

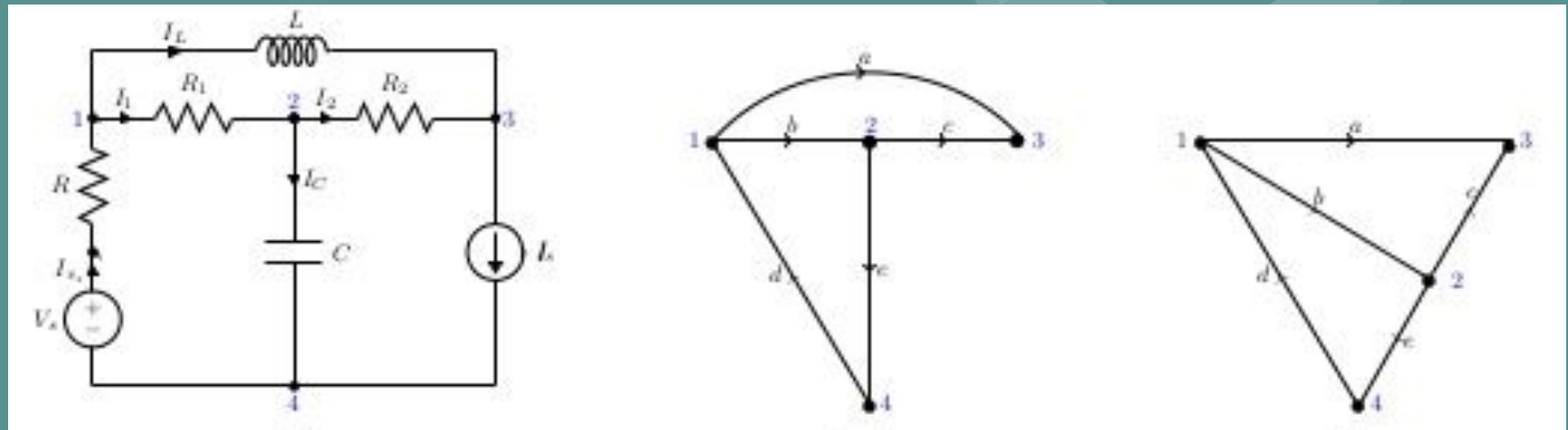
Graph Theory using Twitter dataset

Mini Project
By: Surbhi Sonkiya



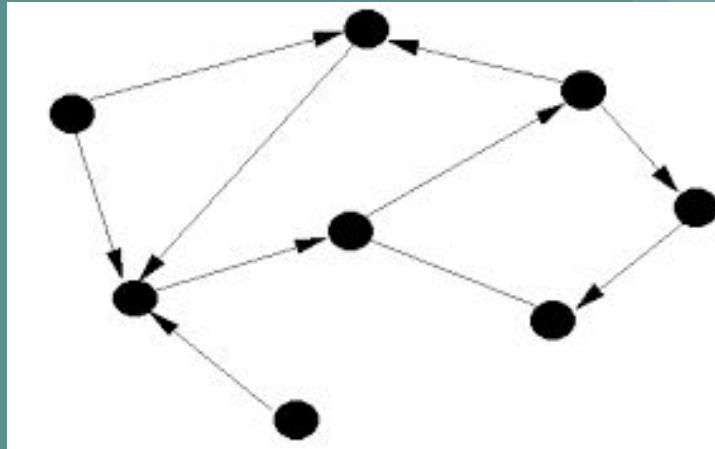
The Story!

