Brazilian Capitol: A Network Of Criminals

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Introduction

Brazil - Brasilia - 08/01/2023, 14:00

Figure: Criminals don't accept the results of the elections and attack Brazilian congress building and the democratic regime

Figure: Rioters inside the government building, clashing against police forces

Figure: Crowd of Far-Right Rioters outside the building, the poster says "Military Intervention, now!"

A Network of Criminals:

A social network of people directly involved was studied based on their twitter connections, the nodes being one user and the edges being the connections between them. Centrality measures were applied to discover the most influential users.

Data Preparation

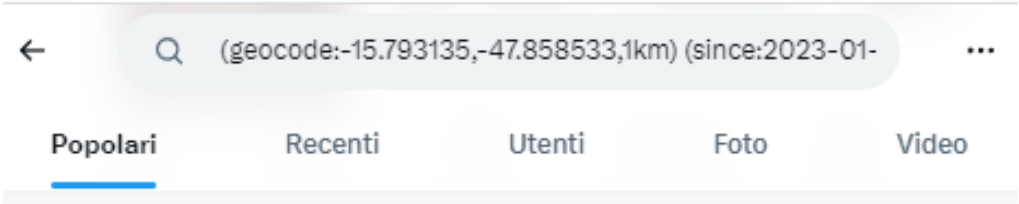

Figure: Queries were made directly from twitter website engine, specifying the geographic coordinates of Brazilian government building and the data of the episode

Figure: Flashy aesthetics of a regular Brazilian right wing twitter account.

Data Preparation

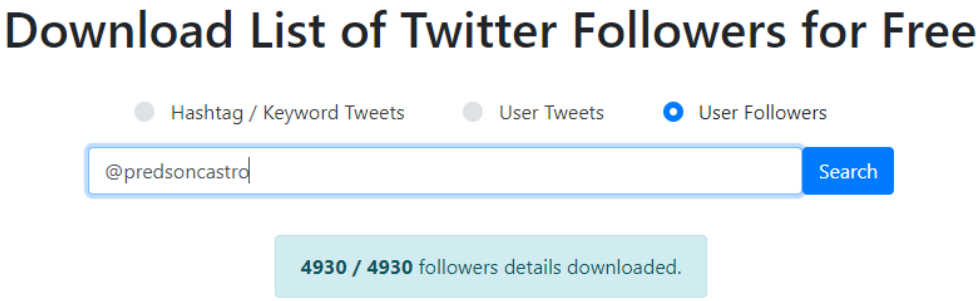

Figure: vicinitas website was used to scrape twitter data: for accounts with less than 7000 followers, it gives you a csv file with a list of the followers of the acount

