952    NaN  "Big business resorts in #Maldives keeps on hi…
49953    NaN  "Watch special feature on #COVID19, this morni…

[49954 rows x 2 columns]
```

[453]:

```
#Remove twitter handlers(@user)
df2['cleaned_tweet'] = np.vectorize(remove_pattern)(df2['tweet'], "@[\w]*")
#Remove newlines
df2['cleaned_tweet'] = df2['cleaned_tweet'].str.replace(r'\\n', ' ')
#Remove url links
df2['cleaned_tweet'] = df2['cleaned_tweet'].str.replace("http\S+", "")
#remove punctuations, numbers and special characters
df2['cleaned_tweet'] = df2['cleaned_tweet'].str.replace("[^a-zA-Z#]", " ")
#remove multiple whitespaces
df['cleaned_tweet'] = df['cleaned_tweet'].str.replace("\s+", " ")
#removing short words
df2['cleaned_tweet'] = df2['cleaned_tweet'].apply(lambda x: ' '.join([w for w␣
 ↪in x.split() if len(w) > 3]))
#making lowercase
df2['cleaned_tweet'] = df2['cleaned_tweet'].str.lower()

print(df2['tweet'][0])
print(df2['cleaned_tweet'][0])
```

```
"Spain reports 2,579 new cases and 276 new deaths bringing total confirmed cases
there to 245,567 and 25,100 total deaths.\n\n#CoronaVirus #Covid19
#CoronaVirusOutbreak"

spain reports cases deaths bringing total confirmed cases there total deaths
#coronavirus #covid #coronavirusoutbreak
```

[454]:

```
#tokenizing tweets
tokenized_tweet2 = df2['cleaned_tweet'].apply(lambda x: x.split())
print(tokenized_tweet2.head())
```

```
0    [spain, reports, cases, deaths, bringing, tota…
1    [#coronavirusoutbreak, confirmed, cases, india…
2    [brazil, reports, cases, deaths, bringing, tot…
```

```
3    [california, reports, cases, death, bringing, …
4    [ecuador, reports, cases, deaths, bringing, to…
Name: cleaned_tweet, dtype: object
```

[455]:

```
lemmatized_tweet2 = []
for tweet in tokenized_tweet2:
    #print(tweet)
    tweet = lemmatize_text(tweet)
    #print("----")
    #print(tweet)
    lemmatized_tweet2.append(tweet)
```

[456]:

```
'''for i in range(len(tokenized_tweet)):
    tokenized_tweet[i] = ' '.join(tokenized_tweet[i])'''
for i in range(len(lemmatized_tweet2)):
    lemmatized_tweet2[i] = ' '.join(lemmatized_tweet2[i])
df2['cleaned_tweet'] = lemmatized_tweet2
print(df2.head())
```

```
                                               tweet  \
0  "Spain reports 2,579 new cases and 276 new dea…
1  "#CoronavirusOutbreak | The confirmed cases in…
2  "Brazil reports 428 new cases and 22 new death…
3  "California reports 58 new cases and 1 new dea…
4  "Ecuador reports 1,128 new cases and 308 new d…

                                       cleaned_tweet
0  spain report case death bring total confirmed …
1  #coronavirusoutbreak confirm case india climb …
2  brazil report case death bring total confirmed…
3  california report case death bring total confi…
4  ecuador report case death bring total confirme…
```

[457]:

```
print(df2['tweet'][0])
print(df2['cleaned_tweet'][0])
```

```
"Spain reports 2,579 new cases and 276 new deaths bringing total confirmed cases
there to 245,567 and 25,100 total deaths.\n\n#CoronaVirus #Covid19
#CoronaVirusOutbreak"

spain report case death bring total confirmed case there total death
#coronavirus #covid #coronavirusoutbreak
```

[468]:

```
#Getting emotion lexicon data
emolex_df2 = pd.read_csv("NRC-Emotion-Lexicon-Wordlevel-v0.92.txt",
                         names=["word","emotion","association"],
                         sep="\t")
print(emolex_df2)
```

```
         word       emotion  association
0       aback         anger            0
1       aback  anticipation            0
2       aback       disgust            0
3       aback          fear            0
4       aback           joy            0
…       …           …          …
141815   zoom      negative            0
141816   zoom      positive            0
141817   zoom       sadness            0
141818   zoom      surprise            0
141819   zoom         trust            0