Graph theory for circuit analysis

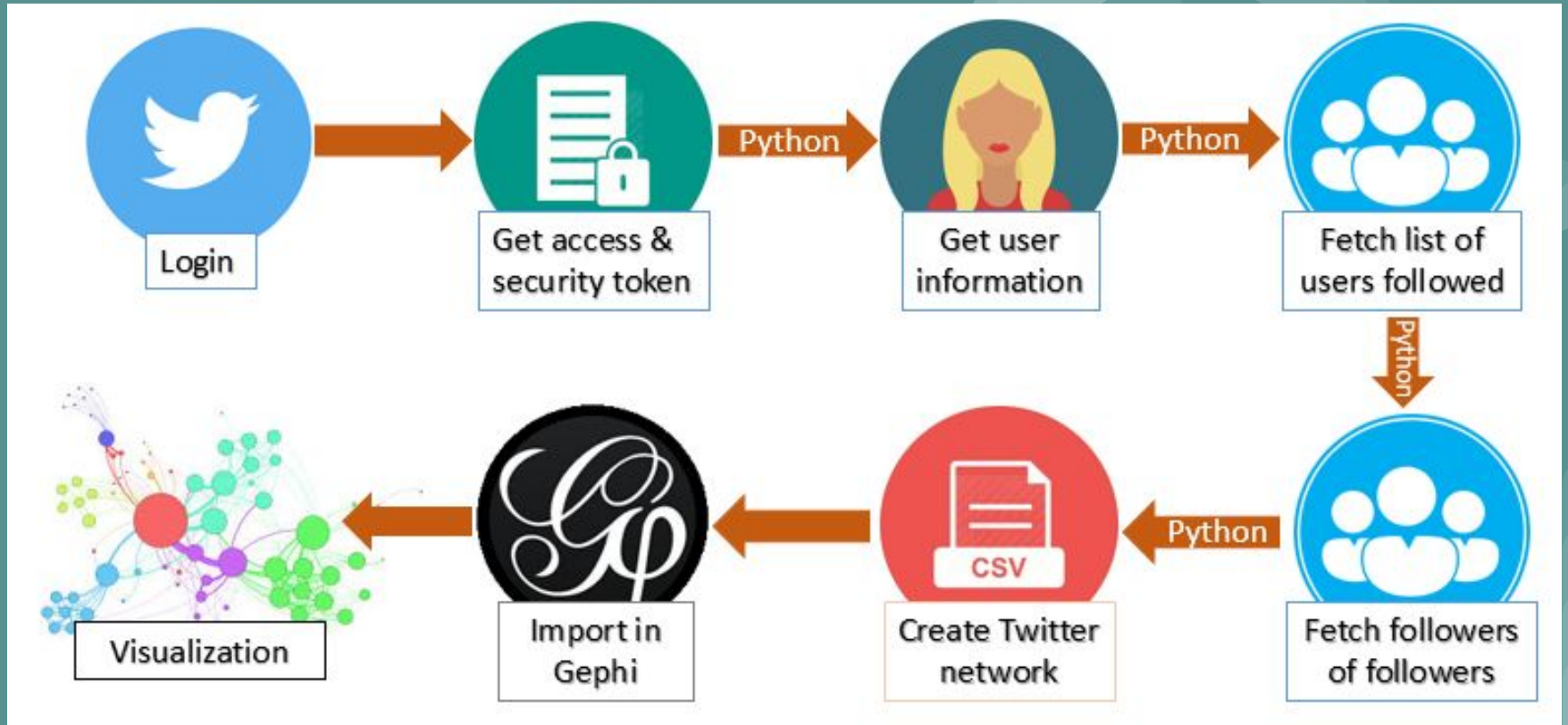


Project Description

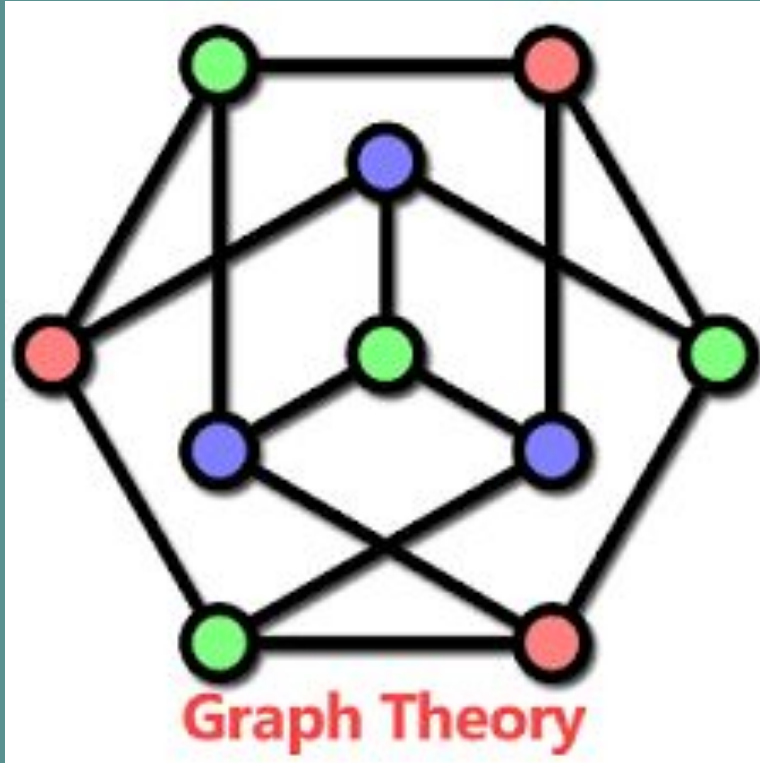
To create a directed network of followers (example friends of friends) on social media like Twitter.



Process Flow

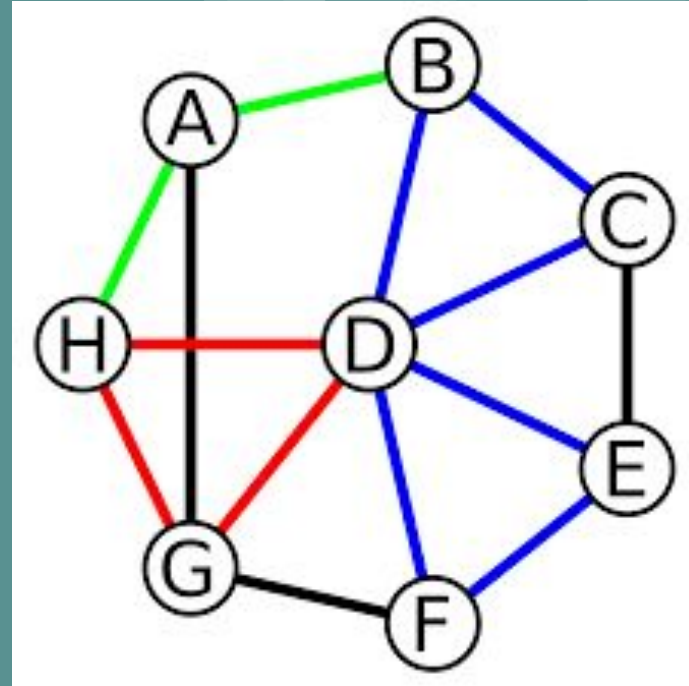


What is Graph Theory?

