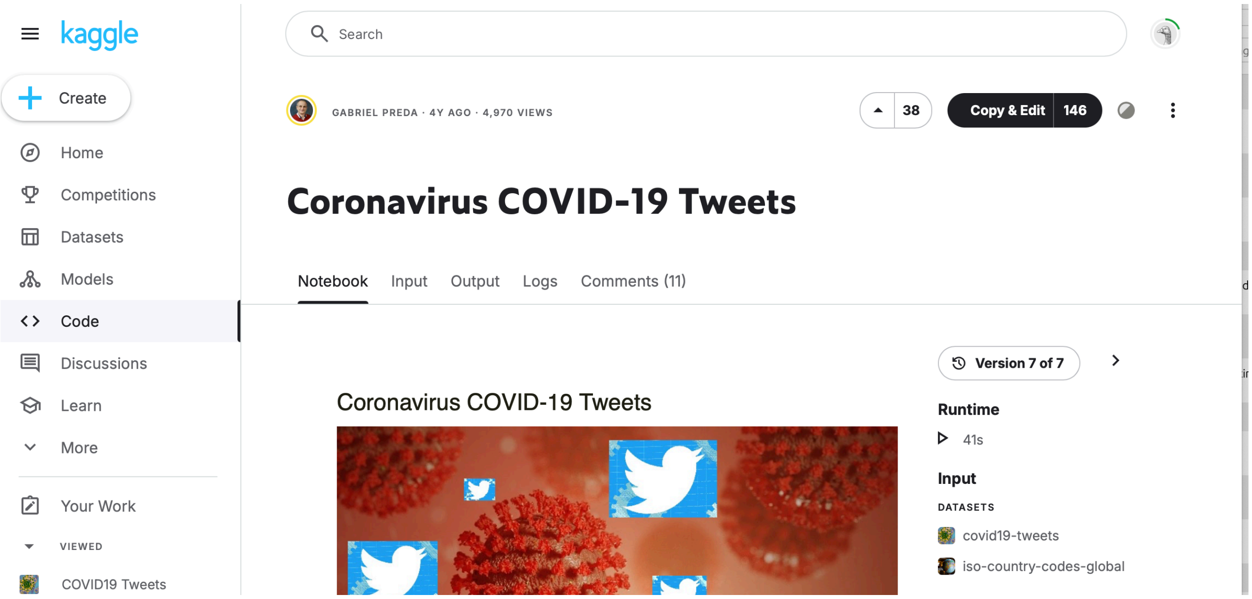
Project-2

In this project, I will be utilizing NLTK library to analyze Twitter conversations regarding the COVID-19 Omicron variant.

Dataset:

The most challenging aspect of this project was extracting data from Twitter. Following the professor's instructions and provided links for downloading the dataset, I encountered difficulties. I found a dataset with only tweet IDs, but to convert these into actual tweets, I needed to hydrate the data. Unfortunately, I was limited to hydrating only 100 tweets at a time. I then tried web scraping, which was not legal on its own but was attempted for educational purposes. When I scraped up to 1,000 tweets, my access was blocked, so that method failed. Finally, I turned to Kaggle and found a dataset titled "Coronavirus COVID-19 Tweets," which I am now using for the project.



