Gephi Analysis

Shubhavi Arya - Net_Sci

Les Miserables

Undirected Graph

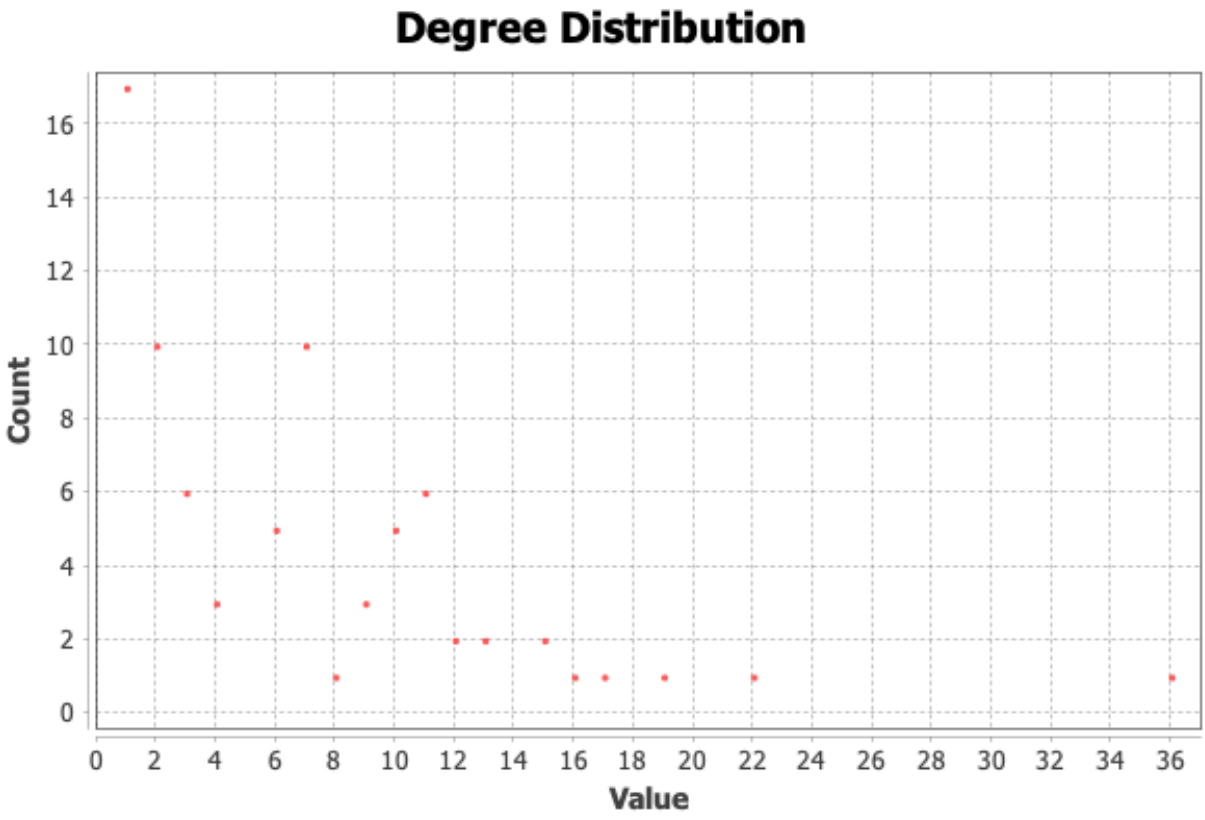
#of Nodes:77

#of Edges: 254

Degree Report

Results:

Average Degree: 6.597



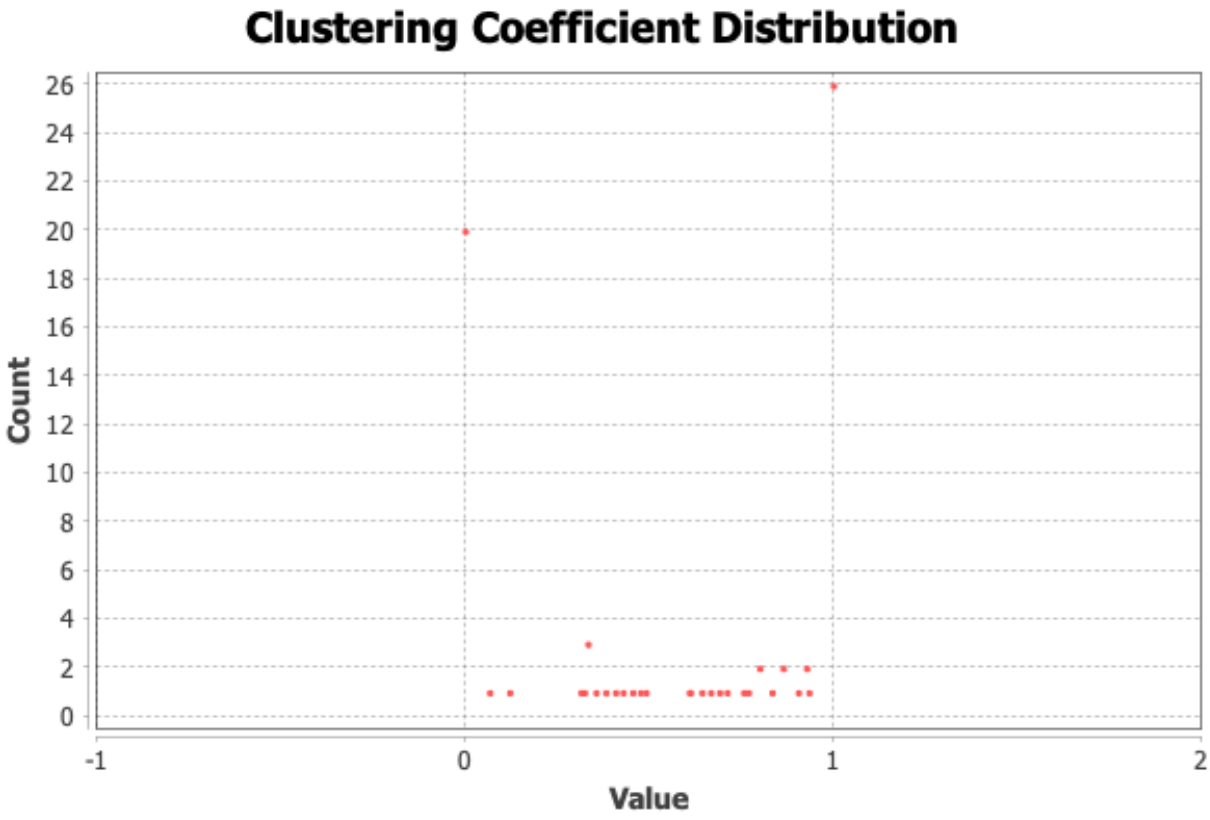
Clustering Coefficient Metric Report

Parameters:

Network Interpretation: undirected

Results:

Average Clustering Coefficient: 0.736
Total triangles: 467
The Average Clustering Coefficient is the mean value of individual coefficients.



Algorithm:

Matthieu Latapy, *Main-memory Triangle Computations for Very Large (Sparse (Power-Law)) Graphs*, in Theoretical Computer Science (TCS) 407 (1-3), pages 458-473, 2008

