

GuruCool IBM Project Build-A-Thon
Project

On

Web based Dashboard for COVID-19 Twitter Sentiment Analysis

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1. INTRODUCTION

1.1 Overview

As governments and organizations continue to work towards COVID-19 and stem the growing humanitarian toll it is exacting, the economic effects are also beginning to be felt. We can track sentiment to gauge how people's expectations, incomes, spending, and behaviors change throughout the crisis across the country over time and also predict their state if the lockdown is extended.

1.2 Purpose

The project mainly focuses on people's sentiment towards the pandemic, understands the sentiments of people on government's decisions to extend the lockdown and possibility to predict riots against the government.

In this Project, our server application subscribes to a Twitter feed as configured by the user. Each tweet received will be analyzed for emotional tone and sentiment, all data is stored in a Cloudant database, with the opportunity to store historical data as well. The resulting analysis is presented in a Node-Red based Web UI as a series of graphs and charts

- Tweets are pushed out by Twitter based on Hashtag.
- The Watson Tone Analyzer Service /Sentiment node performs an analysis of
- Sentiment and emotional tone.
- Tweets and metadata are stored in Cloudant
- The Web UI displays charts and graphs.

2. LITERATURE SURVEY

a. Existing Problem

There is a drastic change in people's sentiment towards the pandemic. Initially there was fear among the people, but now the fear is slowly gone and people started taking things for granted. There is a need to understand the sentiments of people on government's decisions to extend the lockdown and possibility to predict riots against the government

b. Proposed Solution

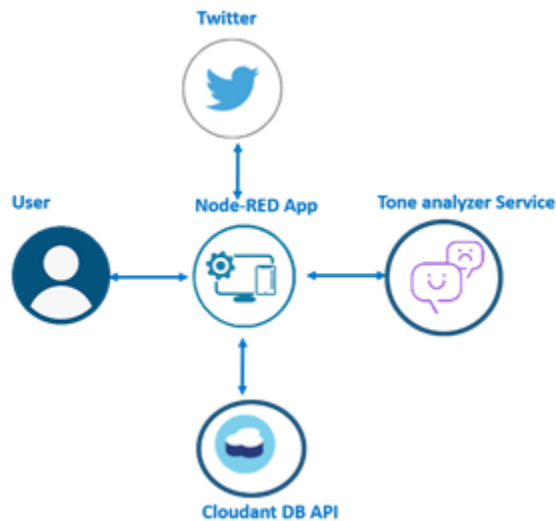
In this Project, our server application subscribes to a Twitter feed as configured by the user. Each tweet received will be analyzed for emotional tone and sentiment, all data is stored in a Cloudant database, with the opportunity to store historical data as well. The resulting analysis is presented in a Node-Red based Web UI as a series of graphs and charts

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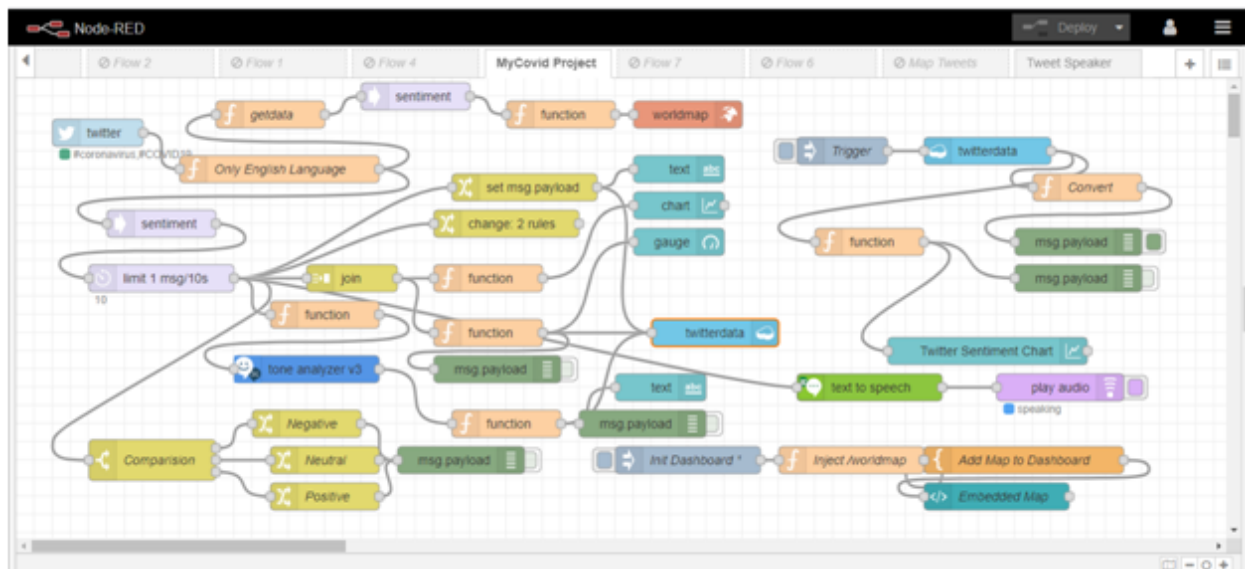
3. THEORITICAL ANALYSIS