GABRIEL PREDA · 4Y AGO · 4,970 VIEWS

Coronavirus COVID-19 Tweets

Coronavirus COVID-19 Tweets

Runtime

41s

Input

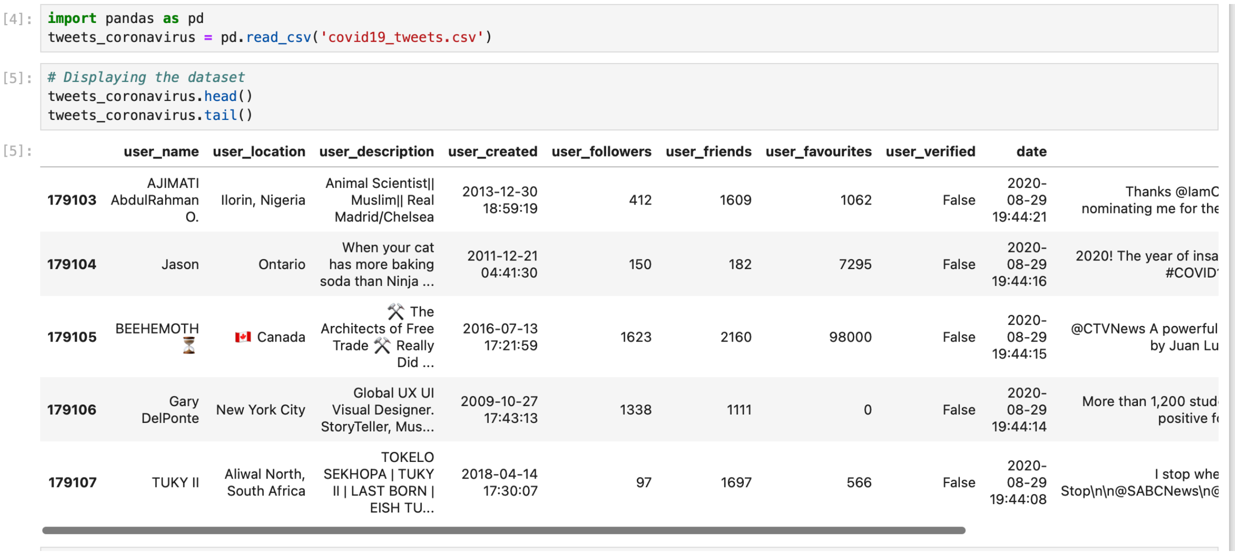
DATASETS

covid19-tweets

iso-country-codes-global

Pre-processing Dataset:

For loading the dataset, I am using the pandas.



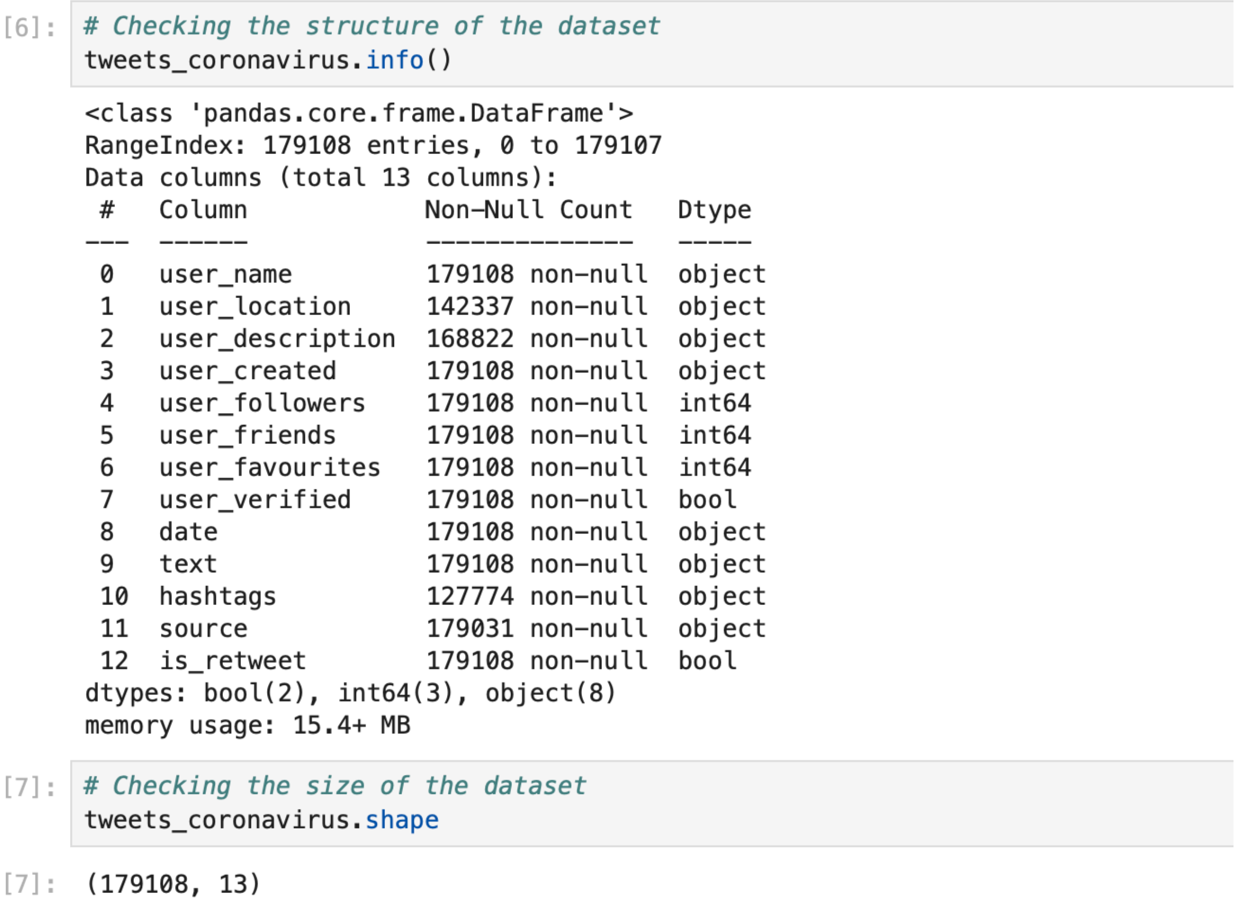
```
[4]: import pandas as pd
     tweets_coronavirus = pd.read_csv('covid19_tweets.csv')
```

```
[5]: # Displaying the dataset
     tweets_coronavirus.head()
     tweets_coronavirus.tail()
```