Graph Distance Report

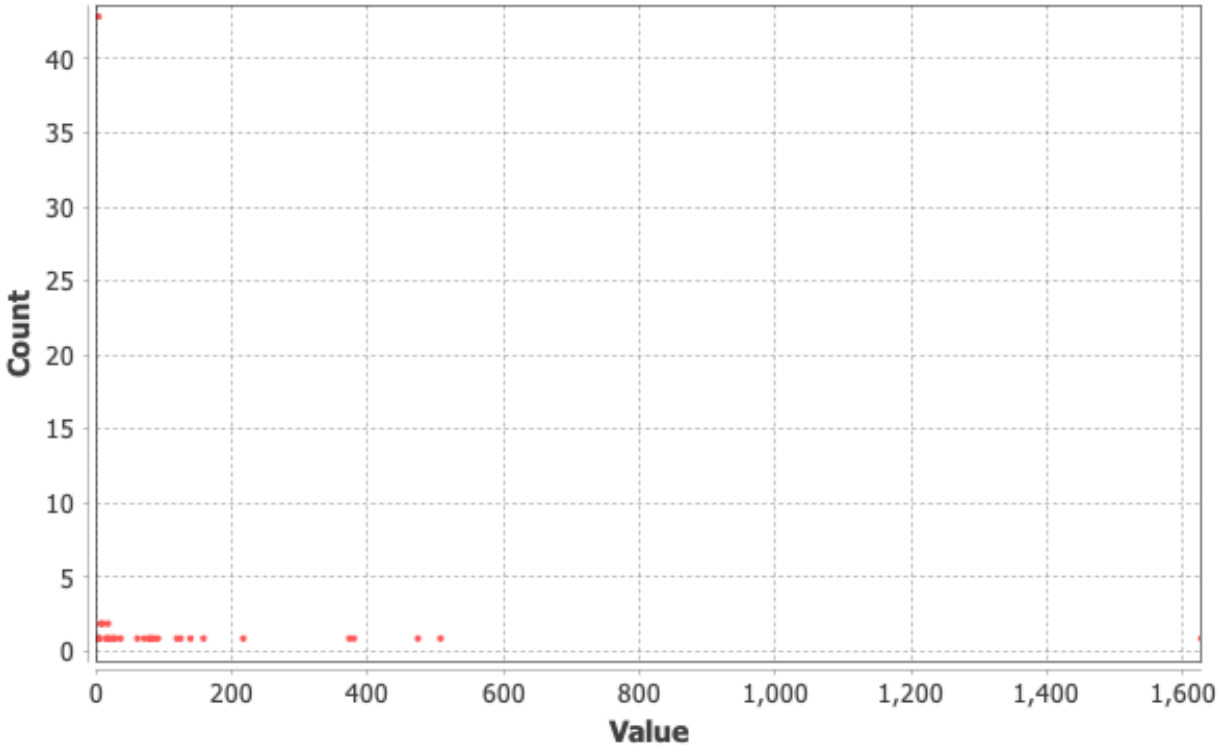
Parameters:

Network Interpretation: undirected

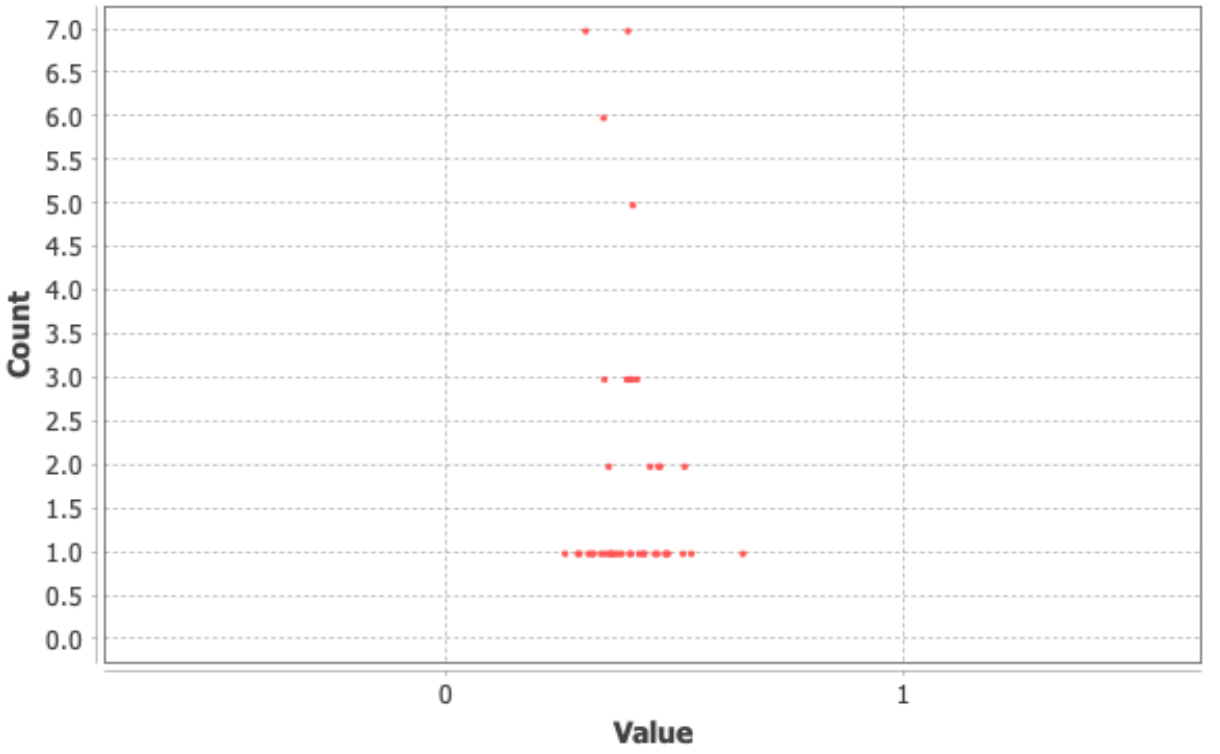
Results:

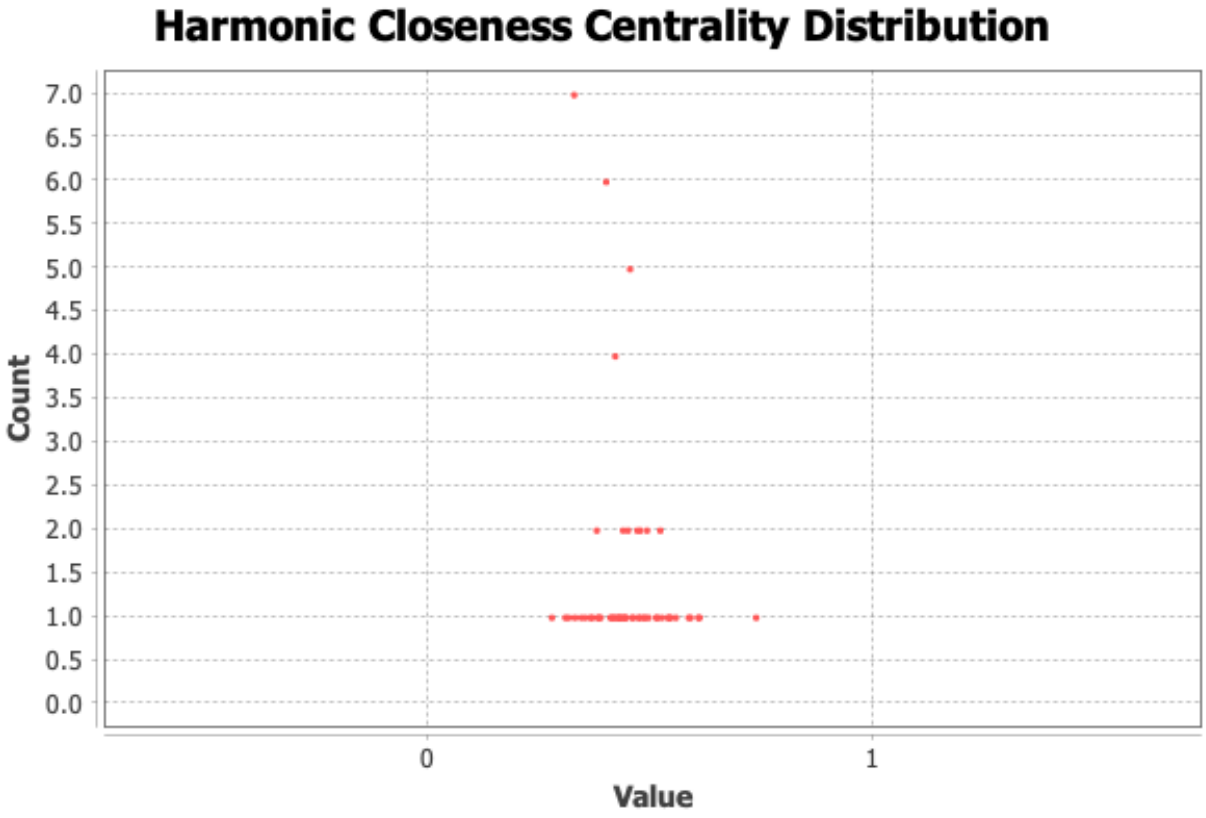
Diameter: 5
Radius: 3
Average Path length: 2.6411483253588517

