Introduction

On the day 4th of October 2021, Facebook crashed for couple of hours and usage of Twitter has been doubled. People polarized about the topic some were stating that social media is better when Facebook and Instagram do not exist, some were angry and sad because of absence of Facebook Products. Facebook is the largest social media network in the world. When Facebook was down even for a few hours, many social media users are affected by that. Since Facebook also owns Instagram and Whatsapp, some people were not even able to keep in touch with their friends since those are the only apps they used. People raised their opinions on Twitter mostly because Twitter is the largest social media application which is not down that day.

In this study, tweets at the hours of Facebook shutdown from 4th of October 2021 are analyzed to observe emotions of users and their reaction to the event. Moreover, the hashtags used by the users whose tweets get the greatest number of likes have been examined by network analysis.

Scraping Twitter Data

There are many ways of scraping data from twitter and the most common one is directly using Twitter API by creating a developer account and getting access to the API. I have created a developer account for myself to do the project. And I was able to use the API by using my private access tokens and consumer keys that provided by Twitter to me. Twitter has certain restrictions with its API. The biggest problem is that it is allowed to scrap tweets at most one-week-old. That makes it impossible to do the project with Twitter API since the event that Facebook crashed was on 4th of October and it has been already more than one week.

Opensource libraries like snscrape, twitterscraper and twint has been tried to select the most suitable one for the project. **Twint** is quite fast, and it is possible to retrieve tweets for any date and any time. It is capable of scraping tens of thousands tweets only in a few minutes. I have forked Twint project to my GitHub and configured it for the project. The library has been updated to retrieve a specific language (for this project, only english tweets scrapped) and also the limitations on scraping tweets has been removed by me. From googlecolab, I

used the command “!pip3 install --user --upgrade git+https://github.com/melihkurtaran/twint” to import the library.

Facebook shutdown started around 15.45 GMT on 4th September and the problem persisted couple of hours. Therefore, 5 hours period between 15.40 and 20.40 is used for scraping the tweets. For keywords, Facebook and #FacebookDown hashtag are used to filter the tweets. Total of **29,733 tweets** has been scrapped and stored in a csv file named as FacebookDown.csv. Each tweet has 36 attribution such as creation time, username, number of likes or retweet or list of the hashtags used.

Exploratory Data Analysis and Classifying Emotions

Top 10 the most liked tweets are examined, the first two of them are from Edward Snowden who is a former computer intelligence consultant who leaked highly classified information from NSA in 2013. He got more than 176 thousands of like for the tweet “Facebook and Instagram go mysteriously offline, and, for one shining day, the world becomes a healthier place.”, it is seen that he is happy about Facebook shutdown and many people liked his tweet. Moreover, when it is checked out that the most liked tweets are the tweets that express joy about Facebook server down. The most liked 500 tweets are selected and classified with emotions by feel_it library. The result showed by a piechar in Figure I.

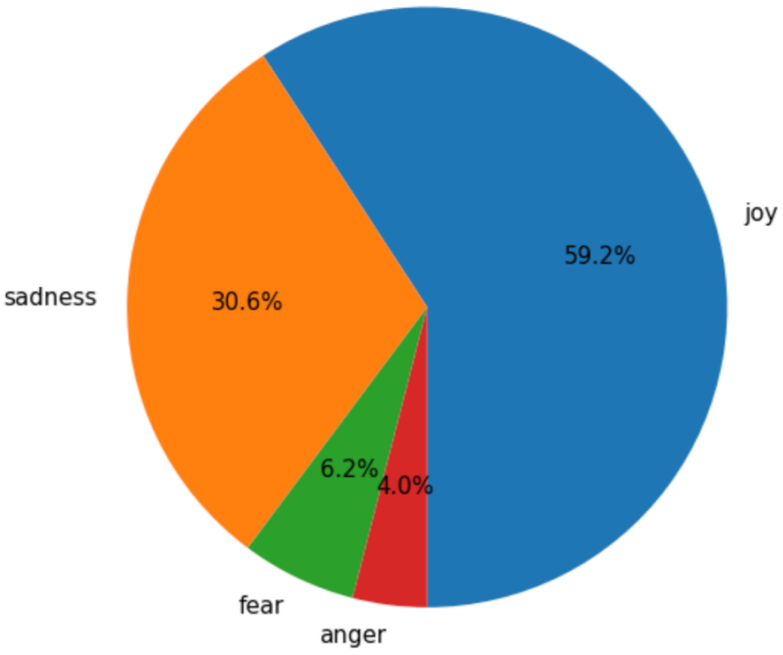

Figure I: Emotions of the most liked 500 tweets

It is clearly seen that tweets that are joking and having fun about Facebook failure are getting the greatest number of likes. Tweets that categorized as anger and fear do not get many likes as sadness and joy. Another analysis has been done to observe the users who tweeted most, and figure II is drawn.