[5]:

	user_name	user_location	user_description	user_created	user_followers	user_friends	user_favourites	user_verified	date	
179103	AJIMATI AbdulRahman O.	Ilorin, Nigeria	Animal Scientist|| Muslim|| Real Madrid/Chelsea	2013-12-30 18:59:19	412	1609	1062	False	2020-08-29 19:44:21	Thanks @IamC nominating me for the
179104	Jason	Ontario	When your cat has more baking soda than Ninja ...	2011-12-21 04:41:30	150	182	7295	False	2020-08-29 19:44:16	2020! The year of insa #COVID
179105	BEEHEMOTH ⏳	🇨🇦 Canada	⚒ The Architects of Free Trade ⚒ Really Did ...	2016-07-13 17:21:59	1623	2160	98000	False	2020-08-29 19:44:15	@CTVNews A powerful by Juan Lu
179106	Gary DelPonte	New York City	Global UX UI Visual Designer. StoryTeller, Mus...	2009-10-27 17:43:13	1338	1111	0	False	2020-08-29 19:44:14	More than 1,200 stud positive f
179107	TUKY II	Aliwal North, South Africa	TOKELO SEKHOPA | TUKY II | LAST BORN | EISH TU...	2018-04-14 17:30:07	97	1697	566	False	2020-08-29 19:44:08	I stop whe Stop\n\n@SABCNews\n@

Always check the data structure like data type and shape.



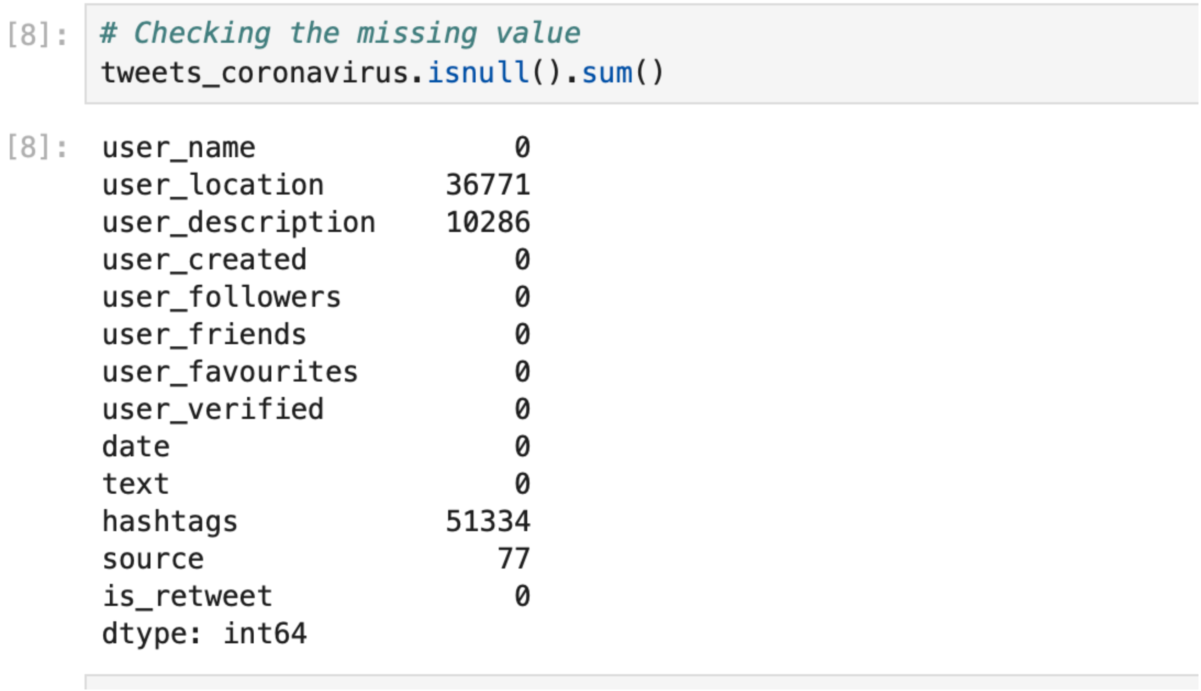
```
[6]: # Checking the structure of the dataset
     tweets_coronavirus.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 179108 entries, 0 to 179107
Data columns (total 13 columns):
 #   Column            Non-Null Count   Dtype 
---  ------            --------------   ----- 
 0   user_name         179108 non-null  object
 1   user_location     142337 non-null  object
 2   user_description  168822 non-null  object
 3   user_created      179108 non-null  object
 4   user_followers    179108 non-null  int64 
 5   user_friends      179108 non-null  int64 
 6   user_favourites   179108 non-null  int64 
 7   user_verified     179108 non-null  bool  
 8   date              179108 non-null  object
 9   text              179108 non-null  object
 10  hashtags          127774 non-null  object
 11  source            179031 non-null  object
 12  is_retweet        179108 non-null  bool  
dtypes: bool(2), int64(3), object(8)
memory usage: 15.4+ MB
```

```
[7]: # Checking the size of the dataset
     tweets_coronavirus.shape
```

```
[7]: (179108, 13)
```