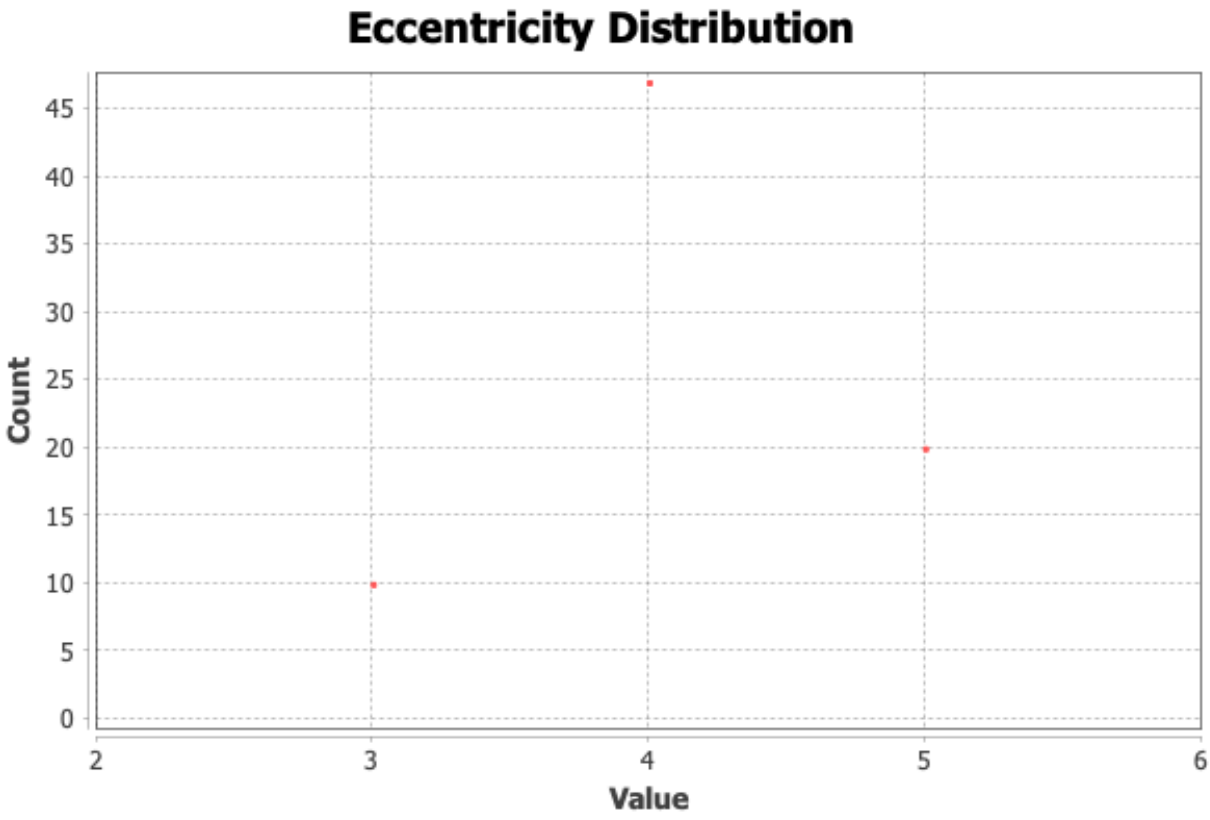
Betweenness Centrality Distribution



Closeness Centrality Distribution




Harmonic Closeness Centrality Distribution
Count
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
1
Value



Algorithm:

Ulrik Brandes, *A Faster Algorithm for Betweenness Centrality*, in Journal of Mathematical Sociology 25(2):163-177, (2001)

VISUALIZING GRAPH

Layout: Force Atlas 2

Node size set with ranking degree (min=10, max=50)

node color set by ranking (degree -light to dark)

Force Atlas 2 - default settings(except Behavior alternatives ~Prevent overlap: Enabled, Tuning~ Scaling: 50.0)