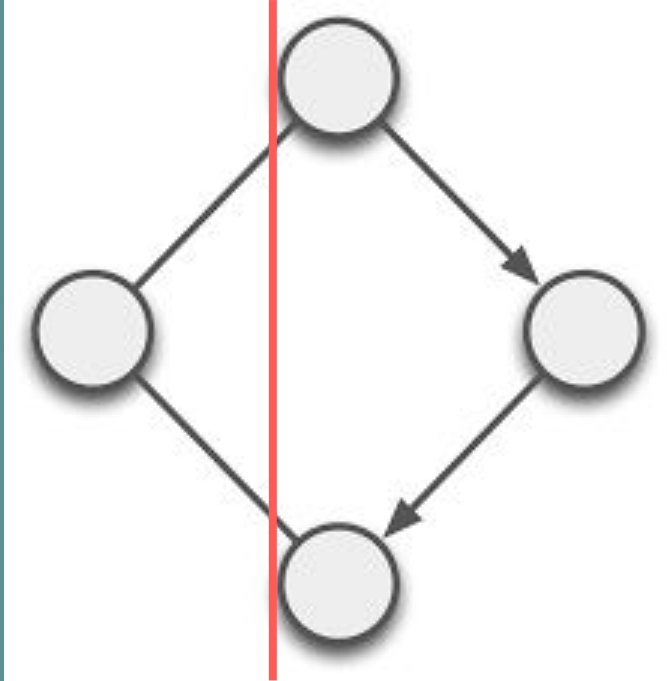


Elements of Graph Theory

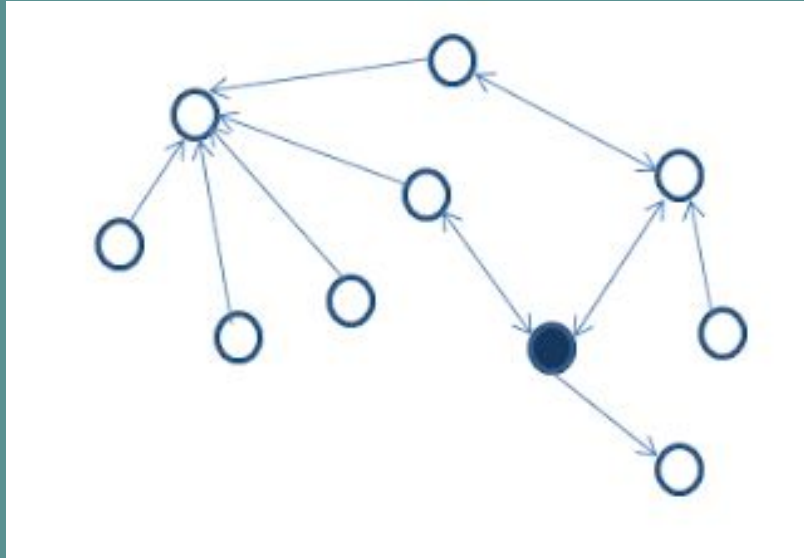
- Edges
- Vertices
- Weight
- Degree
- Depth
- Direction