[141820 rows x 3 columns]
```

[472]:
```
emolex_words2 = emolex_df2.pivot(index='word',
                                   columns='emotion',
                                   values='association').reset_index()
emotions2 = emolex_words2.columns.drop('word')
emo_df2 = pd.DataFrame(0, index=df2.index, columns=emotions2)

print(emo_df2.head(100))
#print(len(emo_df2))
```

```
emotion  anger  anticipation  disgust  fear  joy  negative  positive  sadness  \
0            0             0        0     0    0         0         0        0
1            0             0        0     0    0         0         0        0
2            0             0        0     0    0         0         0        0
3            0             0        0     0    0         0         0        0
4            0             0        0     0    0         0         0        0
..         …           …      …   …  …       …       …      …
95           0             0        0     0    0         0         0        0
96           0             0        0     0    0         0         0        0
97           0             0        0     0    0         0         0        0
98           0             0        0     0    0         0         0        0
99           0             0        0     0    0         0         0        0

emotion  surprise  trust
0               0      0
1               0      0
2               0      0
3               0      0
4               0      0
..            …    …
95              0      0
96              0      0
97              0      0
98              0      0
```

```
99                0      0

[100 rows x 10 columns]
49954
```

[473]:
```python
document2 = []
for i in range(0, len(df2)-1):
    document2 = word_tokenize(df2['cleaned_tweet'][i])
    for word in document2:
        if len(word) > 1:
            #print(word)
            emo_score2 = emolex_words2[emolex_words2.word == word]
            if not emo_score2.empty:
                for emotion in list(emotions2):
                    emo_df2.at[i, emotion] += emo_score2[emotion]

new_df2 = pd.concat([df2, emo_df2], axis=1)
print(new_df2)
```

```
                                                    tweet  \
0      "Spain reports 2,579 new cases and 276 new dea…
1      "#CoronavirusOutbreak | The confirmed cases in…
2      "Brazil reports 428 new cases and 22 new death…
3      "California reports 58 new cases and 1 new dea…
4      "Ecuador reports 1,128 new cases and 308 new d…
…                                                   …
49949  "Brazil reports 1,048 new cases and 34 new dea…
49950  "Watch special feature on #COVID19, this morni…
49951  "COVID-19: 11 individuals test positive in #Ma…
49952  "Big business resorts in #Maldives keeps on hi…
49953  "Watch special feature on #COVID19, this morni…

                                            cleaned_tweet  anger  anticipation  \
0      spain report case death bring total confirmed …      2             2
1      #coronavirusoutbreak confirm case india climb …      1             1
2      brazil report case death bring total confirmed…      3             3
3      california report case death bring total confi…      3             3
4      ecuador report case death bring total confirme…      2             2
…                                                   …    …            …
49949  brazil report case death bring total confirmed…      2             2
49950  watch special feature #covid this morning live…      0             1
49951  covid individual test positive #maldives editi…      0             1
49952  business resort #maldives keep hire foreigner …      1             2
49953  watch special feature #covid this morning live…      0             0

       disgust  fear  joy  negative  positive  sadness  surprise  trust
0            2     4    0         4         1        4         2      1
1            1     2    0         2         1        2         1      0
```

```
2            3     6    0         6         1        6         3      1
3            3     6    0         6         1        6         3      1
4            2     4    0         4         1        4         2      1
…        …   …  …       …       …      …       …    …
49949        2     4    0         4         1        4         2      1
49950        0     1    1         0         2        0         0      0
49951        0     0    0         0         0        0         0      0
49952        1     2    2         2         3        1         1      4
49953        0     0    0         0         0        0         0      0

[49954 rows x 12 columns]
```

[474]:

```
count = []
for i in range(0, len(lemmatized_tweet2)):
    counter = 0
    document2 = word_tokenize(df2['cleaned_tweet'][i])
    for word in document2:
        if len(word) > 1:
            counter = counter + 1
    count.append(counter)
#print(count)
new_df2['word_count'] = count
```

[476]:

```
new_df2
```

[476]:

```
                                                    tweet  \
0      "Spain reports 2,579 new cases and 276 new dea…
1      "#CoronavirusOutbreak | The confirmed cases in…
2      "Brazil reports 428 new cases and 22 new death…
3      "California reports 58 new cases and 1 new dea…
4      "Ecuador reports 1,128 new cases and 308 new d…
…                                                   …
49949  "Brazil reports 1,048 new cases and 34 new dea…
49950  "Watch special feature on #COVID19, this morni…
49951  "COVID-19: 11 individuals test positive in #Ma…
49952  "Big business resorts in #Maldives keeps on hi…
49953  "Watch special feature on #COVID19, this morni…

