

Six degrees of separation

A) What is Six Degree of Separation?

B) How to calculate Degrees of Separation of a Network?

C) How to calculate Degrees of Separation between any two nodes?

In our assignment, given is Facebook data.

Facebook data download URL:

<http://snap.stanford.edu/data/ego-Facebook.html>

From this website download the following file:

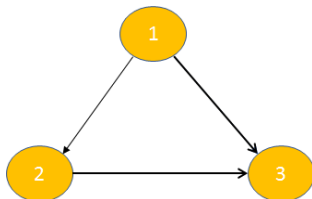
[facebook_combined.txt.gz](#)

This dataset consists of 'circles' (or 'friends lists') from Facebook. Facebook data was collected from survey participants using the Facebook app.

There 3 ways of representing graphs. They are:

- a) Edge list
- b) Adjacency matrix
- c) Adjacency List

The data here is stored in the form of edge list. An edge list is a data structure used to represent a graph as a list of its edges.

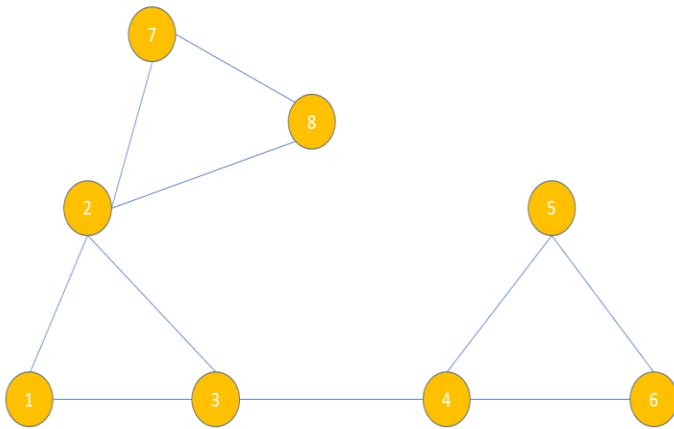


Edge list for the above directed graph is (1,2),(2,3),(1,3)

It consists of people and their connection (friends) to other people. People are represented as nodes and their connection (friendship) to other people as edges. Thus, there is a graph of given set of people and their connection (friendship) to other people.

- B) Using this graph, we can apply graph theory to find the shortest path lengths between every two nodes in the network (**minimum number of hops between every two nodes**). The **average of shortest path lengths of all such pair of nodes is the Degree of Separation of the network**.
- C) Similarly, **one can find Degree of Separation between any two given nodes as the shortest path length between two given nodes (minimum number of hops between these two nodes)**.

Q1) What is the degrees of separation of the following network?



Sr. No.	From Node	To Node	shortest path Length (Minimum no. of hops)
1	1	2	1
2	1	3	1
3	1	4	2
4	1	5	3
5	1	6	3
6	1	7	2
7	1	8	2
8	2	1	1
9	2	3	1
10	2	4	2
11	2	5	3
12	2	6	3
13	2	7	1
14	2	8	1
15	3	1	1
16	3	2	1
17	3	4	1
18	3	5	2
19	3	6	2
20	3	7	2
21	3	8	2
22	4	1	2
23	4	2	2
24	4	3	1

25	4	5	1
26	4	6	1
27	4	7	3
28	4	8	3
29	5	1	3
30	5	2	3
31	5	3	2
32	5	4	1
33	5	6	1
34	5	7	4
35	5	8	4
36	6	1	3
37	6	2	3
38	6	3	2
39	6	4	1
40	6	5	1
41	6	7	4
42	6	8	4
43	7	1	2
44	7	2	1
45	7	3	2
46	7	4	3
47	7	5	4
48	7	6	4
49	7	8	1
50	8	1	2
51	8	2	1
52	8	3	2
53	8	4	3
54	8	5	4
55	8	6	4
56	8	7	1

No. of entries =56

Sum of shortest path Lengths =120

Average shortest path length = Sum of shortest path Lengths/ No. of entries

OR

Degrees of Separation of the given network is = $120/56 = 2.14$

Homework:

Q2) What is the degrees of separation of the following network?