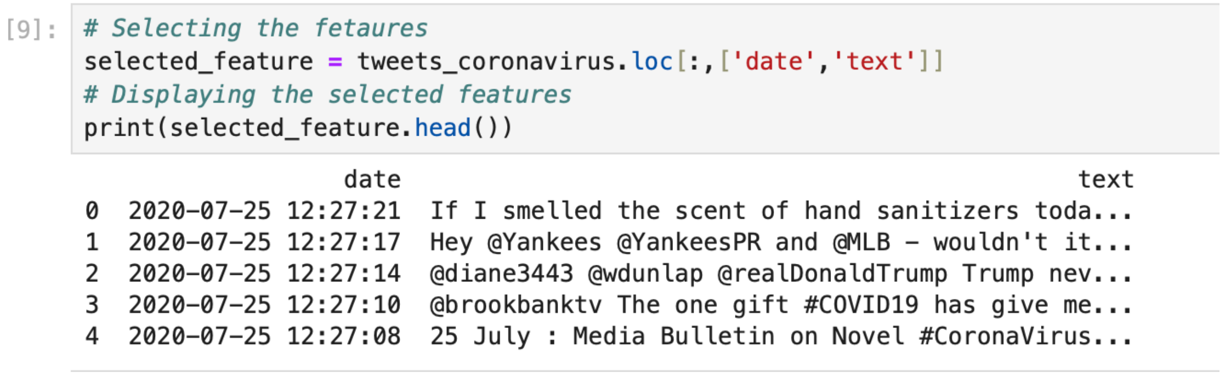
Check the any missing values.



```
[8]: # Checking the missing value
     tweets_coronavirus.isnull().sum()
```

```
[8]: user_name               0
     user_location       36771
     user_description    10286
     user_created            0
     user_followers          0
     user_friends            0
     user_favourites         0
     user_verified           0
     date                    0
     text                    0
     hashtags            51334
     source                 77
     is_retweet              0
     dtype: int64
```

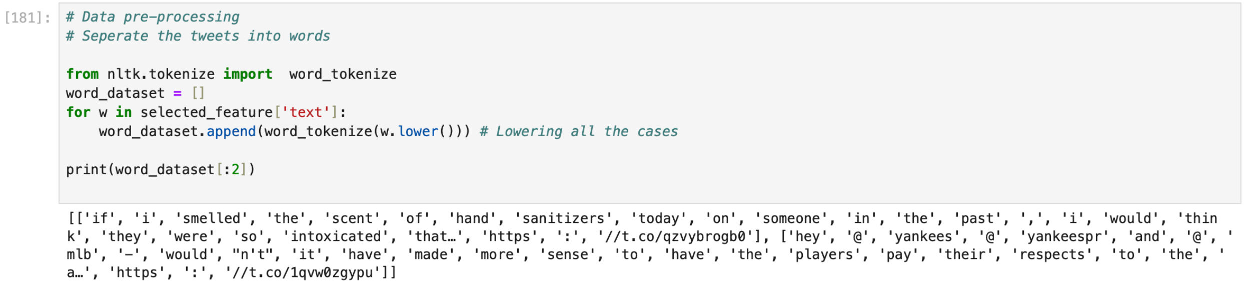
The dataset includes many features, so the first step in pre-processing is to select the most relevant ones. The key feature I'm focusing on is the "text" (tweets), along with the "date" feature to track the timeline of the tweets.



```
[9]: # Selecting the fetaures
     selected_feature = tweets_coronavirus.loc[:,['date','text']]
     # Displaying the selected features
     print(selected_feature.head())
```

```
                  date                                               text
0  2020-07-25 12:27:21  If I smelled the scent of hand sanitizers toda...
1  2020-07-25 12:27:17  Hey @Yankees @YankeesPR and @MLB - wouldn't it...
2  2020-07-25 12:27:14  @diane3443 @wdunlap @realDonaldTrump Trump nev...
3  2020-07-25 12:27:10  @brookbanktv The one gift #COVID19 has give me...
4  2020-07-25 12:27:08  25 July : Media Bulletin on Novel #CoronaVirus...
```