                                           cleaned_tweet  anger  anticipation   \
0      spain report case death bring total confirmed …       2             2
1      #coronavirusoutbreak confirm case india climb …       1             1
2      brazil report case death bring total confirmed…       3             3
3      california report case death bring total confi…       3             3
4      ecuador report case death bring total confirme…       2             2
…                                                   …    …           …
49949  brazil report case death bring total confirmed…       2             2
49950  watch special feature #covid this morning live…       0             1
```

```
49951  covid individual test positive #maldives editi…      0             1
49952  business resort #maldives keep hire foreigner …      1             2
49953  watch special feature #covid this morning live…      0             0

       disgust  fear  joy  negative  positive  sadness  surprise  trust  \
0            2     4    0         4         1        4         2      1
1            1     2    0         2         1        2         1      0
2            3     6    0         6         1        6         3      1
3            3     6    0         6         1        6         3      1
4            2     4    0         4         1        4         2      1
…        …   …  …       …       …      …       …    …
49949        2     4    0         4         1        4         2      1
49950        0     1    1         0         2        0         0      0
49951        0     0    0         0         0        0         0      0
49952        1     2    2         2         3        1         1      4
49953        0     0    0         0         0        0         0      0

       word_count
0              14
1              19
2              19
3              19
4              14
…           …
49949          14
49950          15
49951          14
49952          26
49953          15

[49954 rows x 13 columns]
```

[482]:

```python
for emotion in emotion_set:
    new_df2[emotion] = new_df2[emotion] / new_df2['word_count']
```

[483]:

```python
new_df2
```

[483]:

```
                                                   tweet  \
0      "Spain reports 2,579 new cases and 276 new dea…
1      "#CoronavirusOutbreak | The confirmed cases in…
2      "Brazil reports 428 new cases and 22 new death…
3      "California reports 58 new cases and 1 new dea…
4      "Ecuador reports 1,128 new cases and 308 new d…
…                                                  …
49949  "Brazil reports 1,048 new cases and 34 new dea…
49950  "Watch special feature on #COVID19, this morni…
49951  "COVID-19: 11 individuals test positive in #Ma…
```

```
49952  "Big business resorts in #Maldives keeps on hi…
49953  "Watch special feature on #COVID19, this morni…

                                           cleaned_tweet     anger  \
0      spain report case death bring total confirmed …  0.142857
1      #coronavirusoutbreak confirm case india climb …  0.052632
2      brazil report case death bring total confirmed…  0.157895
3      california report case death bring total confi…  0.157895
4      ecuador report case death bring total confirme…  0.142857
…                                                  …       …
49949  brazil report case death bring total confirmed…  0.142857
49950  watch special feature #covid this morning live…  0.000000
49951  covid individual test positive #maldives editi…  0.000000
49952  business resort #maldives keep hire foreigner …  0.038462
49953  watch special feature #covid this morning live…  0.000000

       anticipation   disgust      fear       joy  negative  positive   \
0          0.142857  0.142857  0.285714  0.000000  0.285714  0.071429
1          0.052632  0.052632  0.105263  0.000000  0.105263  0.052632
2          0.157895  0.157895  0.315789  0.000000  0.315789  0.052632
3          0.157895  0.157895  0.315789  0.000000  0.315789  0.052632
4          0.142857  0.142857  0.285714  0.000000  0.285714  0.071429
…             …       …       …       …       …       …
49949      0.142857  0.142857  0.285714  0.000000  0.285714  0.071429
49950      0.066667  0.000000  0.066667  0.066667  0.000000  0.133333
49951      0.071429  0.000000  0.000000  0.000000  0.000000  0.000000
49952      0.076923  0.038462  0.076923  0.076923  0.076923  0.115385
49953      0.000000  0.000000  0.000000  0.000000  0.000000  0.000000

        sadness  surprise     trust  word_count
0      0.285714  0.142857  0.071429          14
1      0.105263  0.052632  0.000000          19
2      0.315789  0.157895  0.052632          19
3      0.315789  0.157895  0.052632          19
4      0.285714  0.142857  0.071429          14
…         …       …       …         …
49949  0.285714  0.142857  0.071429          14
49950  0.000000  0.000000  0.000000          15
49951  0.000000  0.000000  0.000000          14
49952  0.038462  0.038462  0.153846          26
49953  0.000000  0.000000  0.000000          15