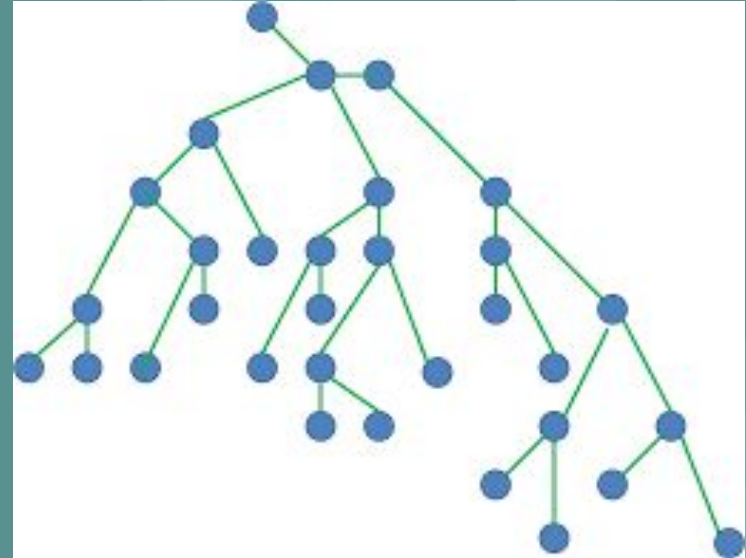
Depth; $d=2$



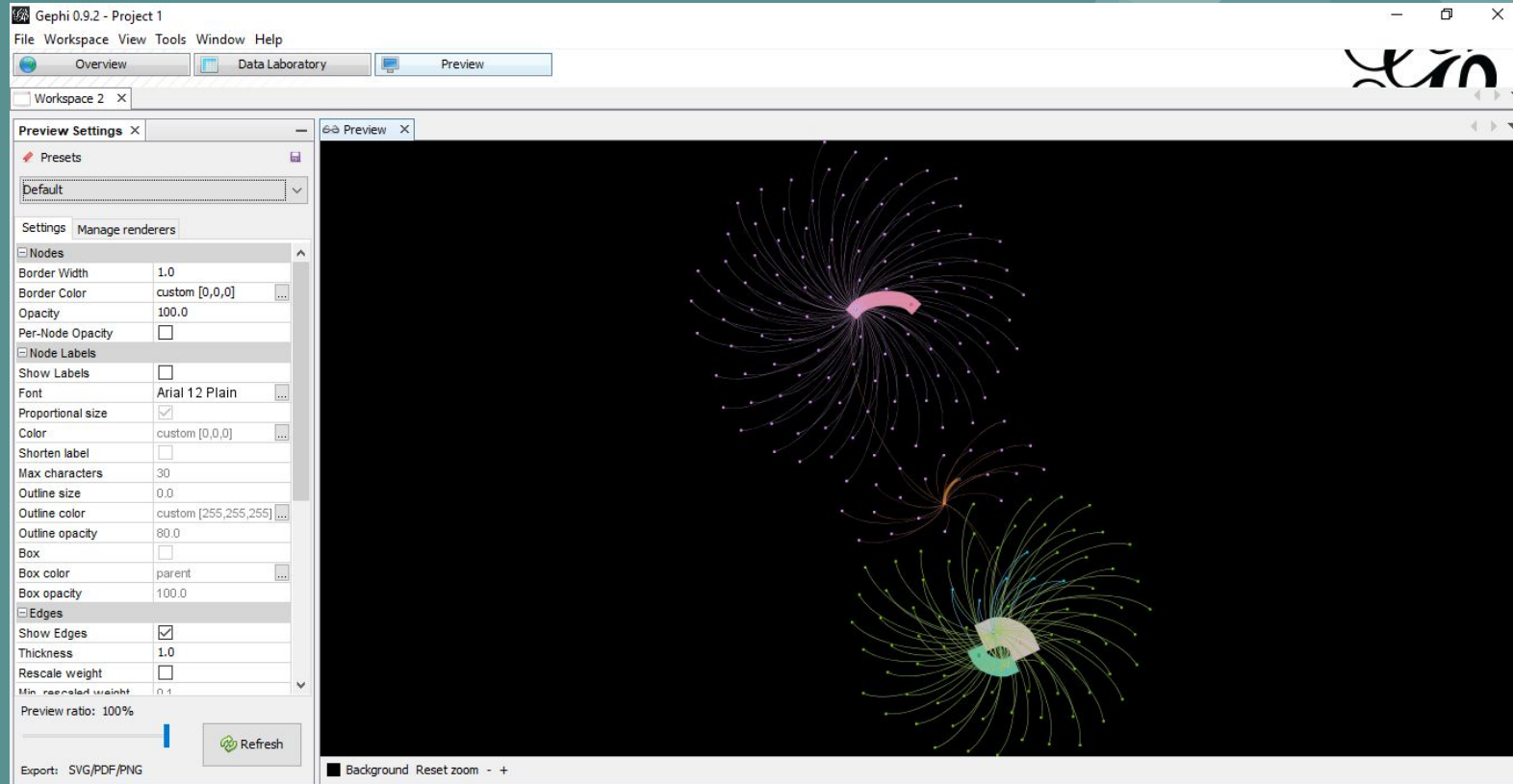
Twitter Connection



Facebook Connection



Graph of Twitter user: Surbhi Sonkiya



Python Code

```
$ sudo python UserFollowers.py -s SonkiyaSurbhi -d 2
```

```
surbhi@surbhi-Lenovo-G50-80: ~/Downloads/twitter-1.18.0
surbhi@surbhi-Lenovo-G50-80:~/Downloads/twitter-1.18.0$ sudo python UserFollowers.py
-s SonkiyaSurbhi -d 2
Max Depth: 2
Retrieving user details for twitter id 871648804562386944
No cached data for screen name "SonkiyaSurbhi"
Retrieving friends for user "Surbhi Sonkiya" (SonkiyaSurbhi)
Found 23 friends for SonkiyaSurbhi
Retrieving user details for twitter id 1042287121342640128
No cached data for screen name "PreetiNambiar1"
Retrieving friends for user "Preeti Nambiar" (PreetiNambiar1)
Found 141 friends for PreetiNambiar1
Retrieving user details for twitter id 708954721
No cached data for screen name "ammachilabs"
Retrieving friends for user "AMMACHI Labs" (ammachilabs)
Found 36 friends for ammachilabs
Retrieving user details for twitter id 152933590
No cached data for screen name "AMRITAedu"
Retrieving friends for user "Amrita Vishwa Vidyapeetham" (AMRITAedu)
Found 55 friends for AMRITAedu
Retrieving user details for twitter id 2493823368
No cached data for screen name "TeamMakenai"
Retrieving friends for user "Makenai" (TeamMakenai)
Rate limited. Sleeping for 15 minutes.
```