3.1 Block diagram

The Proposed Technical Architecture is given as below:



And in Node Red UI the components are connected as given below:



The following nodes are used

- Worldmap node
- Sentiment node

- Twitter node
- Watson Text to speech node
- Template nodes for UI
- Cloudant databases to store and also fetch data
- Charts to display graphical analysis
- Gauge node to display sentiment as meter
- Watson Tone analyzer node

3.2 Hardware / Software designing

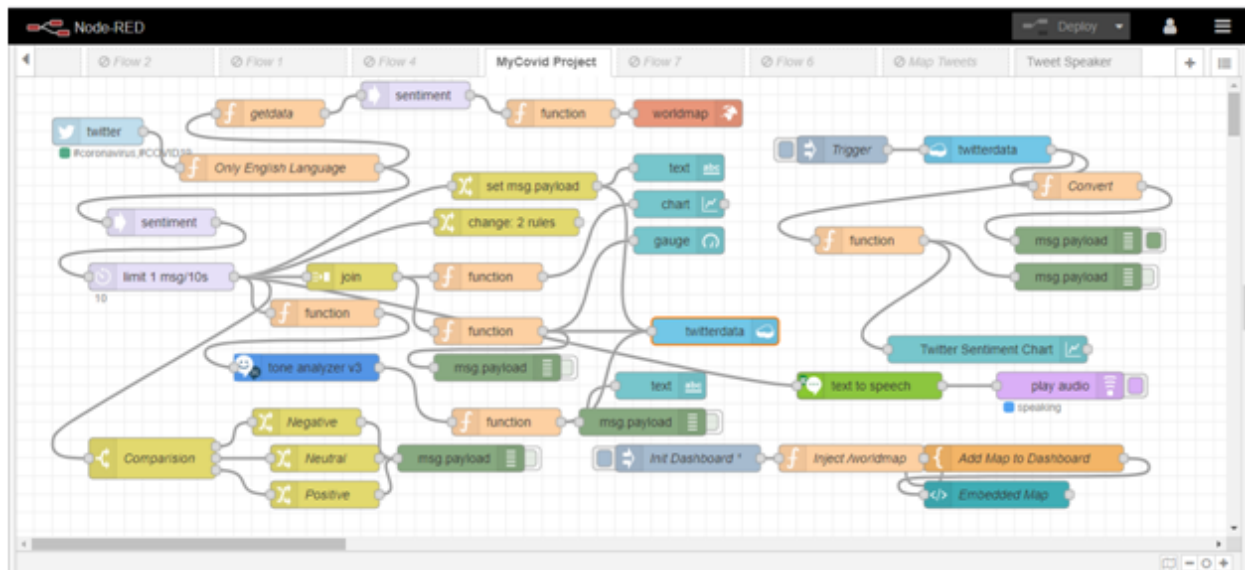
Software services required to implements this project are :

1. IBM Watson Tone Analyzer
2. IBM Nodered
3. IBM Cloudant databse
4. Twitter developer account

4. EXPERIMENTAL INVESTIGATIONS

The project consists of Node Red UI for building all the components required to represent all the analysis graphically.

The given figure shows each node of nodered interface. Each node has its own functionality.



Using twitter node, Tweets are pushed out by Twitter based on Hashtag. The hash tag given is #Coronavirus , #COVID19

For getting tweets first an account was created at developer.twitter.com. An application was sent to Twitter to accept me as developer so that I can create projects and use the tweets.

The application was accepted after review. Then API keys were generated at the twitter developer portal which is then placed as an attribute in the nodered twitter node. Once done, the tweets started to flow.