Random Graph

Undirected Graph

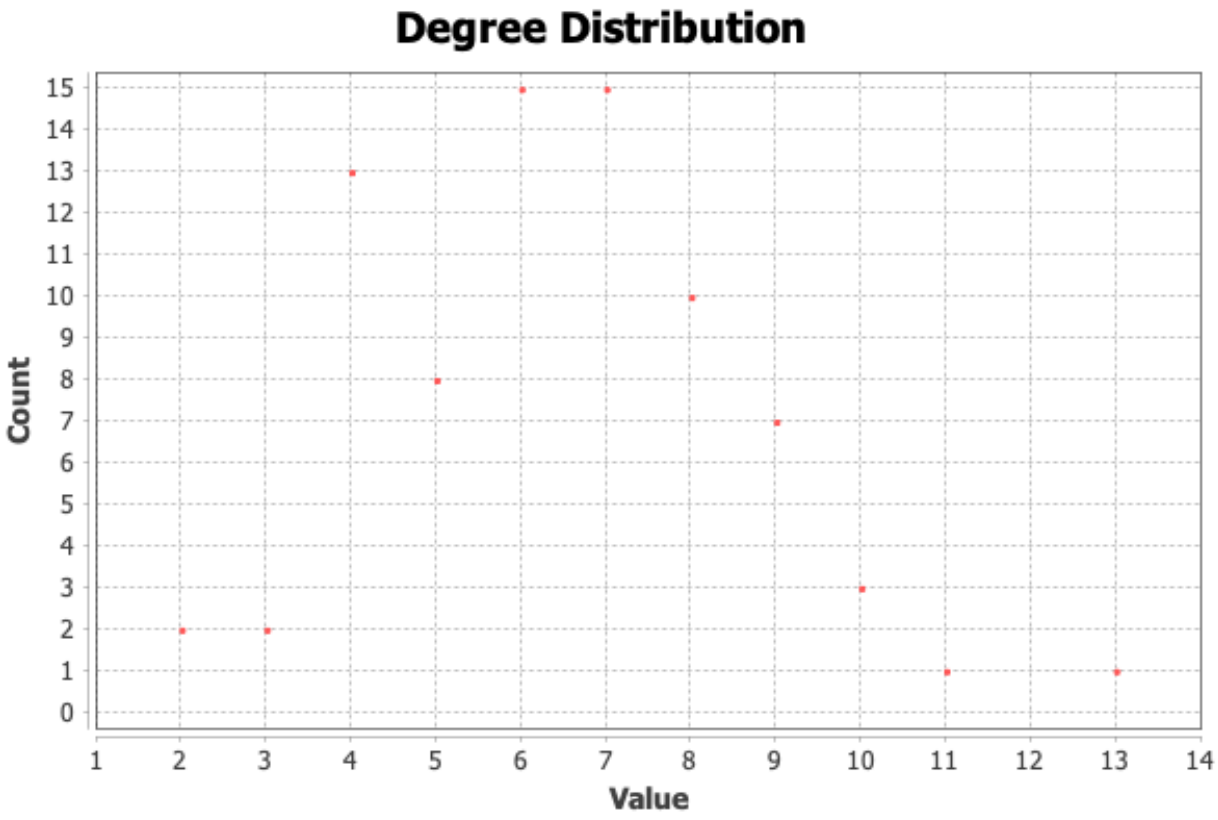
#of Nodes:77

#of Edges: 247

Degree Report

Results:

Average Degree: 6.416



Clustering Coefficient Metric Report

Parameters:

Network Interpretation: undirected

Results:

Average Clustering Coefficient: 0.102
Total triangles: 47
The Average Clustering Coefficient is the mean value of individual coefficients.

Algorithm:

Matthieu Latapy, *Main-memory Triangle Computations for Very Large (Sparse (Power-Law)) Graphs*, in Theoretical Computer Science (TCS) 407 (1-3), pages 458-473, 2008