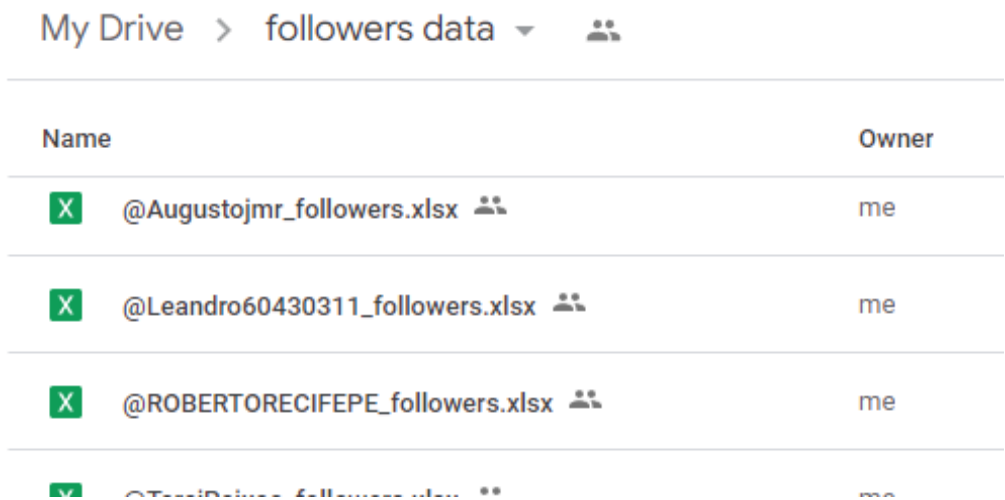

Figure: The Dataset is formed by a folder full of xslx files

Data Preparation

```
my_dict = {
    "user 1": ["follower x", "follower y", ..., "follower z"]
    # ...
    "wwwbhalive": ["Gilveio", "jr_kbrl", ..., "cursino40"],
    "predsoncastro": ["lahmano", "RaulianL", ..., "@m_s_cm"],
    # ...
    "user 247": ["follower u", "follower w", ..., "follower v"]
}
```

```
list of edges=
[('tiagobolsonaro2', 'luizarafaela'),
 ('tiagobolsonaro2', 'TrindadeTiaraju'),
 ...
 ('sevla2011', '_anti_communist'),
 ('sergiocjk', 'elfotografiaa'),
 ('joilsonbrito', 'paula_contador'),
 ...]
```

the lists of edges and users extracted from the dictionary were used to create a G networkx Graph object

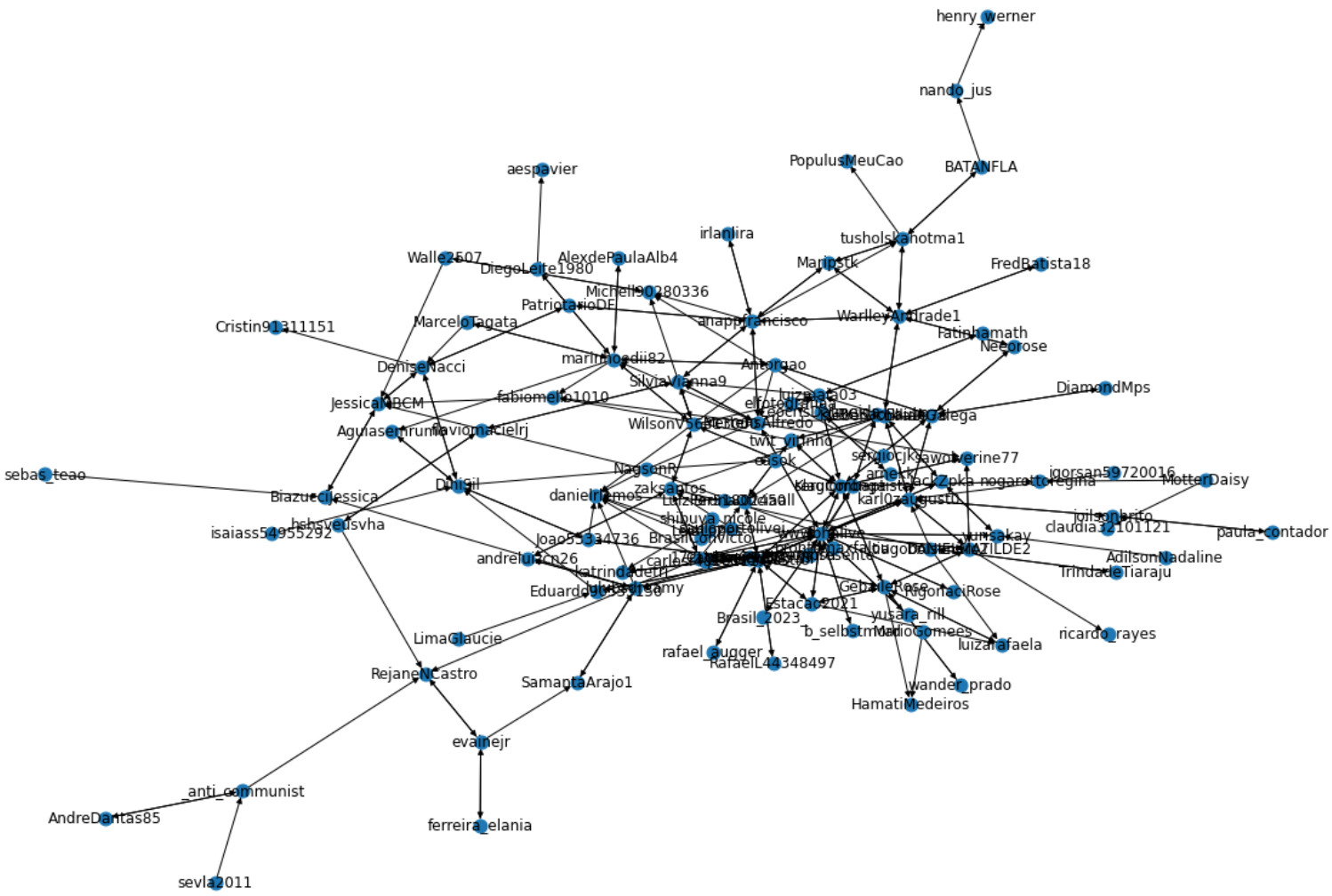

Figure: Unweighted directed 113 nodes network displayed with networkx, kamada kawai positioned