Python Code

871648804562386944.json (~)

Open ▾



```
{  
  "followers_count": 4,  
  "name": "Surbhi Sonkiya",  
  "friends_count": 22,  
  "created_at": "2017-06-05 08:44:04",  
  "followers_ids": [  
    1049945873311064064,  
    2356770098,  
    617900934,  
    1137113455  
  ],  
  "id": 871648804562386944,  
  "profile_image_url": "http://abs.twimg.com/sticky/default_profile_images/  
default_profile_normal.png",  
  "screen_name": "SonkiyaSurbhi"  
}
```

SonkiyaSurbhi.csv (~/.Downloads/twitter-1.18.0/following) - gedit

Open ▾



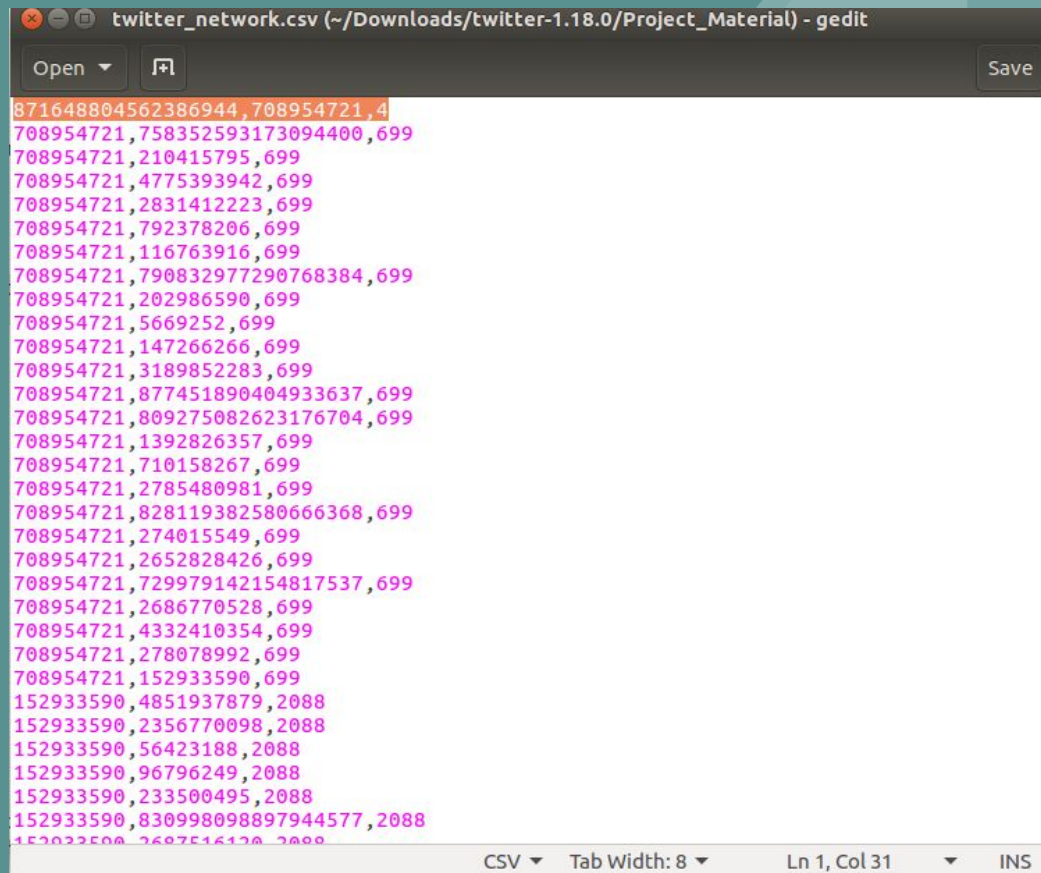
708954721	ammachilabs	AMMACHI Labs
152933590	AMRITAedu	Amrita Vishwa Vidyapeetham
2493823368	TeamMakenai	Makenai
2362618909	WomenTechmakers	Women Techmakers
1078811162	Yogadarshanam1	Santhosh Kumar
881185415004278784	theworldscourt	Ravi Chandra Manda

Python Code

```
$ sudo python CreateNetwork.py -s SonkiyaSurbhi
```

```
surbhi@surbhi-Lenovo-G50-80: ~/Downloads/twitter-1.18.0
surbhi@surbhi-Lenovo-G50-80:~/Downloads/twitter-1.18.0$ sudo python CreateNetwork.py
-s SonkiyaSurbhi
loading twitter-users/1042287121342640128.json
loading twitter-users/708954721.json
loading twitter-users/152933590.json
loading twitter-users/2493823368.json
loading twitter-users/871648804562386944.json
processing following/SonkiyaSurbhi.csv
processing following/PreetiNambiar1.csv
processing following/CEEWIndia.csv
processing following/BlrLitFest.csv
processing following/ProfVarshney.csv
processing following/DannyQuah.csv
processing following/WSJ.csv
processing following/HCI_London.csv
processing following/UKinBengaluru.csv
processing following/FollowCII.csv
processing following/manojladwa.csv
processing following/IndiaIncorp.csv
processing following/inBritish.csv
processing following/tradegovukIND.csv
processing following/UKinIndia.csv
processing following/Unibocconi.csv
processing following/CarnegieMellon.csv
```