To better understand the tweet text and remove unnecessary content, the text needs to be broken down into individual words. This can be achieved using the `word_tokenize` method from NLTK.



```
[181]: # Data pre-processing
       # Seperate the tweets into words

       from nltk.tokenize import  word_tokenize
       word_dataset = []
       for w in selected_feature['text']:
           word_dataset.append(word_tokenize(w.lower())) # Lowering all the cases

       print(word_dataset[:2])
```

```
[['if', 'i', 'smelled', 'the', 'scent', 'of', 'hand', 'sanitizers', 'today', 'on', 'someone', 'in', 'the', 'past', ',', 'i', 'would', 'thin
k', 'they', 'were', 'so', 'intoxicated', 'that…', 'https', ':', '//t.co/qzvybrogb0'], ['hey', '@', 'yankees', '@', 'yankeespr', 'and', '@', '
mlb', '-', 'would', "n't", 'it', 'have', 'made', 'more', 'sense', 'to', 'have', 'the', 'players', 'pay', 'their', 'respects', 'to', 'the', '
a…', 'https', ':', '//t.co/1qvw0zgypu']]
```

For better understanding we will search for most common words.

```
[182]: import nltk
       from itertools import chain
       flat_word_list = list(chain.from_iterable(word_dataset))
       pre_processed_data = nltk.FreqDist(flat_word_list)
       # Most common data
       print(pre_processed_data.most_common(10))
```

```
[('#', 266985), (':', 208423), ('https', 177119), ('the', 103582), ('covid19', 97144), ('@', 85902), (',', 80194), ('.', 75089), ('to', 7345
2), ('of', 58512)]
```

In the English language, there are many words that don't carry significant meaning and are used primarily for sentence structure; these are called stop words. To improve sentiment analysis, these stop words will be removed from the tweets. To reduce processing time, I have limited the dataset to 5,000 tweets, as the focus is on sentiment analysis rather than prediction.Removing unnecessary words helps improve the analysis by focusing on the more meaningful content, leading to a more accurate sentiment analysis of the tweets.

```
[12]: # Removing stopping word
      # Importing the stopping dataset
      from nltk.corpus import stopwords

      # Creating the stop word dataset
      stop_words = set(stopwords.words('english'))
      # Decreasing the dataset becuase due to lack of computational power
      decreased_datasize = word_dataset[:5000]
      # Storage the dataset after removing removing stopping words
      removed_stop_words = []
      for w_list in decreased_datasize:
              cleaned_sentence = [
                  w for w in w_list
                  if w not in stop_words and w not in ('...', 'https', ':', '@','#', '-', ',','.', '●', '!', '``','”',')','(')
                  and not w.startswith(( 'https', '//', '🇺🇸', '🔈', '📍','🤢','👋🏻',',','', "'"))
              ]
              removed_stop_words.append(cleaned_sentence)

      print(removed_stop_words[:2])
```

```
[['smelled', 'scent', 'hand', 'sanitizers', 'today', 'someone', 'past', 'would', 'think', 'intoxicated', 'that…'], ['hey', 'yankees', 'yankee
spr', 'mlb', 'would', "n't", 'made', 'sense', 'players', 'pay', 'respects', 'a…']]
```

To reduce words to their base form, such as converting "smelled" to "smell," the lemmatization method from NLTK will be used. This process helps standardize words for better analysis.

```
[13]: # Lemmatization : reducing word to root form
      # Removing 'ing', 'ed', ''s' etc
      # Importing the package
      from nltk.stem import WordNetLemmatizer
      # Defing the scaler
      lemmatizer_scaler = WordNetLemmatizer()
      converted_dataset = []
      for w_list in removed_stop_words:
          changed_sentance = [
              lemmatizer_scaler.lemmatize(w, pos="v") for w in w_list

          ]
          converted_dataset.append(changed_sentance)
      print(converted_dataset[:2])
```

```
[['smell', 'scent', 'hand', 'sanitizers', 'today', 'someone', 'past', 'would', 'think', 'intoxicate', 'that…'], ['hey', 'yankees', 'yankeesp
r', 'mlb', 'would', "n't", 'make', 'sense', 'players', 'pay', 'respect', 'a…']]
```

For sentiment analysis, we need to convert all the split and cleaned words back into sentences.