[49954 rows x 13 columns]
```

[484]:

```
length2 = len(new_df2)
#find average of anger sentiment accross tweets
avg_anger2 = 0.0
```

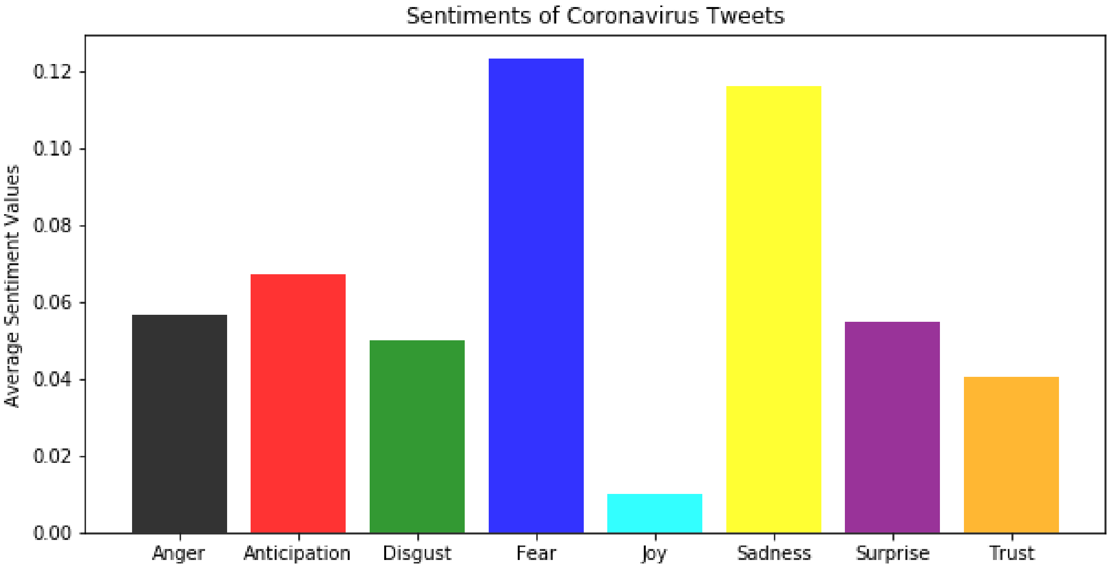
```
sum_anger2 = 0.0
for i in range(0, length2-1):
    sum_anger2 = sum_anger2 + new_df2['anger'][i]

avg_anger2 = sum_anger2 / length2
print("Sum anger: ",sum_anger2)
print("Avg anger: ",avg_anger2)
print("--------------------------")
#find average of anticipation sentiment accross tweets
avg_anticipation2 = 0.0
sum_anticipation2 = 0.0
for i in range(0, length2-1):
    sum_anticipation2 = sum_anticipation2 + new_df2['anticipation'][i]

avg_anticipation2 = sum_anticipation2 / length2
print("Sum anticipation: ",sum_anticipation2)
print("Avg anticipation: ",avg_anticipation2)
#find average of disgust sentiment accross tweets
avg_disgust2 = 0.0
sum_disgust2 = 0.0
for i in range(0, length2-1):
    sum_disgust2 = sum_disgust2 + new_df2['disgust'][i]

avg_disgust2 = sum_disgust2 / length2
print("Sum disgust: ",sum_disgust2)
print("Avg disgust: ",avg_disgust2)
print("--------------------------")
#find average of fear sentiment accross tweets
avg_fear2 = 0.0
sum_fear2 = 0.0
for i in range(0, length2-1):
    sum_fear2 = sum_fear2 + new_df2['fear'][i]

avg_fear2 = sum_fear2 / length2
print("Sum fear: ",sum_anticipation2)
print("Avg fear: ",avg_anticipation2)
################################################
#find average of joy sentiment accross tweets
avg_joy2 = 0.0
sum_joy2 = 0.0
for i in range(0, length2-1):
    sum_joy2 = sum_joy2 + new_df2['joy'][i]

avg_joy2 = sum_joy2 / length2
print("Sum joy: ",sum_joy2)
print("Avg joy: ",avg_joy2)
print("--------------------------")
```