Twitter Network CSV



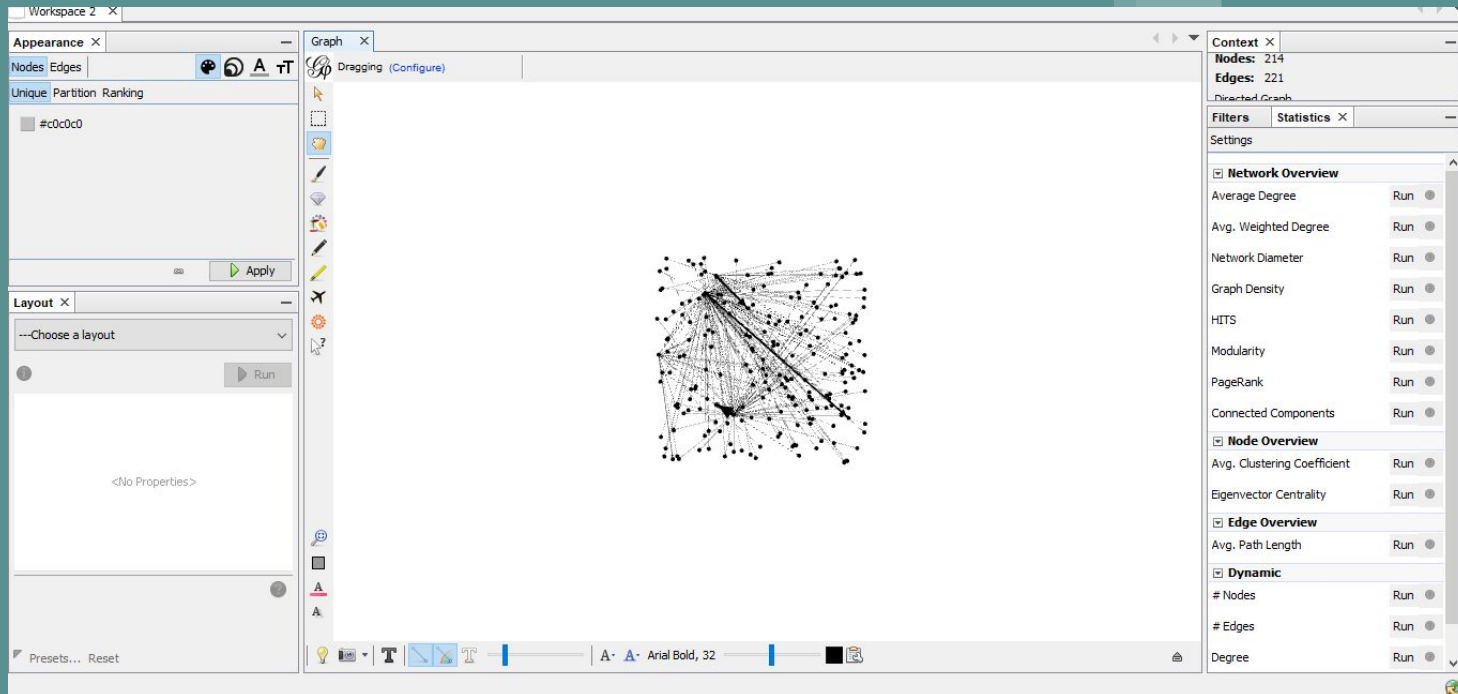
```
twitter_network.csv (~/Downloads/twitter-1.18.0/Project_Material) - gedit
Open ▾ [+]
```

```
871648804562386944,708954721,4
708954721,758352593173094400,699
708954721,210415795,699
708954721,4775393942,699
708954721,2831412223,699
708954721,792378206,699
708954721,116763916,699
708954721,790832977290768384,699
708954721,202986590,699
708954721,5669252,699
708954721,147266266,699
708954721,3189852283,699
708954721,877451890404933637,699
708954721,809275082623176704,699
708954721,1392826357,699
708954721,710158267,699
708954721,2785480981,699
708954721,828119382580666368,699
708954721,274015549,699
708954721,2652828426,699
708954721,729979142154817537,699
708954721,2686770528,699
708954721,4332410354,699
708954721,278078992,699
708954721,152933590,699
152933590,4851937879,2088
152933590,2356770098,2088
152933590,56423188,2088
152933590,96796249,2088
152933590,233500495,2088
152933590,830998098897944577,2088
152933590,2687516120,2088
```

```
CSV ▾ Tab Width: 8 ▾ Ln 1, Col 31 ▾ INS
```

Gephi

The Open Graph Viz Platform is the leading visualization and exploration software for all kinds of graphs and networks.