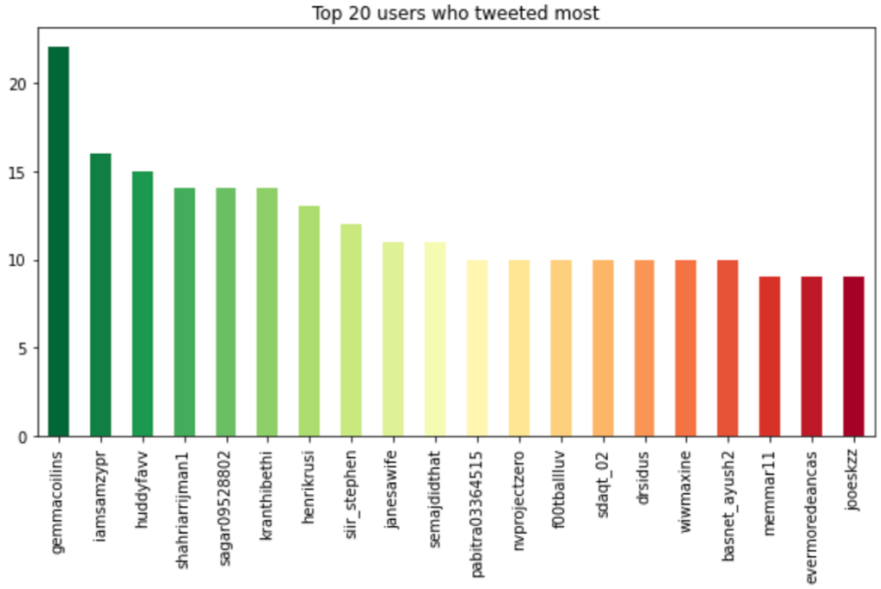

Figure II: Top 20 Users who tweeted the most bar chart

Another interesting analysis would be observing the words that used the greatest number of times. Spacy and nltk libraries are used to preprocess the text data. First, all hashtags and punctuations are removed. Secondly, the words have been stemmed for example the words “chocolates”, “chocolatey”, “choco” reduced to the root word, “chocolate”. After that, stop words have been removed by en_core_web_lg model which is the largest English model of spacy with size 788 MB. Finally, top 30 words visualized in figure III.

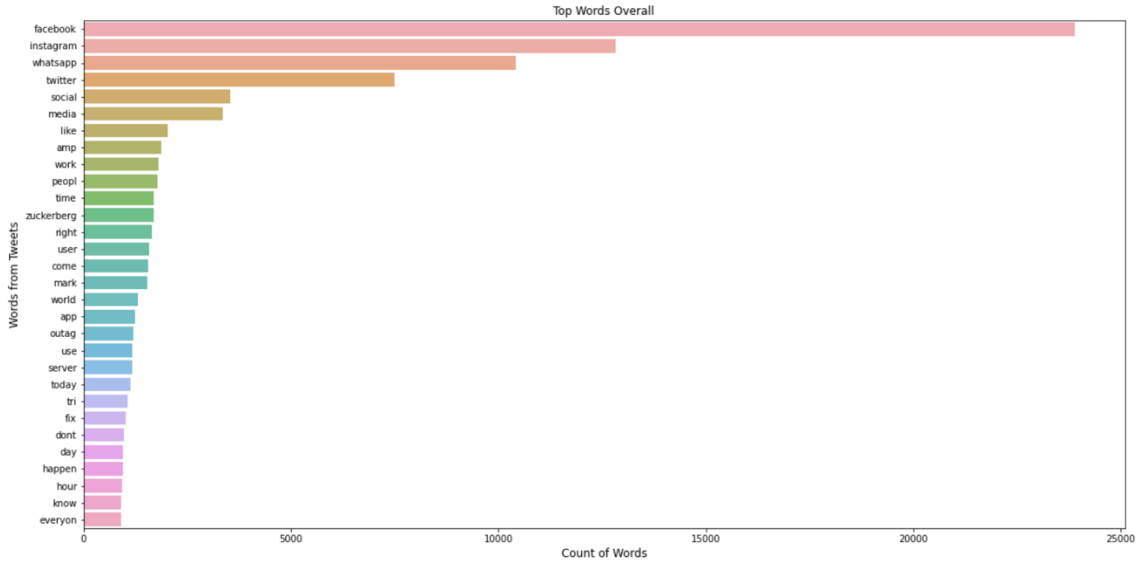

Figure III: Top 30 words from 29,733 tweets

As expected, the most popular words are “facebook”,” Instagram”, “whatsapp”, “twitter”, “social” and “media”. In addition, Word cloud of words has been plotted in Figure IV.