```python
#find average of sadness sentiment accross tweets
avg_sadness2 = 0.0
sum_sadness2 = 0.0
for i in range(0, length2-1):
    sum_sadness2 = sum_sadness2 + new_df2['sadness'][i]

avg_sadness2 = sum_sadness2 / length2
print("Sum sadness: ",sum_sadness2)
print("Avg sadness: ",avg_sadness2)
#find average of surprise sentiment accross tweets
avg_surprise2 = 0.0
sum_surprise2 = 0.0
for i in range(0, length2-1):
    sum_surprise2 = sum_surprise2 + new_df2['surprise'][i]

avg_surprise2 = sum_surprise2 / length2
print("Sum surprise: ",sum_surprise2)
print("Avg surprise: ",avg_surprise2)
print("--------------------------")
#find average of fear sentiment accross tweets
avg_trust2 = 0.0
sum_trust2 = 0.0
for i in range(0, length2-1):
    sum_trust2 = sum_trust2 + new_df2['trust'][i]

avg_trust2 = sum_trust2 / length2
print("Sum trust: ",sum_trust2)
print("Avg trust: ",avg_trust2)
```

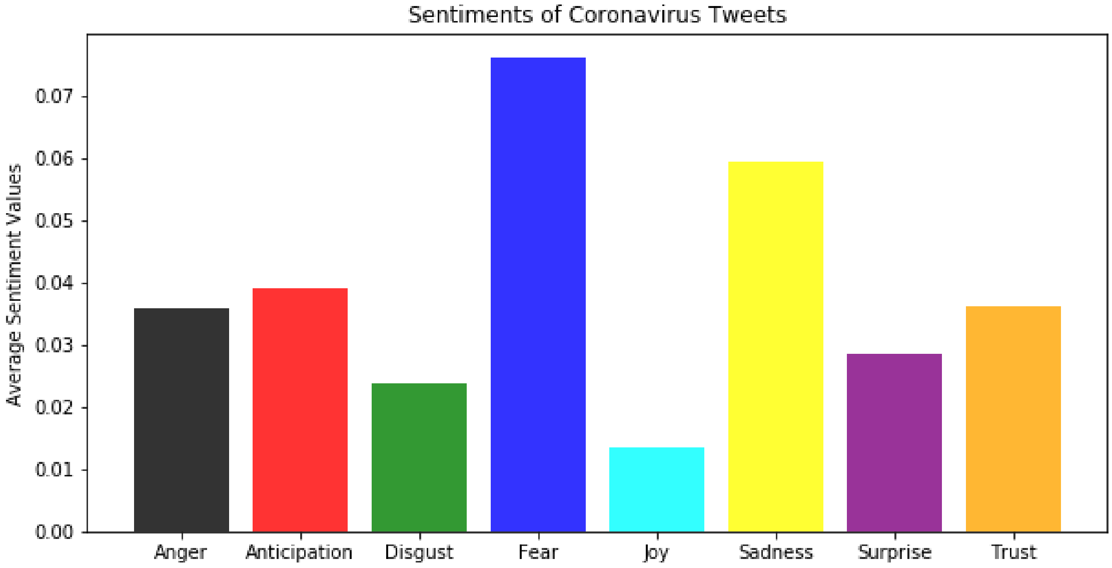
```
Sum anger:  2822.8205730912173
Avg anger:  0.056508399189078296
--------------------------
Sum anticipation:  3339.909474110945
Avg anticipation:  0.06685970040659298
Sum disgust:  2488.1624990636883
Avg disgust:  0.04980907432965705
--------------------------
Sum fear:  3339.909474110945
Avg fear:  0.06685970040659298
Sum joy:  501.41549624700536
Avg joy:  0.010037544465848688
--------------------------
Sum sadness:  5801.318994718607
Avg sadness:  0.11613322245903446
Sum surprise:  2717.438821570795
Avg surprise:  0.05439882334889688
--------------------------
```

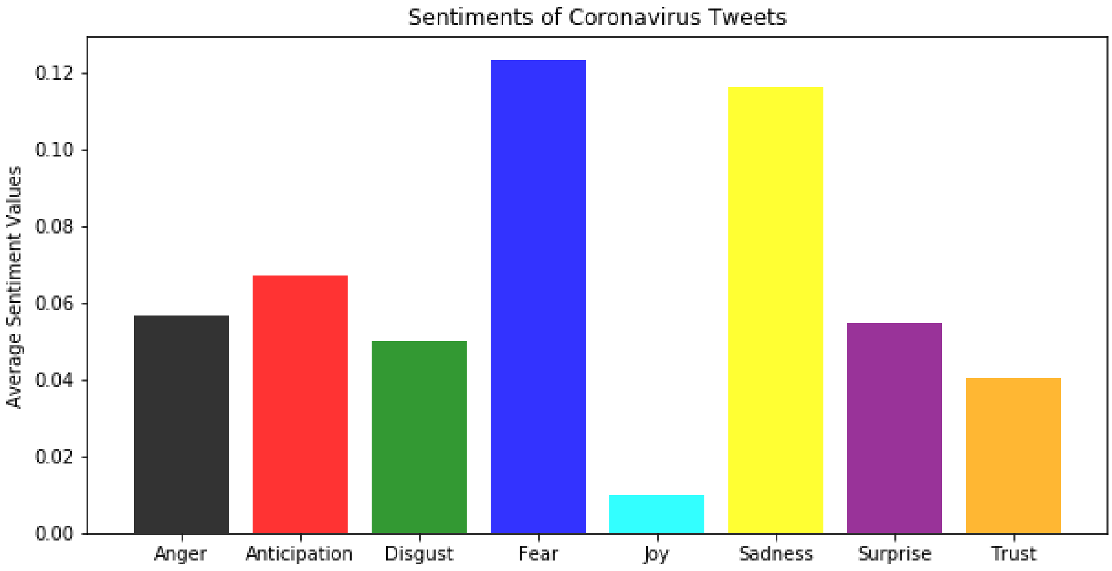
```
Sum trust:  2008.1820496658602
Avg trust:  0.040200625568840534
```

[485]:
```
avg_sentiment2 = [avg_anger2, avg_anticipation2, avg_disgust2, avg_fear2,␣
 ↪avg_joy2, avg_sadness2, avg_surprise2, avg_trust2]
bars2 = ["Anger", "Anticipation", "Disgust", "Fear", "Joy", "Sadness",␣
 ↪"Surprise", "Trust"]
y_pos2 = np.arange(len(bars2))