Tweets

RT @Holbornlolz: Looks like the UK is settling into luxury Communism. "Stay home, do nothing, Boris will pay for everything"

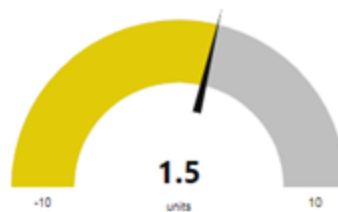
Tweets

RT @DrEricDing: 📌RECAP: Key thing Kamala said at #VPDEBATE: 'On January 28, the Vice President & the President were informed that #COVID19...

The sentiment was then calculated using sentiment node. The score usually varies between -5 to +5. When score is <0 , it is considered to be negative sentiment. When it is >0 , then the sentiment is a Positive sentiment else Neutral.

This score is aggregated over a period of 10 seconds and then is displayed using gauge node as Sentiment Meter.

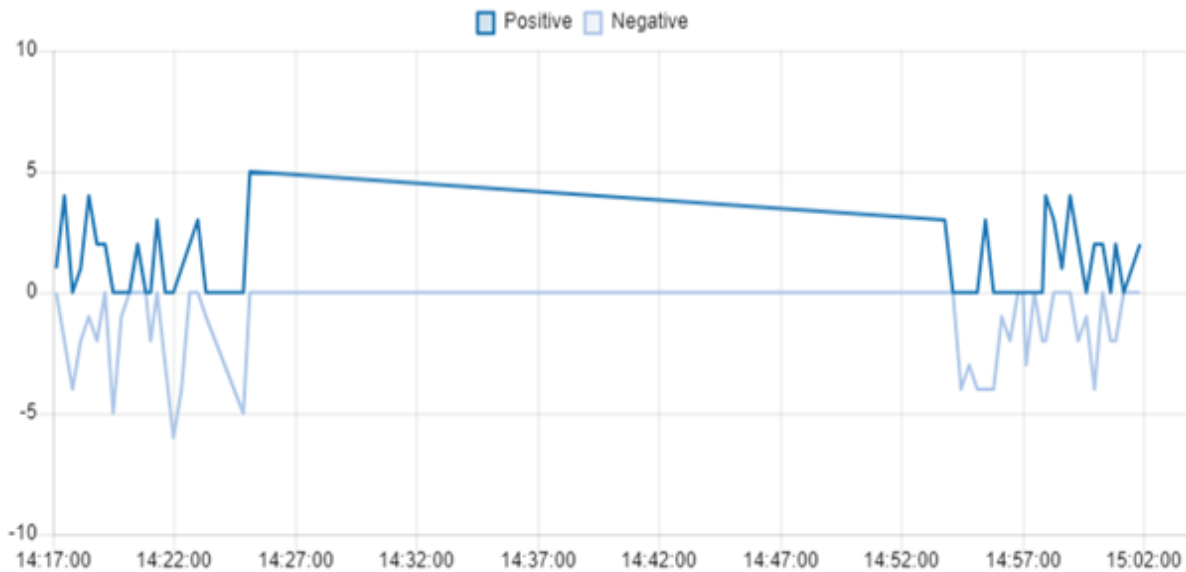
Average Tweet Sentiment Meter for 10s
Time Period



The sentiment score is segregated as positive and negative, accumulated for a period of 10 seconds as the tweets keep on coming.

There are then plotted using chart node as shown below.

Aggregate Sentiment Value per 10s Time Period



The tweets are analyzed for their tone using Watson Tone analyzer. Different tone names are associated with each tweet such as Joy, Confident, anger, Sadness, Fear etc. These tones are also stored in cloudant database along with tweet data and sentiment score data.