Degree Distribution

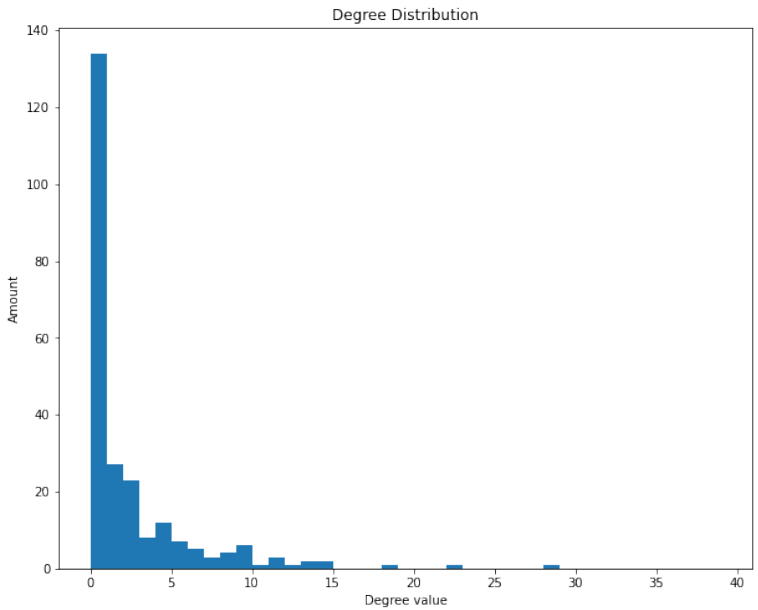

Figure: Degree distribution containing zero degree nodes.

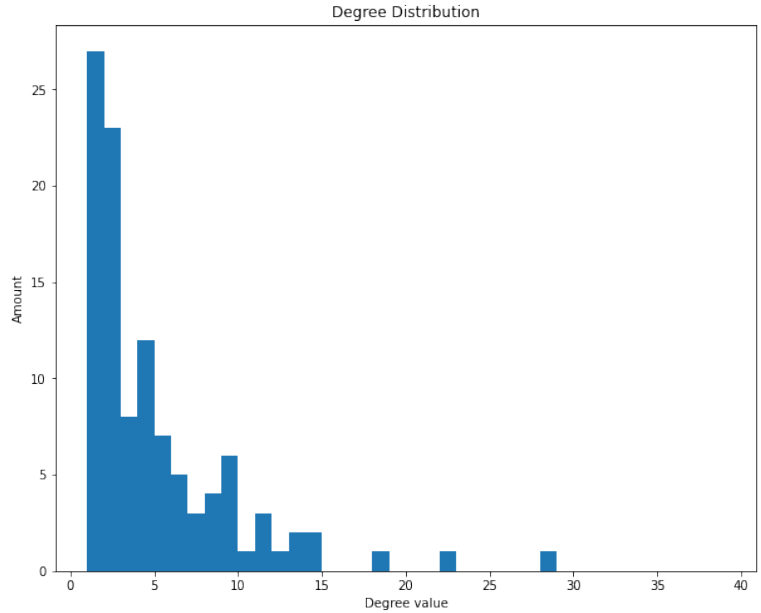

Figure: Degree distribution excluding zero degree nodes.