Gephi Features

Gephi 0.9.2 - Project 1

File Workspace View Tools Window Help

Overview Data Laboratory Preview

Workspace 2

Appearance

Nodes Edges

Unique Partition Ranking

#c0c0c0

Apply

Layout

Contraction

Run

properties

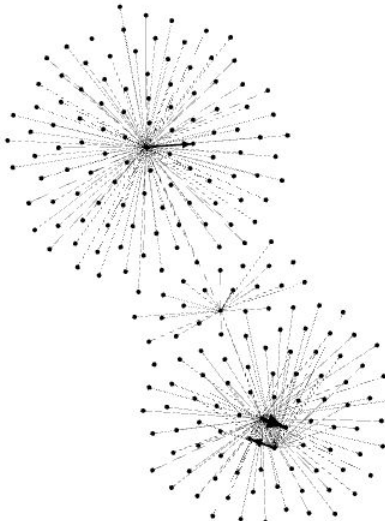
Scale factor 0.8

Contraction

Presets... Reset

Graph

Dragging (Configure)



Context

Nodes: 214
Edges: 221
Directed Graph

Filters **Statistics**

Settings

Network Overview

Average Degree	Run
Avg. Weighted Degree	Run
Network Diameter	Run
Graph Density	Run
HITS	Run
Modularity	Run
PageRank	Run
Connected Components	Run

Node Overview

Avg. Clustering Coefficient	Run
Eigenvector Centrality	Run

Edge Overview

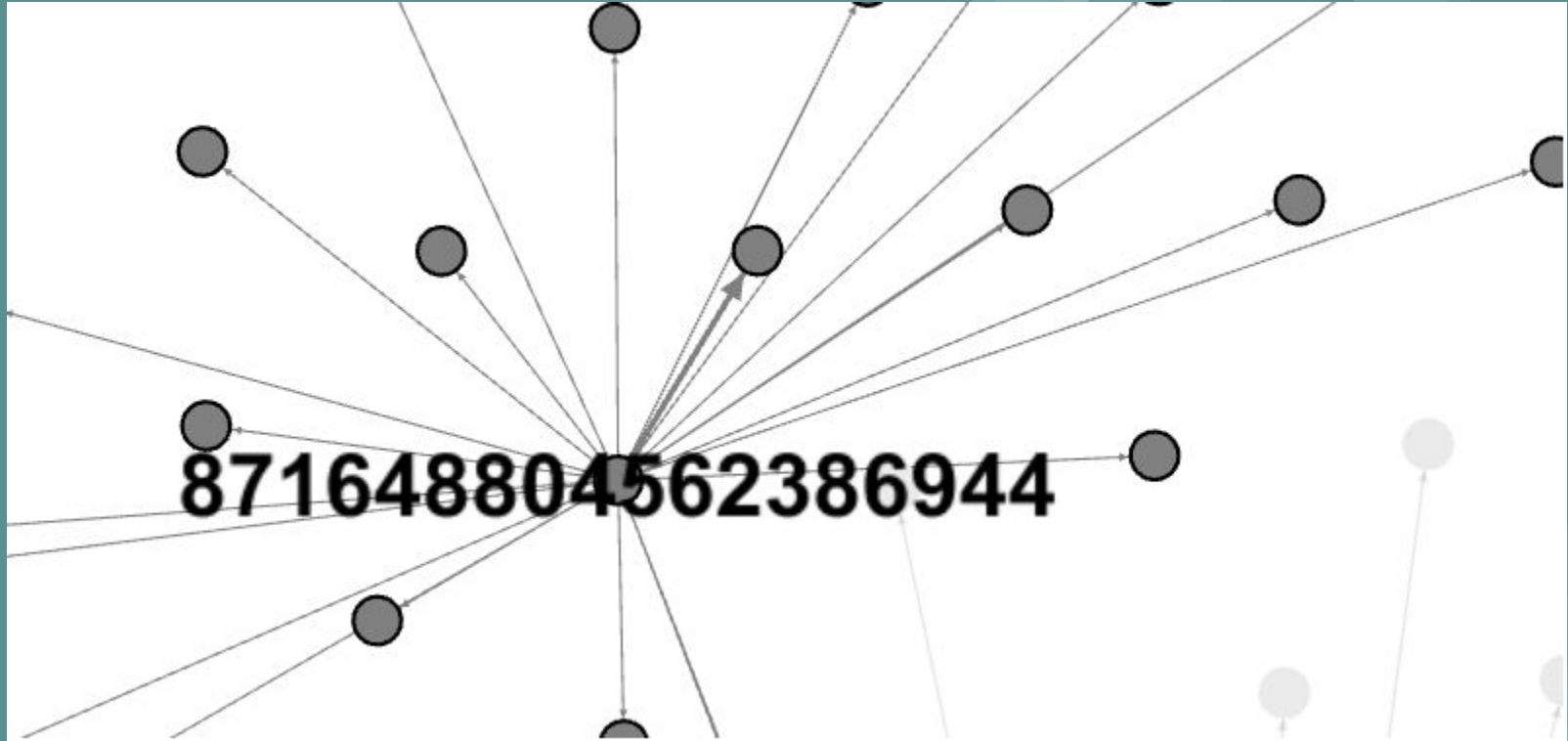
Avg. Path Length	Run
------------------	-----

