Web Science (H)

Network based Social Media Analytics Report

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Source Code

https://github.com/Parklife05/Twitter-Crawler-Web-Science

Sample Data

https://github.com/Parklife05/Twitter-Crawler-Web-Science/blob/master/csv/sample.csv

Introduction

The program I have developed allows for crawling of twitter data collecting tweets using keywords to track tweets. I compiled two python scripts to collect tweet data and both Twitter's Streaming and REST API's were used. My first script [getData.py] was to collect !% of data and was ran on 29/03/2020 at 2pm for 1.5 hours. Tweets were gathered and then classified for word, username frequency and saved to a MongoDB database. I refined my crawler, and selected keywords with my classified data and ran my second script [getAllData.py] on the 30/032020 at 3pm for 1.5 hours. Tweets were again gathered and then classified, this time by through the use of K-Means clustering and saved again to my database. I referenced this site for in compiling my initial crawling scripts:

https://www.toptal.com/python/twitter-data-mining-using-python

I compiled a script to [cluster.py] to extract usernames and hashtags and printed the sorted results to my [output.csv] file. Network interaction graphs were compiled and feature later in this report ,

Data Crawl

The Tweepy library was used for crawling and the scripts mentioned above [getData.py] & [getAllData.py] were compiled for gathering the data. After my initial crawl I compiled a script [wordFreq.py] to parse the database and extract most common word frequencies in order to refine my twitter crawler. After studying the data I felt that the terms below appeared frequently and I based my keywords for my refined crawler on them.

```
coronavirus,2602
@realDonaldTrump,2113
quarantine,1892
```

The keywords I tracked for my second stream in [getData.py] were:

```
keywords = ['Covid-19', 'Coronavirus', 'self-isolation', 'stay at home',
'#flatenthecurve',
            'social distancing', 'pandemic', 'virus', '@RealDonalTrump',
'#StayHomeSaveLives', '@GOVUK',
            '@10DowningStreet', 'Corona Virus', '@BorisJohnson ', 'coronavirus
deaths', 'world health organisation',
            '#COVID_19', '#coronavirus', '@WHO', 'quarantine', '#Quarantine'
'donald', 'trump', 'boris', 'johnson',
            'corona', 'virus', 'test positive covid-19']
```

I also obtained the most frequent usernames from my [wordFreq.py] script and tracked them they were:

```
users = ['25073877', '3131144855', '17481977', '14499829', '14224719']
```

Tweet Grouping

For the next analytical tasks for data gathering I compiled further scripts which include [cluster.py], this script used kMeans clustering using the SKLearn library to analyse the data by extracting and clustering the top 5 Users and Hashtags. Output below:

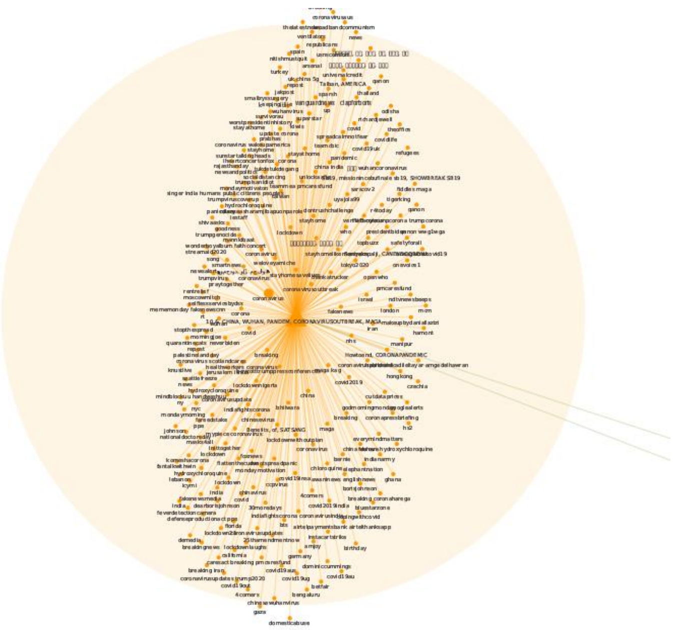
```
=== Preforming KMeans with 10 clusters ===

        === Cluster 0, Size: 354762 ===

=== Usernames ===
[('@realDonaldTrump', 3), ('@joyb37', 2), ('@Maestro_Mathur', 2), ('@BigTony2014', 2),
('@marinasoltan_', 2)]

=== Hashtags ===
[('#singer', 1), ('#India', 1), ('#humans', 1), ('#public', 1), ('#citizens', 1)]

        === Cluster 1, Size: 354762 ===

=== Usernames ===
[('@Mzakal91058', 3), ('@MzalakaMzala2', 2), ('@MzalendoShujaa', 2), ('@sakaHammed11',
1), ('@alakijaofficial', 1)]

=== Hashtags ===
[('#COVID19S', 1)]


        === Cluster 2, Size: 354762 ===

=== Usernames ===
[('@MzalendoShujaa', 3), ('@Mzakal91058', 3), ('@MzalakaMzala2', 2), ('@ouchinagirl', 1),
('@WhiteHouse', 1)]

=== Hashtags ===
[('#COVID19S', 1)]


        === Cluster 3, Size: 354762 ===

=== Usernames ===
[('@MzalendoShujaa', 4), ('@Mzakal91058', 2), ('@MzalakaMzala2', 2), ('@DcdRetblue', 1),
('@KR_KAG', 1)]

=== Hashtags ===
[('#COVID19S', 1)]

        === Cluster 4, Size: 354762 ===

=== Usernames ===
[('@MzalendoShujaa', 3), ('@Mzakal91058', 3), ('@MzalakaMzala2', 2), ('@cmcqueen47', 1),
('@mitchellvii', 1)]

=== Hashtags ===
[('#COVID19S', 1)]

        === Cluster 5, Size: 354762 ===

=== Usernames ===
[('@MzalendoShujaa', 5), ('@MzalakaMzala2', 2), ('@Amethystinia', 1), ('@FT_SriLanka', 1),
('@zzzzzzzkrtls', 1)]

=== Hashtags ===
[('#lka', 1), ('#COVID19S', 1)]

        === Cluster 6, Size: 354762 ===

=== Usernames ===
[('@Mzakal91058', 3), ('@MzalakaMzala2', 2), ('@MzalendoShujaa', 2), ('@pretendasaur', 1),
('@Lowkey0nline', 1)]

=== Hashtags ===
[('#COVID19S', 1)]

        === Cluster 7, Size: 354762 ===
=== Usernames ===
[('@Mzakal91058', 4), ('@MzalakaMzala2', 2), ('@aqila_yayah', 1), ('@thisiswafiy', 1),
('@zzzzzzzkrtls', 1)]

=== Hashtags ===
[('#COVID19S', 1)]

        === Cluster 8, Size: 354762 ===

=== Usernames ===
[('@MzalendoShujaa', 3), ('@Mzakal91058', 2), ('@MzalakaMzala2', 2), ('@FelonyHarlem11',
1), ('@zzzzzzzkrtls', 1)]

=== Hashtags ===
[('#COVID19', 1), ('#StaySafe', 1), ('#Day4', 1), ('#CoronaVirusLockdown', 1),
('#LockdownSA', 1)]

        === Cluster 9, Size: 354762 ===

=== Usernames ===
[('@MzalendoShujaa', 4), ('@Mzakal91058', 3), ('@MzalakaMzala2', 2), ('@theannuarya', 1),
('@duttsanjay', 1)]

=== Hashtags ===
[('#COVID19', 1), ('#StayAtHomeSaveLives', 1), ('#Corona', 1), ('#COVID19S', 1)]
[['#singer', '#India', '#humans', '#public', '#citizens', '#peoples', '#coronavi', '#PMCaresFunds',
'#CoronaVirus', '#StayHomeStaySafeSaveLives', '#Ghalib', '#everyone', '#bad', '#around',
'#world', '#virus', '#should', '#TheStep'], ['#COVID19S'], ['#COVID19S'], ['#COVID19S'],
['#COVID19S'], ['#lka', '#COVID19S'], ['#COVID19S'], ['#COVID19S'], ['#COVID19',
'#StaySafe', '#Day4', '#CoronaVirusLockdown', '#LockdownSA', '#COVID19S'], ['#COVID19',
'#StayAtHomeSaveLives', '#Corona', '#COVID19S']]
```