	Average degree
Including zero-degree nodes	2.05
Excluding zero-degree nodes	4.62

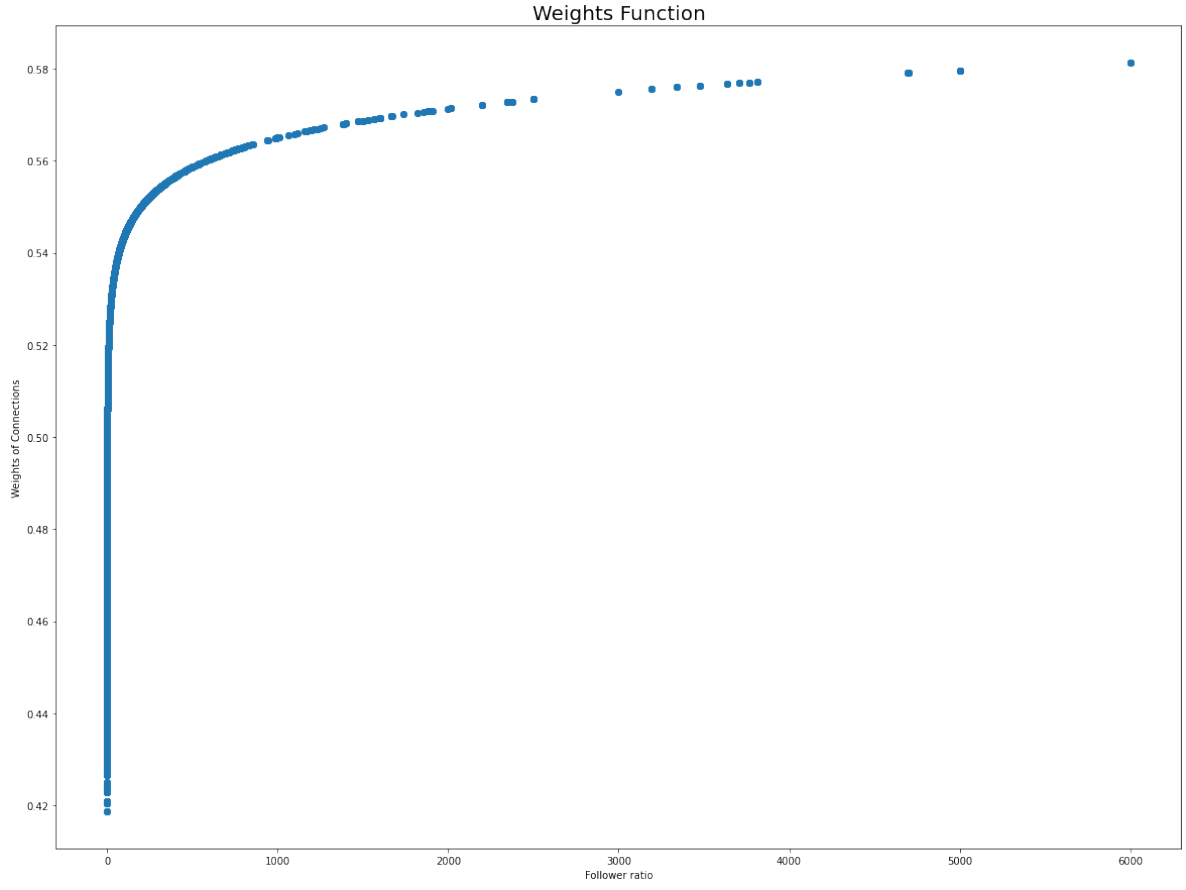

Figure: scattered plot of Weights function computed for followers ratio existing values. Constant k=0.03