Tweets

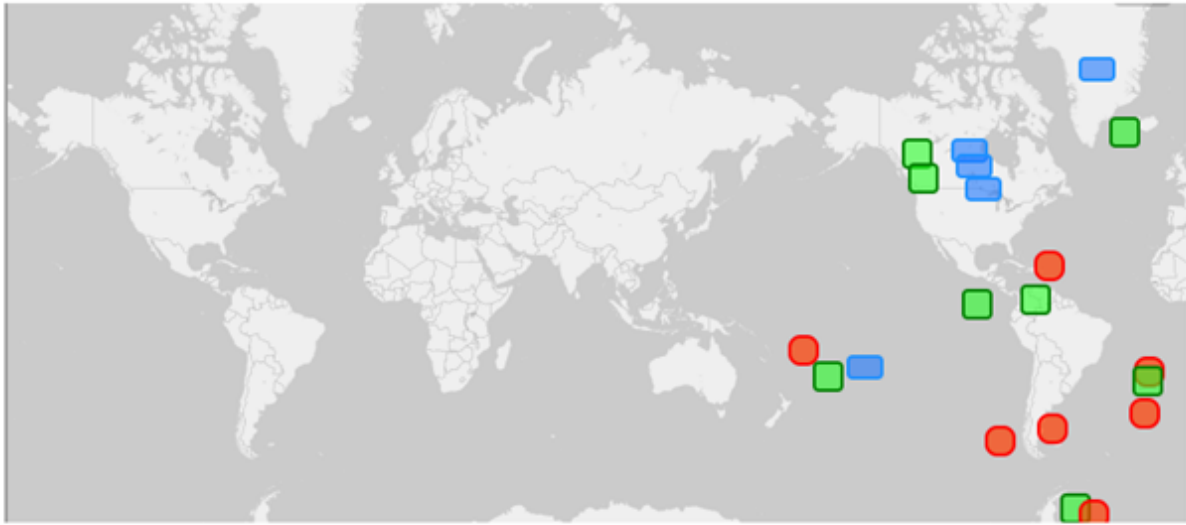
RT @CochraneLibrary: An extraordinary week of published content relating to @cochraneccollab response to the #COVID19 pandemic! <https://t.co...>

Tone of the Tweet

Confident

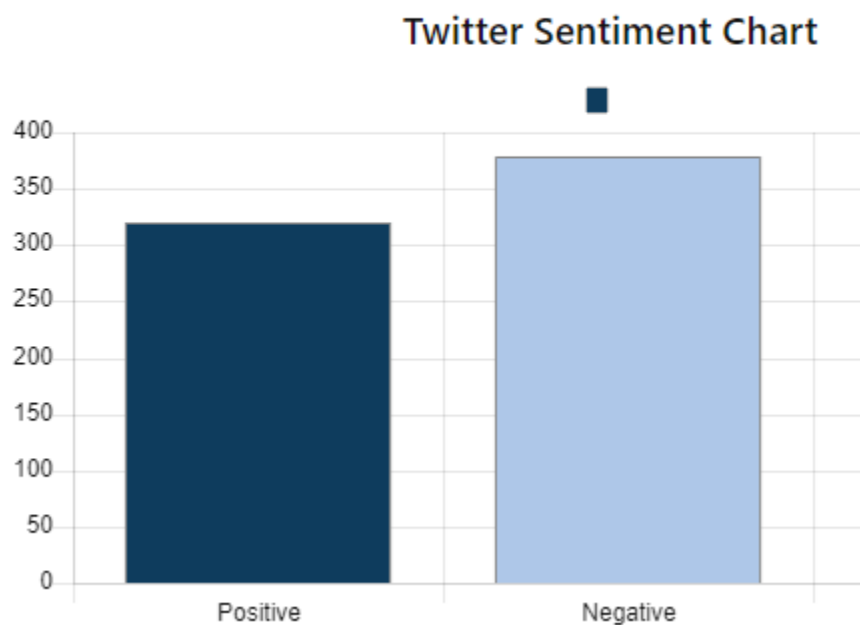
All the tweets which are geo-tagged are collected, and their locations are extracted in the form of latitude and longitude. These attributes along with the tweet and the sentiment score that is calculated previously are plotted on to the world map using world map node. Colors are given for different sentiments. Green pointers on the map are locations to neutral sentiment tweets. Blue ones are positive sentiment tweet locations and red are negative sentiment tweet locations. They are plotted only when we inject into the map node.

Global Tweet Map



All the tweets are continuously fed into cloudant database named twitter data. After sufficient amount of tweets are collected into the database, we can analyze all the tweets collectively by fetching the sentiment score and finding the count of positive and negative scores. Here below you can see negative sentiment of people is more compared to positive sentiment.