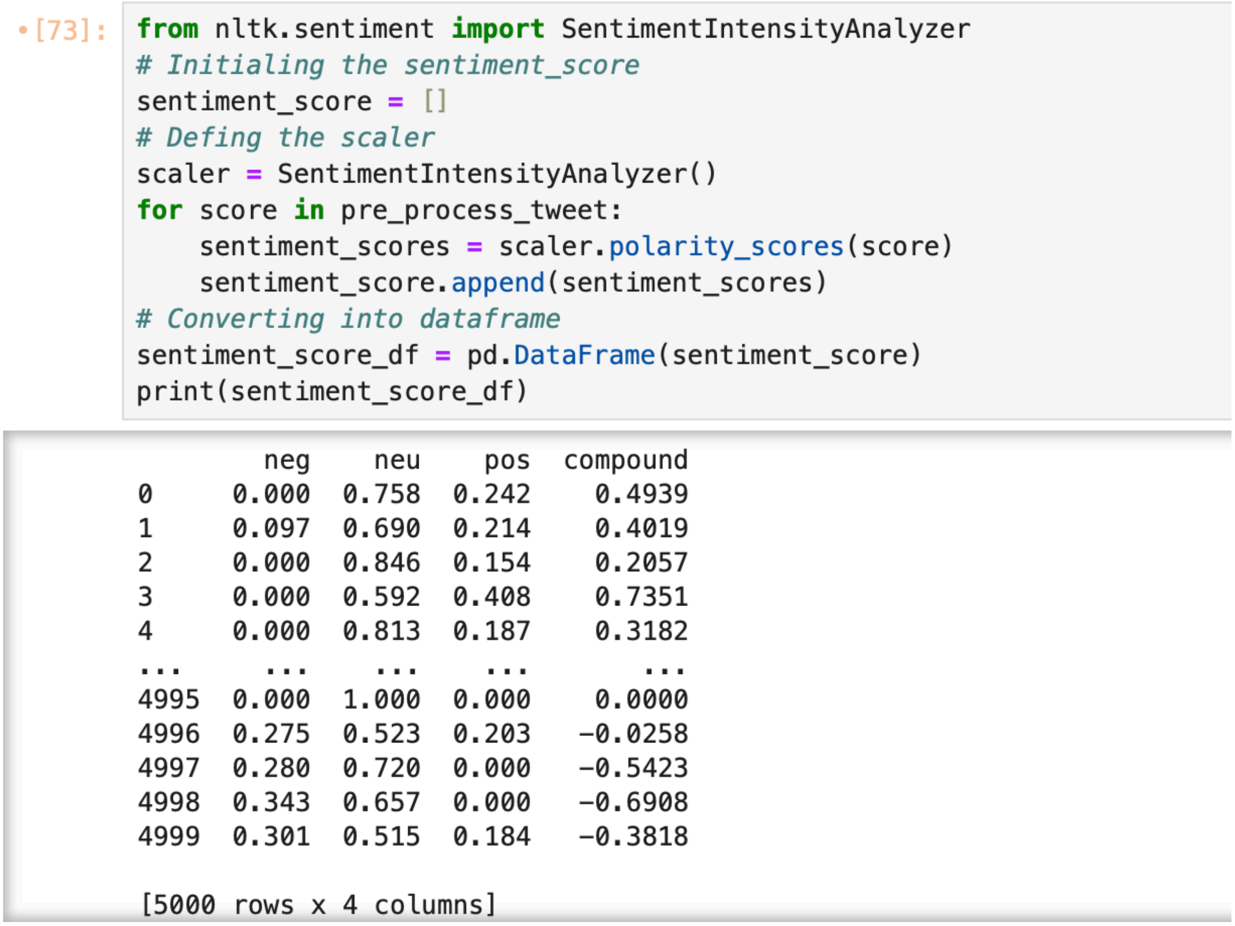
```
[14]: # Joining the word to make sentance for sentimental analysis
      # storage for pre-processed tweets
      pre_process_tweet = []

      for w in converted_dataset:
          whole_sentance = ' '.join(w)
          pre_process_tweet.append(whole_sentance )
      print(pre_process_tweet[:3])
```

```
['smell scent hand sanitizers today someone past would think intoxicate that…', "hey yankees yankeespr mlb would n't make sense players pay r
espect a…", 'diane3443 wdunlap realdonaldtrump trump never claim covid19 hoax claim effort to…']
```

The NLTK library includes a tool called SentimentIntensityAnalyzer for sentiment analysis. This tool analyzes a sentence and provides sentiment scores for the following categories: negative (neg), neutral (neu), positive (pos), and a combined overall sentiment score called compound.

neg: This value means negative sentiment of the sentence.This range from 0 to 1.
neu: This value means neutral sentiment of the sentence. This range from 0 to 1.
pos: This value means positive sentiment of the sentence. This range from 0 to 1.
compound : This value means overall sentiment of the sentence. This range from -1 to +1. -1 means negative and +1 means positive.