$$weigths(i,j) = \arctan(k \log \frac{followers_i}{followers_j}) \quad (1)$$

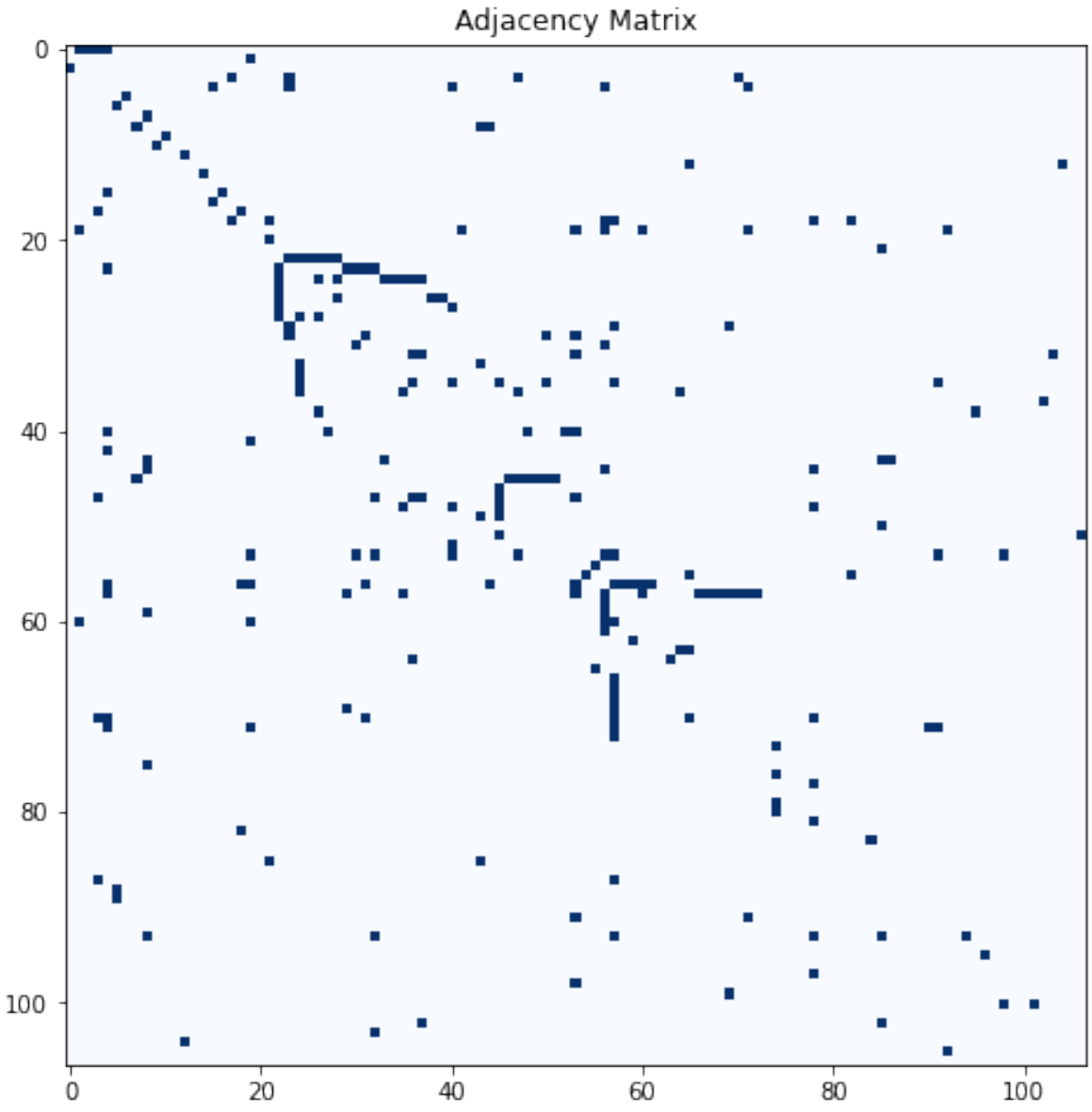

Figure: Weighted Adjacency Matrix

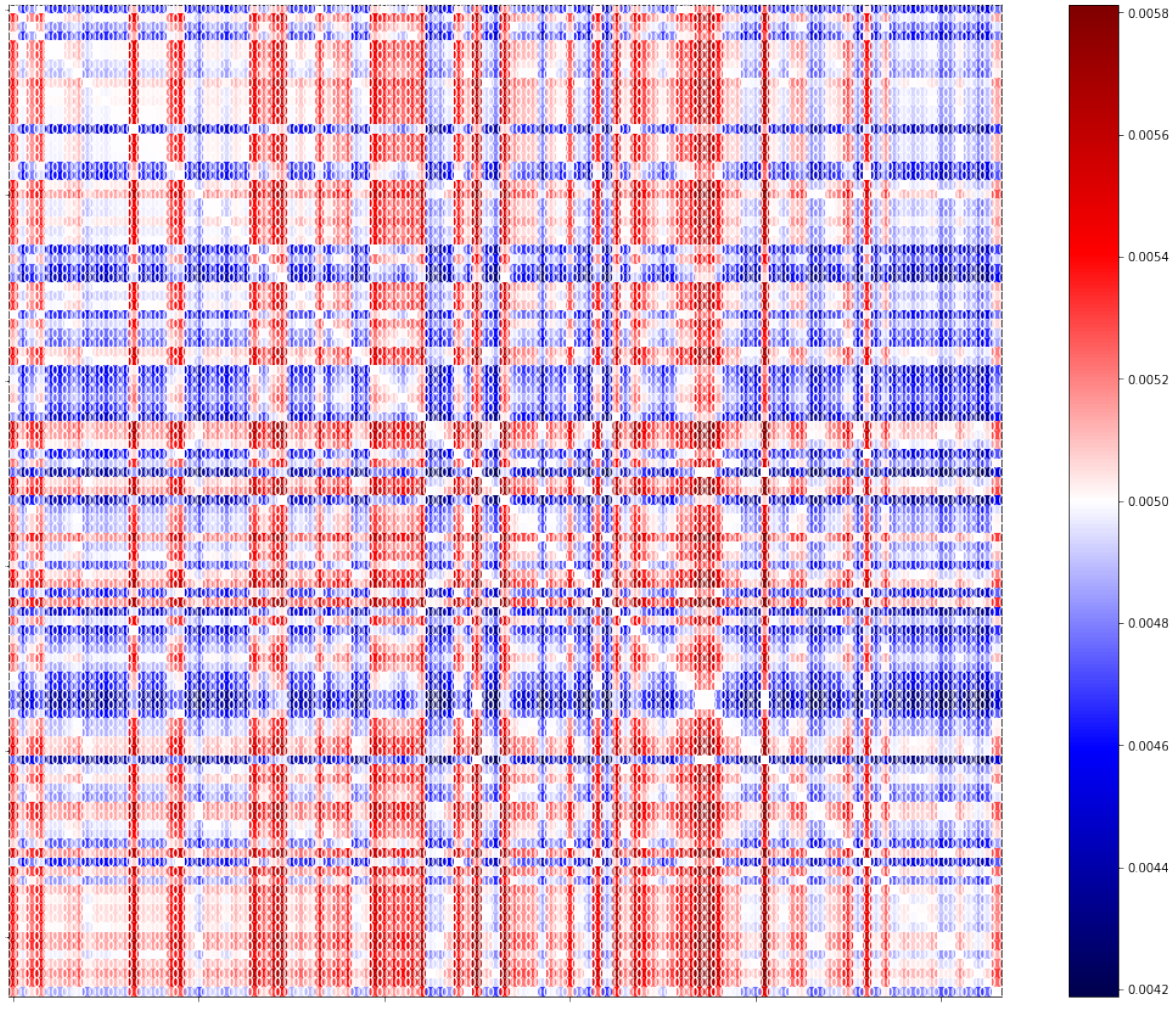

Figure: Adjacency Matrix of unweighted network

Degree Centrality