Method for Capturing & Organising User and hashtag information

User interaction and hashtag information was used to compile interaction graphs using the packages, NetworkX. MatPlotLib and web based network tool at:

https://www.cortext.net/

The Hashtag data was extracted from the database using the compiled script [hashtags.py] and the output was saved, uploaded to the above site and a network mapped. The result can be seen in the [Hashtags_network.pdf] file in the root folder of this project and in the figures below.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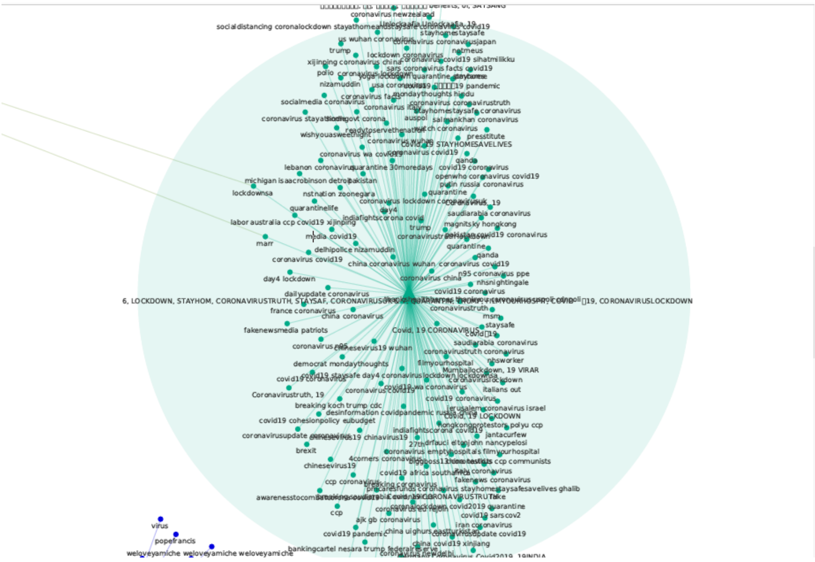
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day4 lockdown
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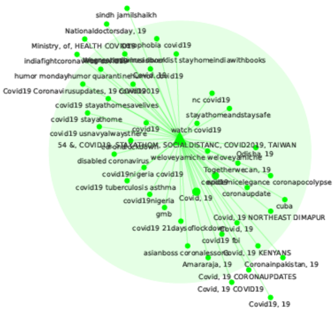
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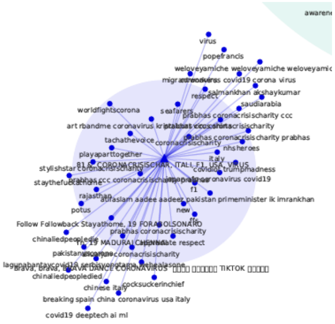
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Another script was compiled [interactions.py] which classifies the tweets and constructs network interaction graphs:

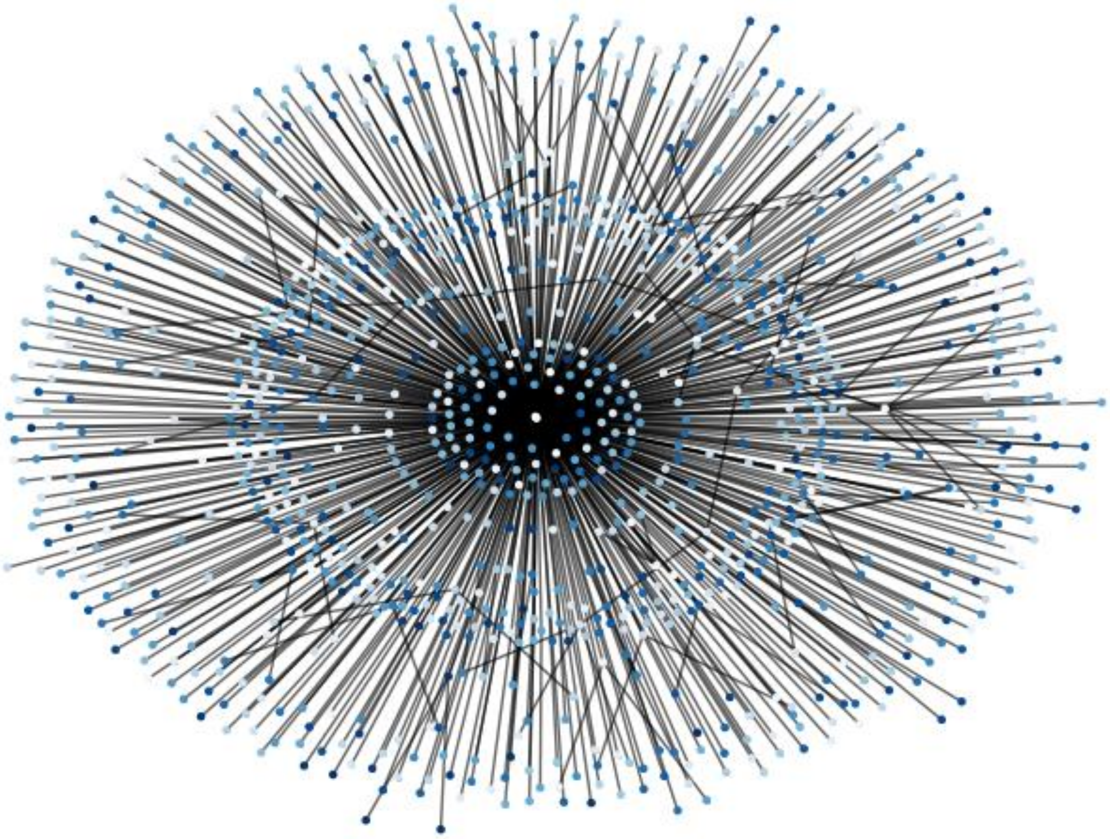
- Replies
- Retweets
- Mentions
- Quoted text

Pandas data frame package are used to organise the data and the NetworkX package is used to graph the interactions. A sample size was used for these functions of 7000, this was due to time constraints, sample size could be increased and factored into any future work.

- Nodes → Users
- Edges → Interactions

Network Analysis

Replies:

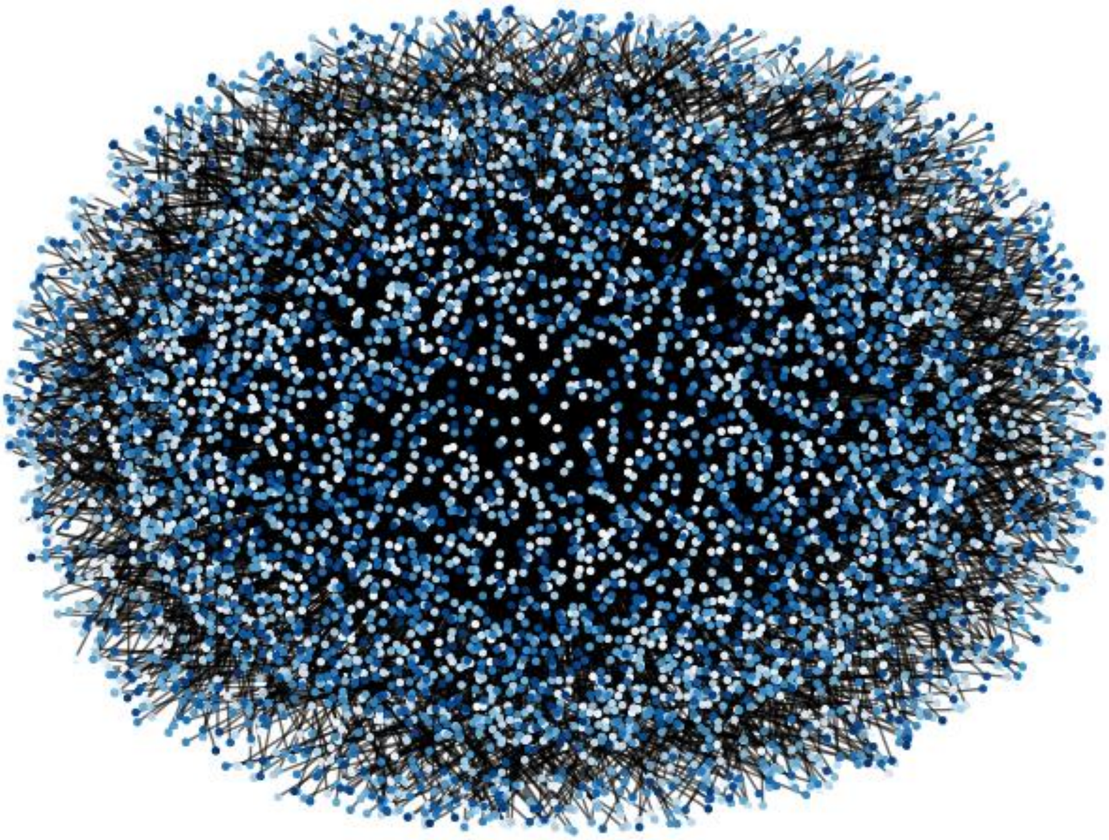


Graph Data

- 1069 nodes

- 431 edges
- maximum degree 596
- minimum degree 1
- average degree 2.3
- most frequent degree 2

Retweets:

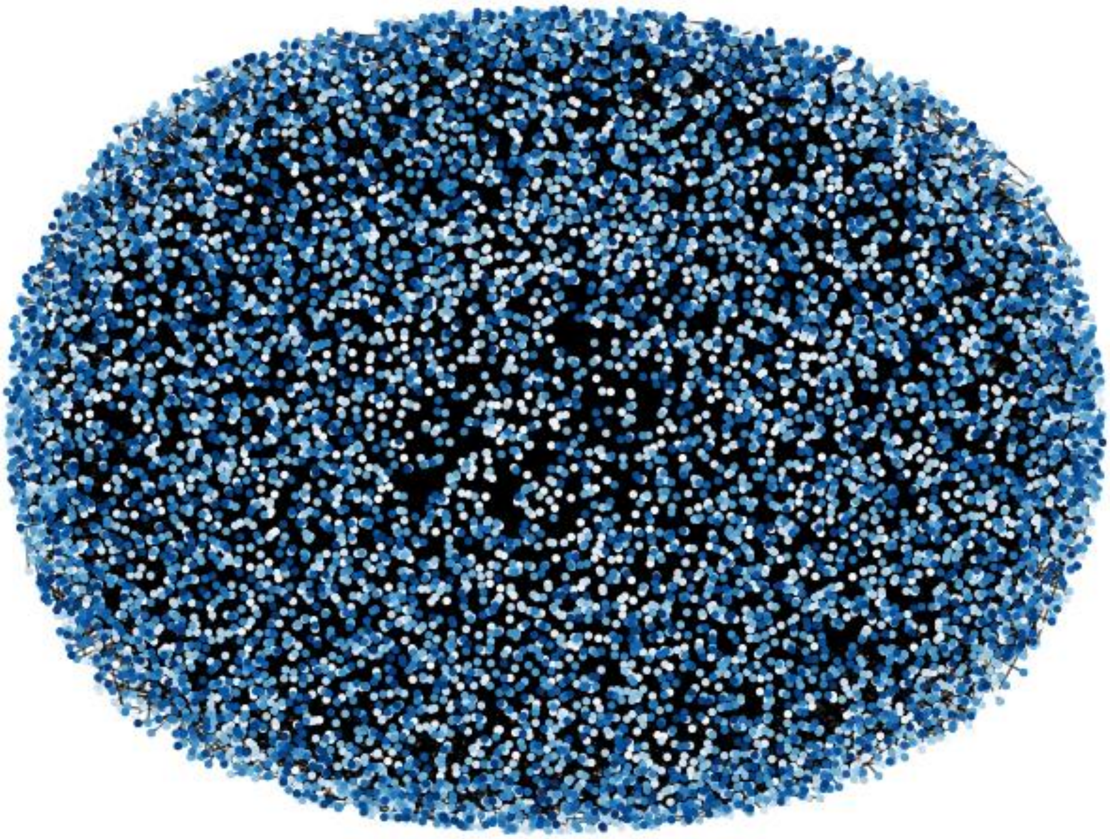


Graph Data

- 7760 nodes
- 6935 edges

- maximum degree 4609
- minimum degree 1
- average degree 2.7
- most frequent degree 2

Mentions:

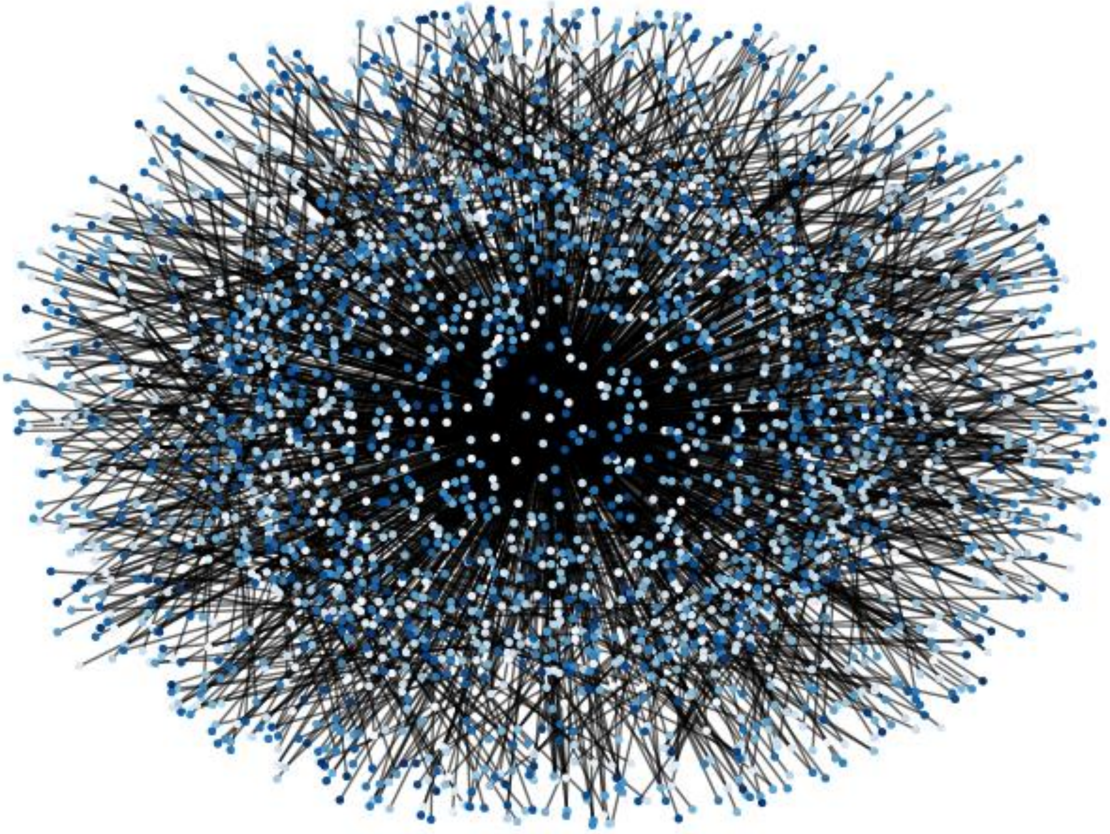


Graph Data

- 10020 nodes

- 9945 edges
- maximum degree 6239
- minimum degree 1
- average degree 2.6
- most frequent degree 2

Quotes:



Graph Data

- 2589 nodes
- 1345 edges

- maximum degree 1267
- minimum degree 1
- average degree 2.7
- most frequent degree 1