Dynamic

# Nodes	Run
# Edges	Run
Degree	Run

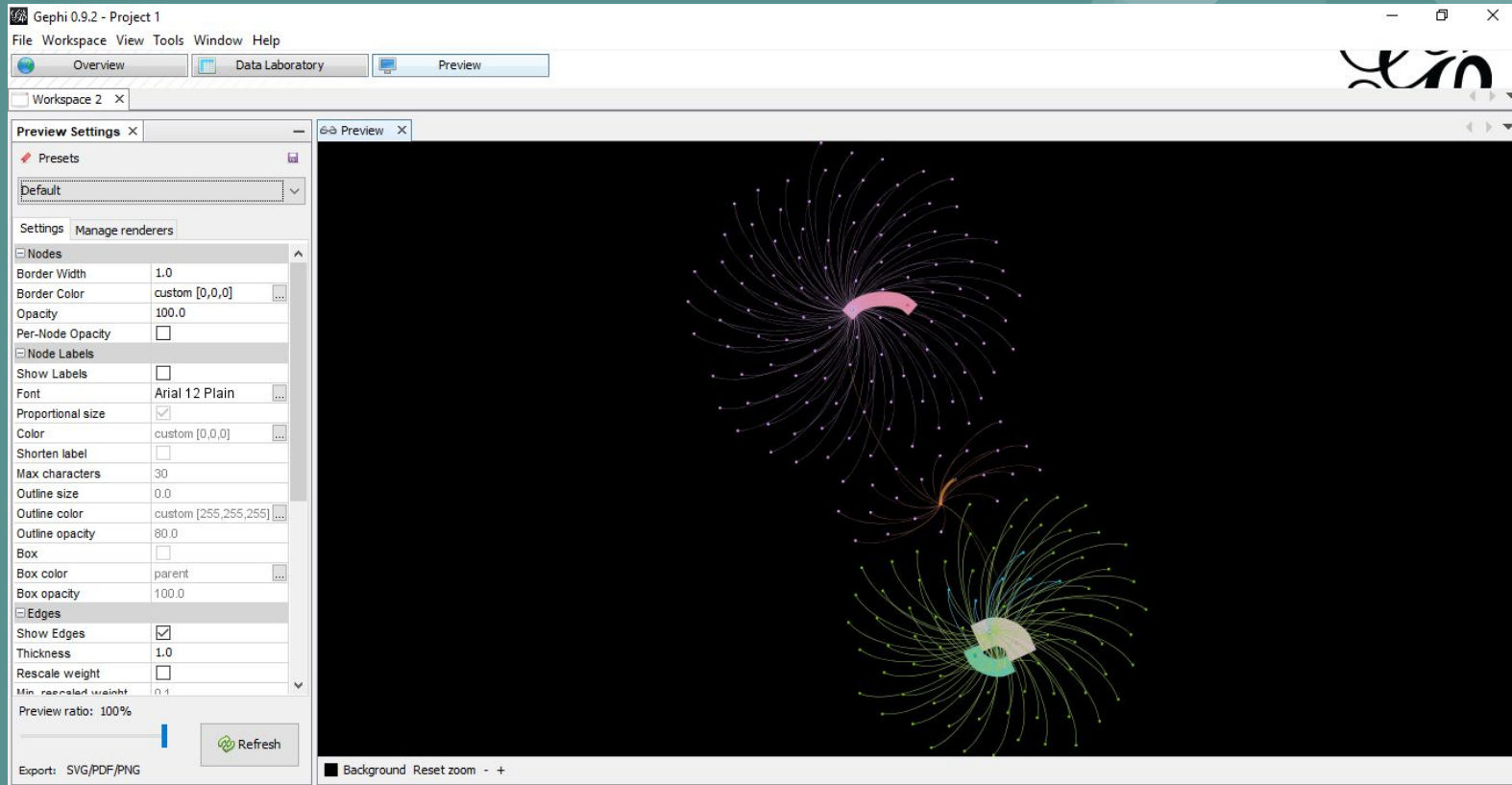
Directed Graph

Twitter user: **Surbhi Sonkiya** and Twitter user ID: **871648804562386944**



Graph of Twitter user: Surbhi Sonkiya

Weight of nodes and Ranking of edges



Future work

To solve the “shortest path” problem:

- Graphs used for elections, discrete mathematics, etc.
- What is the quickest way to get from one node to another?
- For example, LinkedIn tells you how many degrees of introduction you are away from another person. Likewise, the internet solves this problem to figure out how to quickly send messages between your computer and Google’s server.
- This is probably the single most important problem in graph theory.

References

- 1) <http://itssubhamoy.blogspot.com/2013/07/twitter-facebook-graph-theory.html>
- 2) https://www.slideshare.net/Kadir_Akib/graph-theory-presentation-75148446
- 3) https://en.wikipedia.org/wiki/Graph_theory
- 4) <https://developer.twitter.com/en/docs.html>
- 5) <https://gephi.org/>

Thank you!