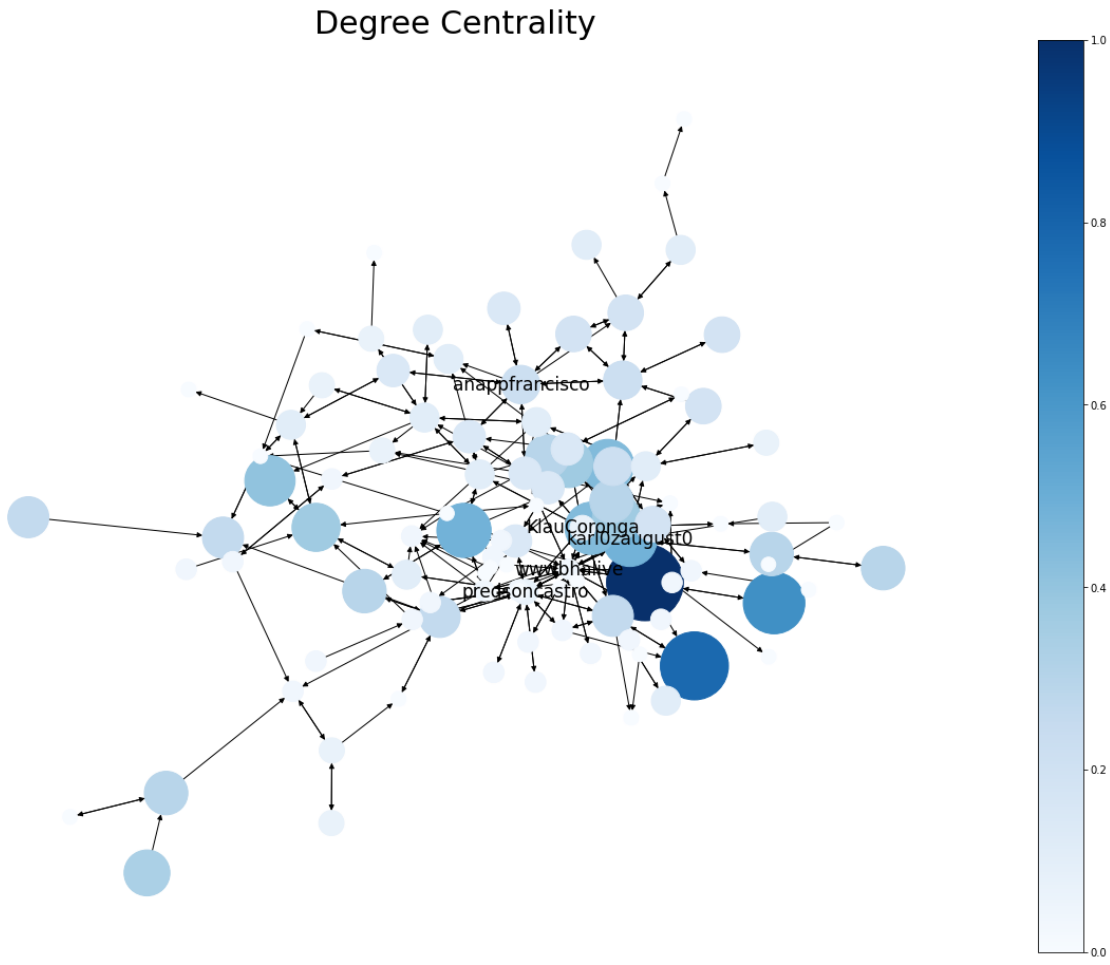

Figure: Degree Centrality visualization

Degree centrality measures the number of connections that a node has in the network.

Degree Centrality

Id	Degree	Score
57	wwwbhalive	0.264151
56	predsoncastro	0.207547
53	anappfrancisco	0.169811