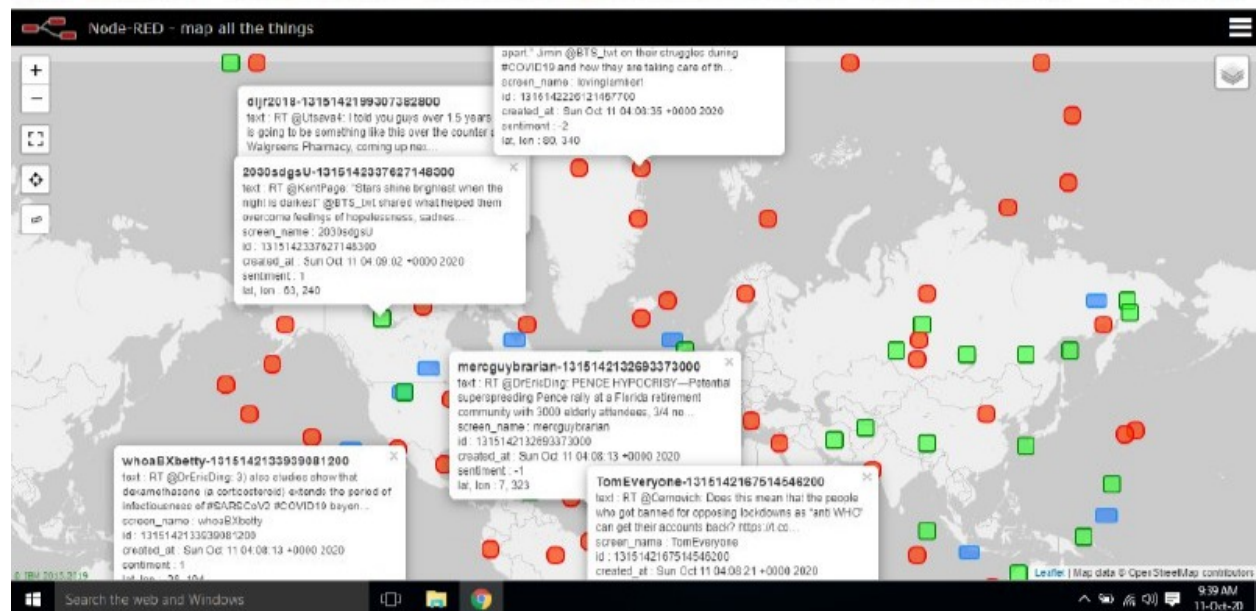
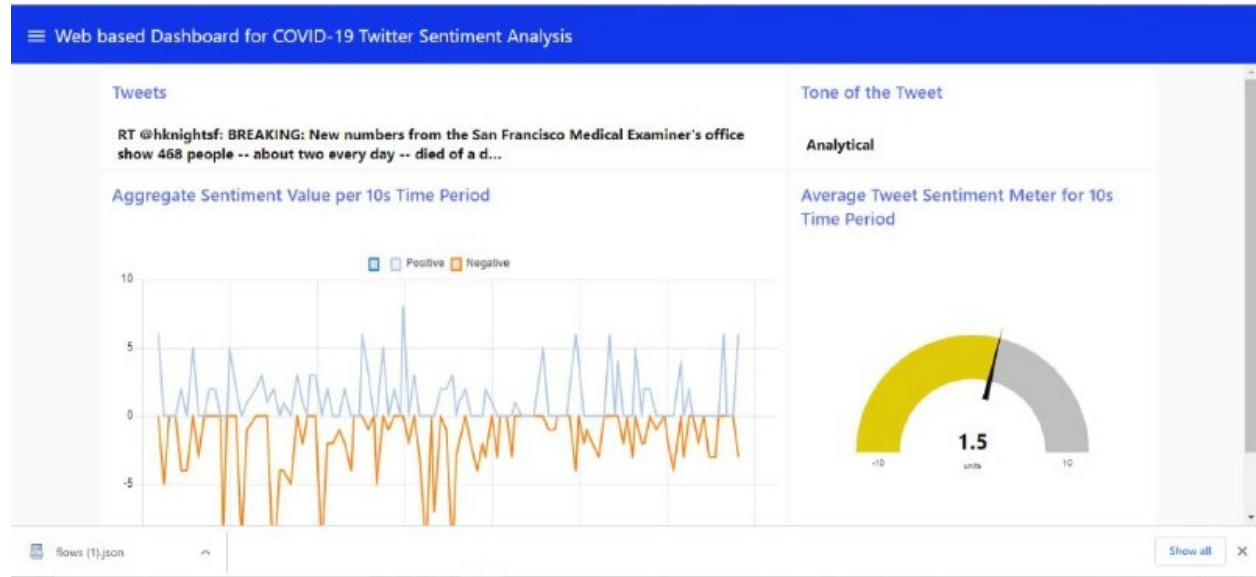
Twitter Sentiment Chart