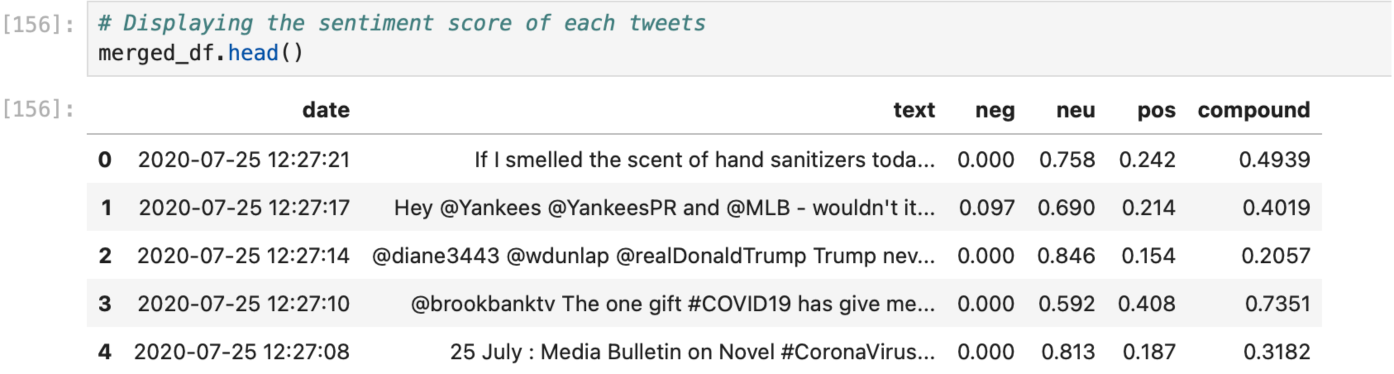
•[73]:

```
from nltk.sentiment import SentimentIntensityAnalyzer
# Initialing the sentiment_score
sentiment_score = []
# Defing the scaler
scaler = SentimentIntensityAnalyzer()
for score in pre_process_tweet:
    sentiment_scores = scaler.polarity_scores(score)
    sentiment_score.append(sentiment_scores)
# Converting into dataframe
sentiment_score_df = pd.DataFrame(sentiment_score)
print(sentiment_score_df)
```

```
        neg    neu    pos  compound
0     0.000  0.758  0.242    0.4939
1     0.097  0.690  0.214    0.4019
2     0.000  0.846  0.154    0.2057
3     0.000  0.592  0.408    0.7351
4     0.000  0.813  0.187    0.3182
...     ...    ...    ...       ...
4995  0.000  1.000  0.000    0.0000
4996  0.275  0.523  0.203   -0.0258
4997  0.280  0.720  0.000   -0.5423
4998  0.343  0.657  0.000   -0.6908
4999  0.301  0.515  0.184   -0.3818

[5000 rows x 4 columns]
```

Displaying tweets along with their sentiments.