Figure IV: Word Cloud of Tweets

Network Analysis by Hashtags

When scraping the tweets with twint library, it also stores all the hashtags used as a string. First challenge was to process this attribute and changed to a list format that can be used easily. The most liked 100 tweets are used to do the network analysis. Nodes are the hashtags and nodes have edge between them only if they used together in the same tweet. The graph has been created by 42 nodes and 147 edges and it is visualized in Figure V.

The tweets that have the greatest number of edges have been accumulated in the center, they are mostly the Facebook shutdown event related such as “serverdown”, “instagramdown”, “whatsappdown” or “deletefacebook”. It is also possible to see unrelated hashtags in the part of the graph that is far from the center.

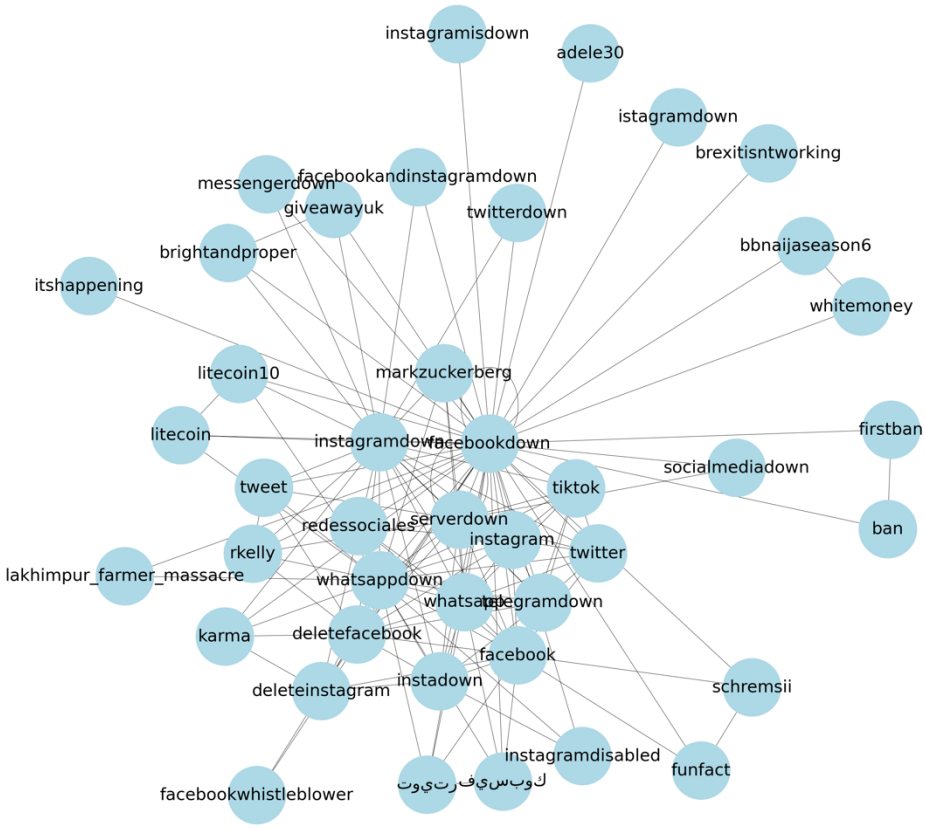

Figure V: Network graph of the hashtags

Conclusion

The expected outcome was to see clusters of tweets in terms of their opinion on Facebook products as emotions such as joy, anger, or fear. The most liked 500 tweets used for this classification, and it has been concluded that most of these tweets (59.2 % percent) categorized as joy. On the other hand, only 4% of those tweets are categorized as anger among the most liked tweets. In conclusion, tweets that make fun of Facebook shutdown and express joy got much more likes than the tweets that express anger or fear about the event.

The second aim of the project was implementing network analysis on the hashtags of the most popular tweets. The graph has been created successfully, and it shown that hashtags about Facebook shutdown event have been used together mostly.