plt.figure(figsize=(10,5))
plt.bar(y_pos2, avg_sentiment2, color=['black', 'red', 'green', 'blue', 'cyan',␣
 ↪'yellow', 'purple', 'orange'], align='center', alpha=0.8)
plt.xticks(y_pos2, bars2)
plt.ylabel('Average Sentiment Values')
plt.title('Sentiments of Coronavirus Tweets')
plt.show()
```



[487]:
```
avg_sentiment = [avg_anger, avg_anticipation, avg_disgust, avg_fear, avg_joy,␣
 ↪avg_sadness, avg_surprise, avg_trust]
bars = ["Anger", "Anticipation", "Disgust", "Fear", "Joy", "Sadness",␣
 ↪"Surprise", "Trust"]
y_pos = np.arange(len(bars))

plt.figure(figsize=(10,5))
plt.bar(y_pos, avg_sentiment, color=['black', 'red', 'green', 'blue', 'cyan',␣
 ↪'yellow', 'purple', 'orange'], align='center', alpha=0.8)
plt.xticks(y_pos, bars)
plt.ylabel('Average Sentiment Values')
plt.title('Sentiments of Coronavirus Tweets')
plt.show()

avg_sentiment2 = [avg_anger2, avg_anticipation2, avg_disgust2, avg_fear2,␣
 ↪avg_joy2, avg_sadness2, avg_surprise2, avg_trust2]
bars2 = ["Anger", "Anticipation", "Disgust", "Fear", "Joy", "Sadness",␣
 ↪"Surprise", "Trust"]
y_pos2 = np.arange(len(bars2))

plt.figure(figsize=(10,5))
plt.bar(y_pos2, avg_sentiment2, color=['black', 'red', 'green', 'blue', 'cyan',␣
 ↪'yellow', 'purple', 'orange'], align='center', alpha=0.8)
plt.xticks(y_pos2, bars2)
plt.ylabel('Average Sentiment Values')
plt.title('Sentiments of Coronavirus Tweets')
plt.show()
```




Sentiments of Coronavirus Tweets
Average Sentiment Values
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Anger
Anticipation
Disgust
Fear
Joy
Sadness
Surprise
Trust

```
[ ]:
```