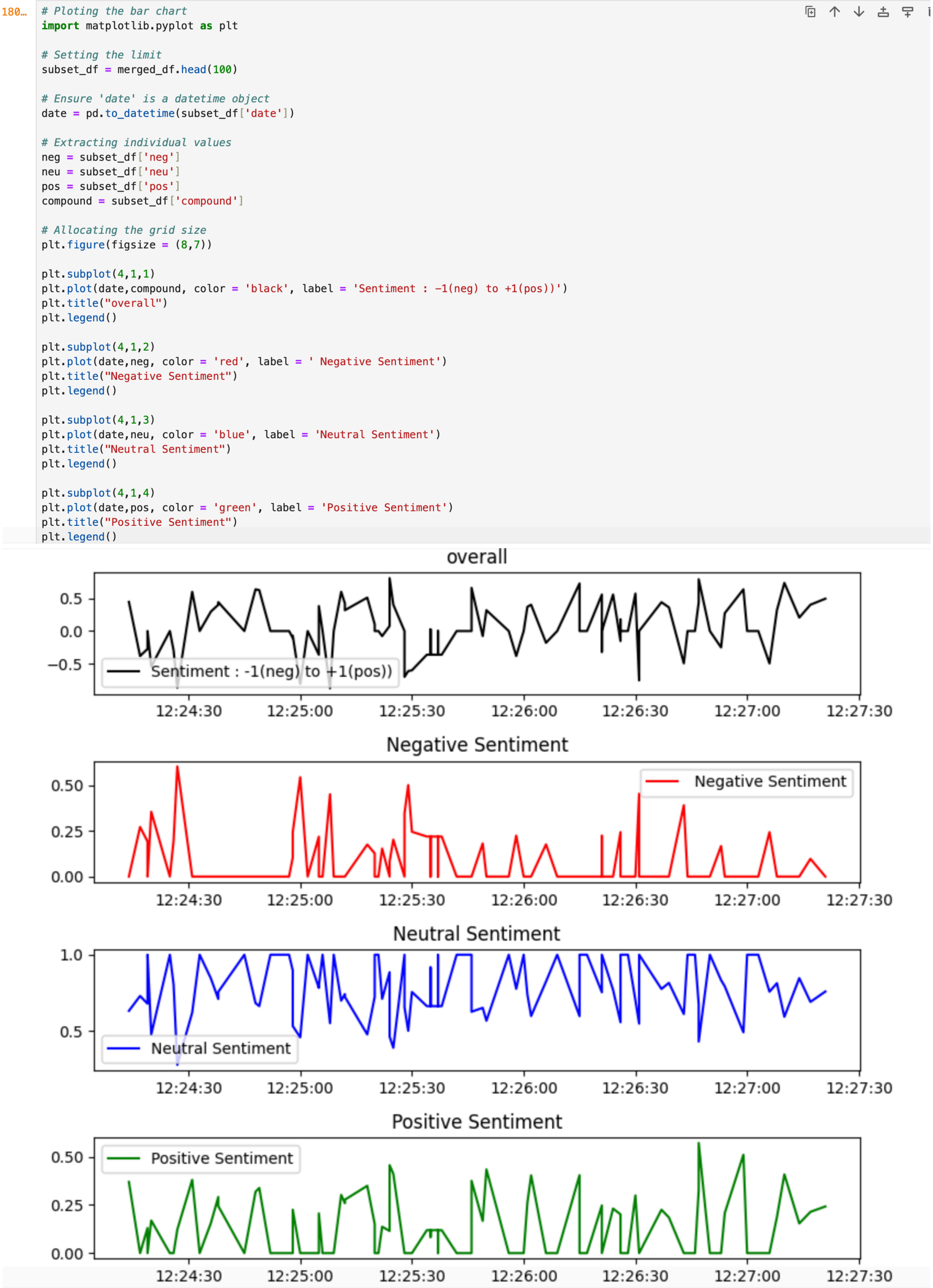
[156]:

```
# Displaying the sentiment score of each tweets
merged_df.head()
```

[156]:

	date	text	neg	neu	pos	compound
0	2020-07-25 12:27:21	If I smelled the scent of hand sanitizers toda...	0.000	0.758	0.242	0.4939
1	2020-07-25 12:27:17	Hey @Yankees @YankeesPR and @MLB - wouldn't it...	0.097	0.690	0.214	0.4019
2	2020-07-25 12:27:14	@diane3443 @wdunlap @realDonaldTrump Trump nev...	0.000	0.846	0.154	0.2057
3	2020-07-25 12:27:10	@brookbanktv The one gift #COVID19 has give me...	0.000	0.592	0.408	0.7351
4	2020-07-25 12:27:08	25 July : Media Bulletin on Novel #CoronaVirus...	0.000	0.813	0.187	0.3182

I am drawing a plot to show the sentiment of people over time. However, due to the large amount of data, the line graph became unclear. To address this, I aggregated (or 'sank') the data and displayed the sentiment for specific timelines.



```
# Ploting the bar chart
import matplotlib.pyplot as plt

# Setting the limit
subset_df = merged_df.head(100)

# Ensure 'date' is a datetime object
date = pd.to_datetime(subset_df['date'])

# Extracting individual values
neg = subset_df['neg']
neu = subset_df['neu']
pos = subset_df['pos']
compound = subset_df['compound']

# Allocating the grid size
plt.figure(figsize = (8,7))

plt.subplot(4,1,1)
plt.plot(date,compound, color = 'black', label = 'Sentiment : -1(neg) to +1(pos))')
plt.title("overall")
plt.legend()

plt.subplot(4,1,2)
plt.plot(date,neg, color = 'red', label = ' Negative Sentiment')
plt.title("Negative Sentiment")
plt.legend()

plt.subplot(4,1,3)
plt.plot(date,neu, color = 'blue', label = 'Neutral Sentiment')
plt.title("Neutral Sentiment")
plt.legend()

plt.subplot(4,1,4)
plt.plot(date,pos, color = 'green', label = 'Positive Sentiment')
plt.title("Positive Sentiment")
plt.legend()
```