24	KlauCoronga	0.132075
4	karl0zaugust0	0.132075

Betwenness Centrality

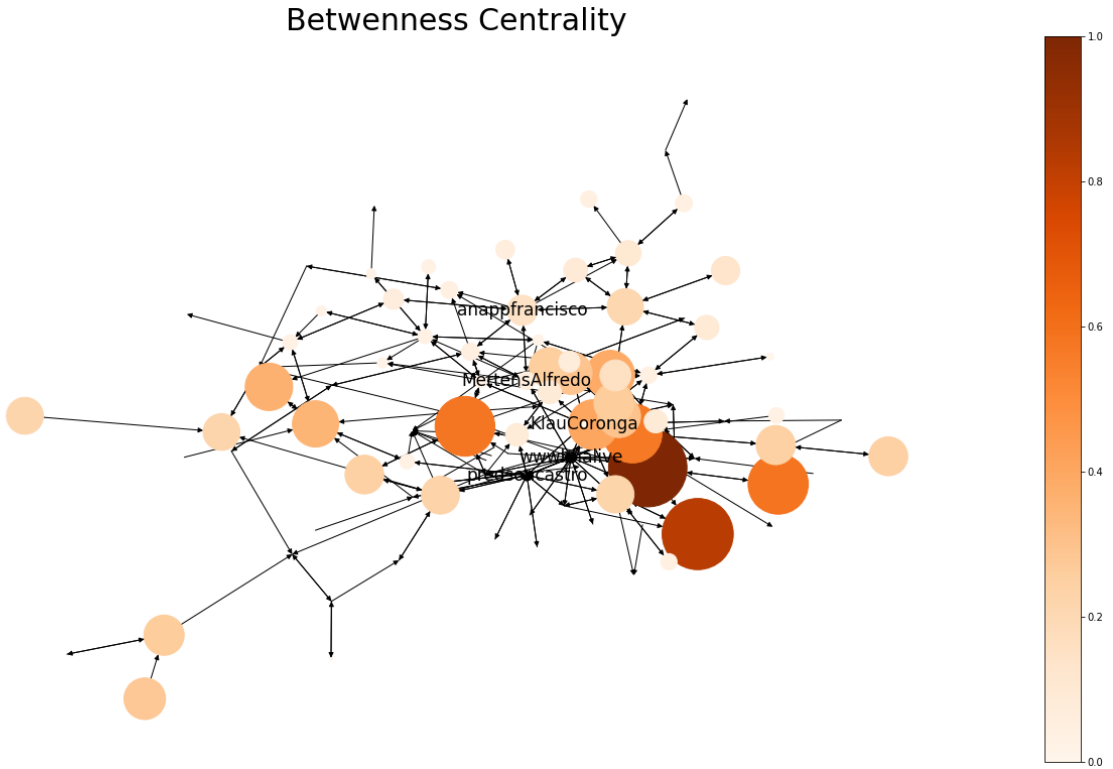

Figure: betwenness Centrality visualization

Betweenness centrality measures the extent to which a node lies on the shortest paths between other nodes in the network.