5. FLOWCHART

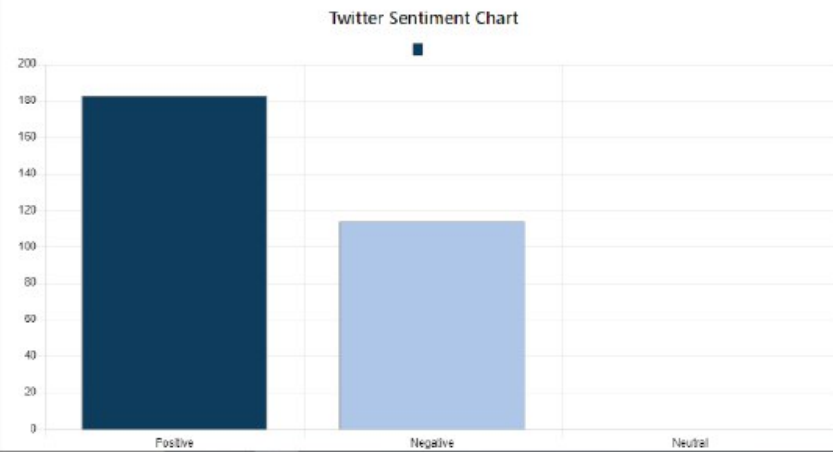


6. RESULT



COVID Historical Analysis

Twitter Sentiment Chart

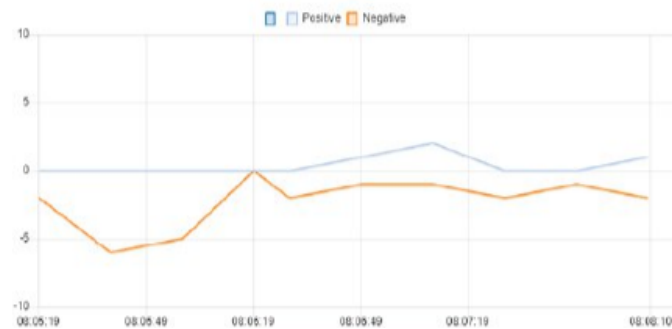


Web based Dashboard for COVID-19 Twitter Sentiment Analysis

Tweets

RT @DemWrite: #Arizona's voter registration deadline has been extended until OCT. 23 b/c of #COVID19 & the problems it has caused for regis...

Aggregate Sentiment Value per 10s Time Period



Tone of the Tweet

Analytical

Average Tweet Sentiment Meter for 10s Time Period



7. ADVANTAGES & DISADVANTAGES

Advantages:

- Accurate analysis of sentiment of people as live twitter feed is considered.
- Sentiment scores and tweets are displayed on an attractive dashboard with all graphics plots and charts which can be easily understood by layman user.

Disadvantages:

- All 100% tweets are not fetched from all over the world due to limitation of twitter developer portal. Hence it may happen sometime that the sentiment varies from the actual value.

8. APPLICATIONS

The applications of this project are in

- Governments
- Healthcare
- Companies
- Politics.

We can get the sentiment of the user regarding any new restrictions imposed by the governments and analyze the overall reaction of the people. Many decisions can be made or reverted by carefully checking the sentiment of the people regarding that decision.

Also the same sentiment analysis can be changed easily to be used in various other domains such as health care, politics, administration etc, just by changing the hashtags of twitter feed.

9. CONCLUSION

After completing this project the conclusion that I can make is that majority of the people have negative sentiment regarding COVID-19, Coronavirus. The decisions made, the rules violated, restrictions imposed, all in all the overall sentiment that I got from analyzing the tweets is more negative than positive.

We can get the sentiment of the user regarding any new restrictions imposed by the governments and analyze the overall reaction of the people. Many decisions can be made or reverted by carefully checking the sentiment of the people regarding that decision.

Also the same sentiment analysis can be changed easily to be used in various other domains such as health care, politics, administration etc, just by changing the hashtags of twitter feed

10. FUTURE SCOPE

For future scope we can perform much deeper analysis by targeting specific locations in the twitter region. We can get the sentiment of the user regarding any new restrictions imposed by the governments and analyze the overall reaction of the people. Many decisions can be made or reverted by carefully checking the sentiment of the people regarding that decision.

Also the same sentiment analysis can be changed easily to be used in various other domains such as health care, politics, administration etc, just by changing the hashtags of twitter feed.

11. BIBILOGRAPHY

- a. <https://cloud.ibm.com/docs?tab=tutorials>
- b. <https://nodered.org/docs/tutorials/>
- c. <https://flows.nodered.org/>
- d. <https://github.com/node-red>

12. APPENDIX

A. Source code

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