Betwenness Centrality

Id	Names	Betweenness
57	wwwbhalive	0.151239
56	predsoncastro	0.124730
24	anappfrancisco	0.089177
53	KlauCoronga	0.087842
35	MertensAlfredo	0.085793

Closeness Centrality

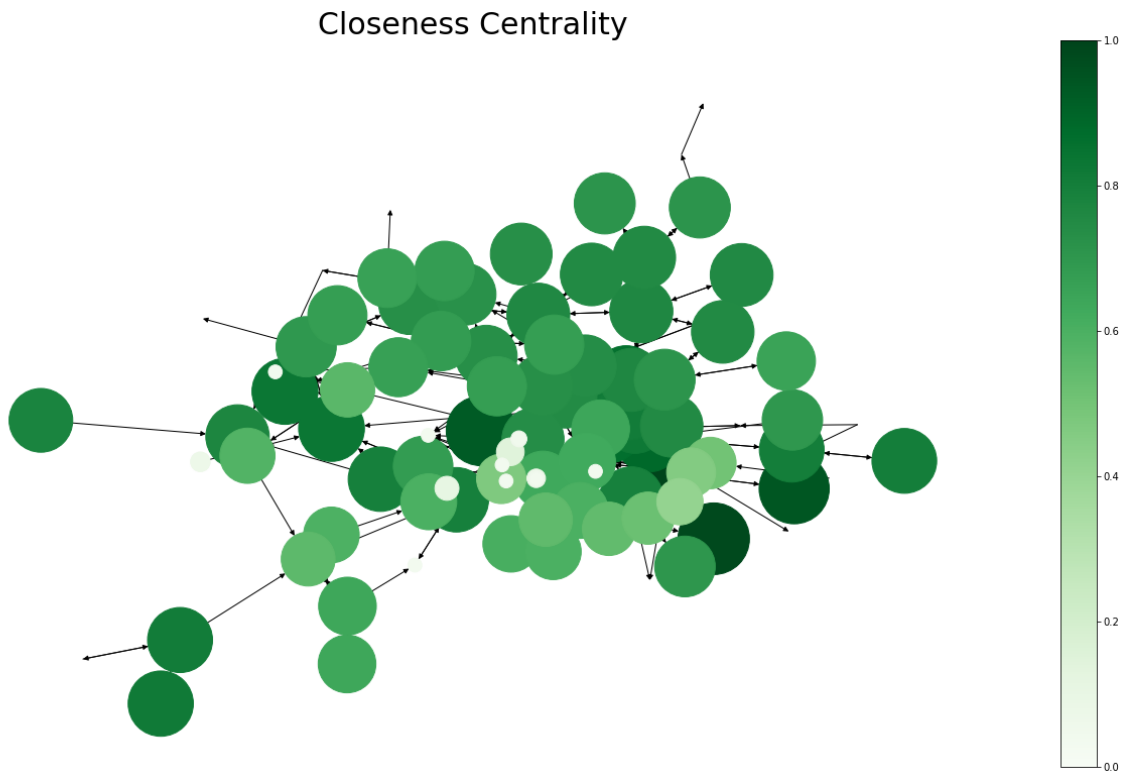

Figure: Closeness centrality visualization

Closeness centrality measures how close a node is to all other nodes in the network.

Closeness Centrality

Id	Names	Closeness
56	predsoncastro	0.256578
57	wwwbhalive	0.251955
53	KlauCoronga	0.242138
4	karl0zaugust0	0.238017
35	MertensAlfredo	0.227374

Pagerank Score

Name	Pagerank
flaviomacielrj	0.009442
wwwbhalive	0.009427
AndreDantas85	0.009422
LimaGlaucie	0.009419
marinhoedii82	0.009411

We fed PageRank algorithm with a normalized version of the weighted adjacency matrix, and a standard dumping factor d=0.85

Conclusion

In total, 10 different twitter profiles were accused by some of the top centrality measures tables.

- wwwbhalive
- predsoncastro
- KlauCoronga
- marinhoedii82
- karlz0august0
- LimaGlaucie
- flaviomacielrj
- MertensAlfredo
- anappfrancisco
- AndreDantas85

Conclusion

Figure: Champion Central User

References

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