Graph Distance Report

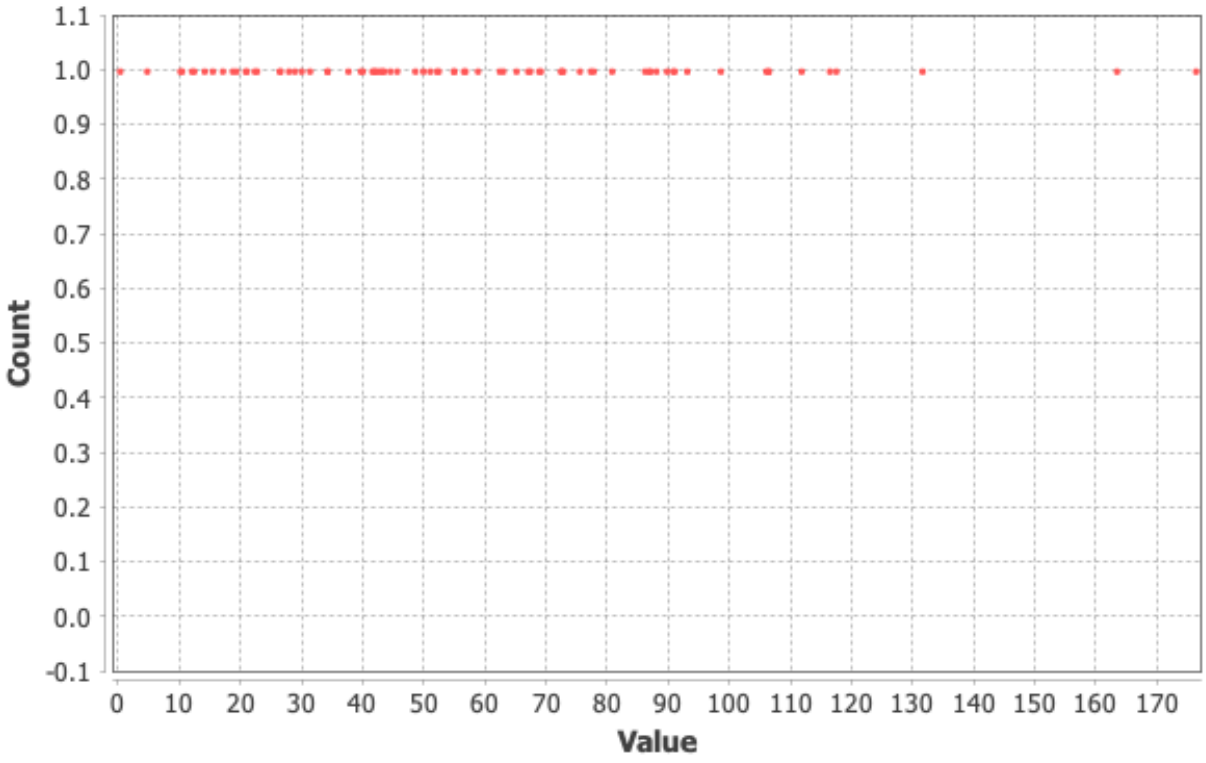
Parameters:

Network Interpretation: undirected

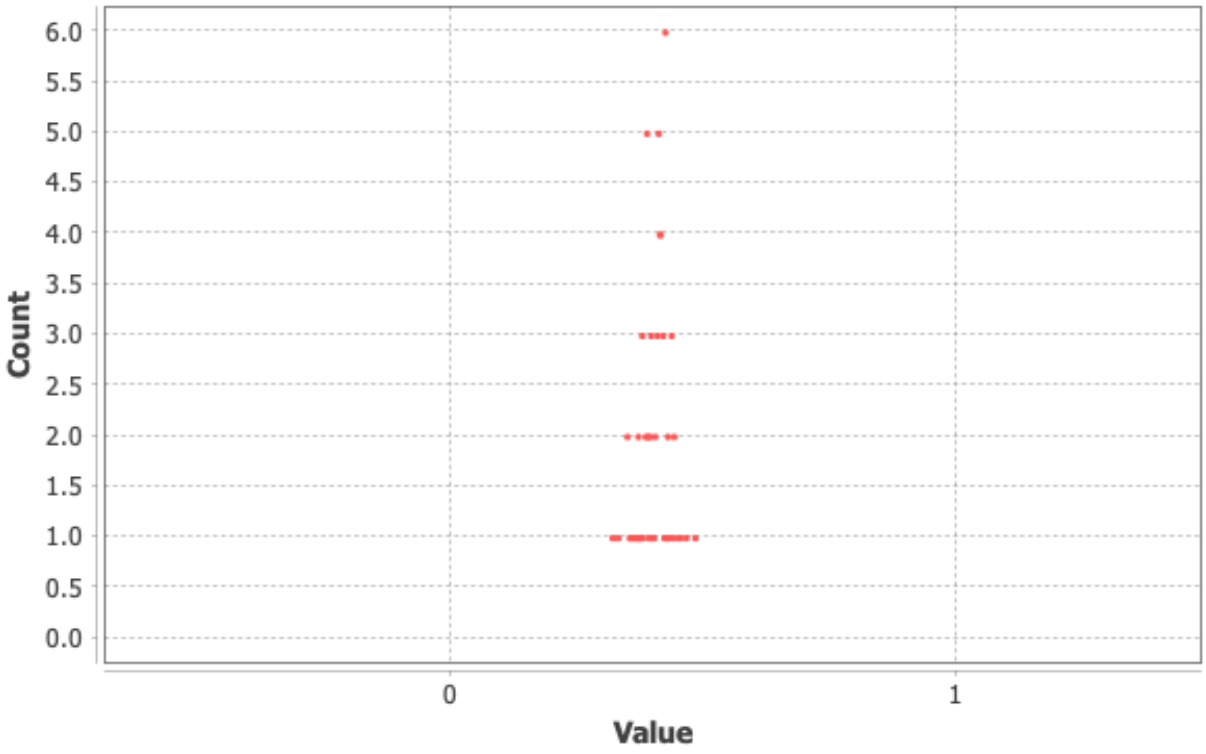
Results:

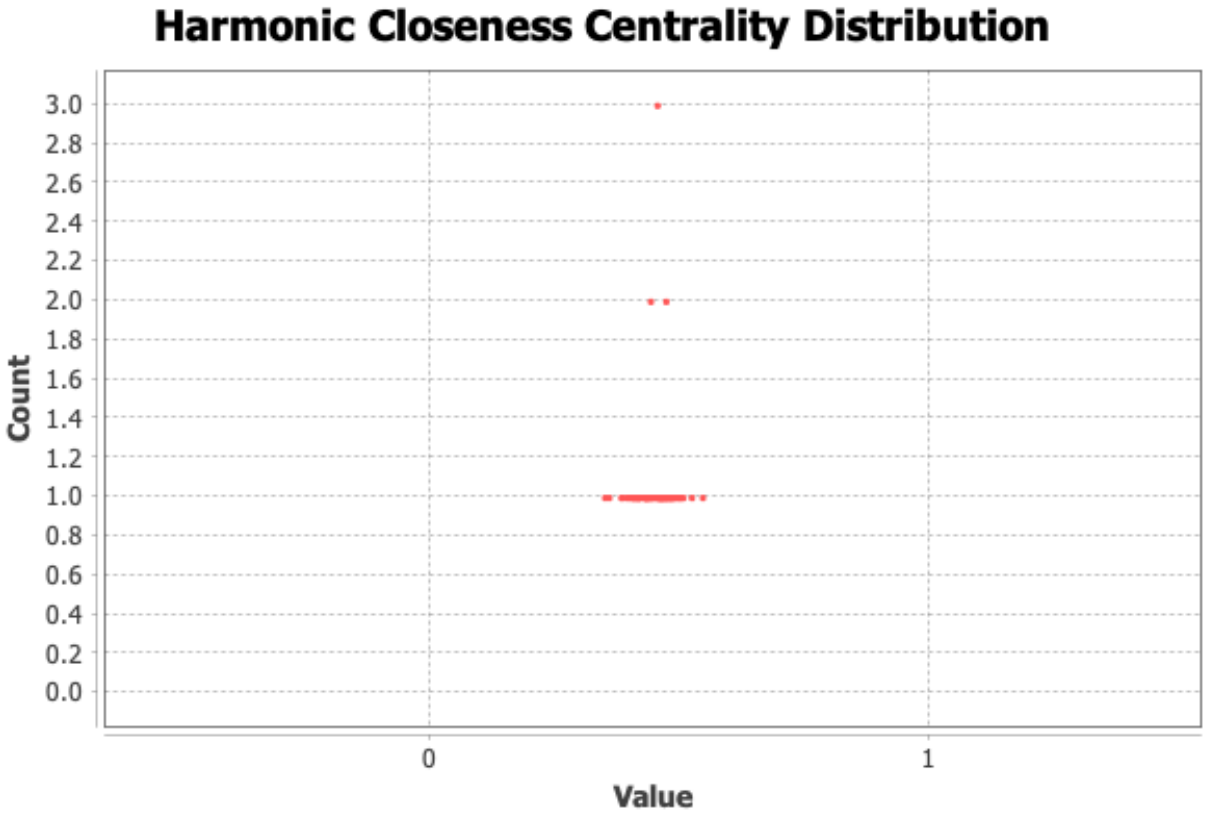
Diameter: 4
Radius: 3
Average Path length: 2.5099111414900888

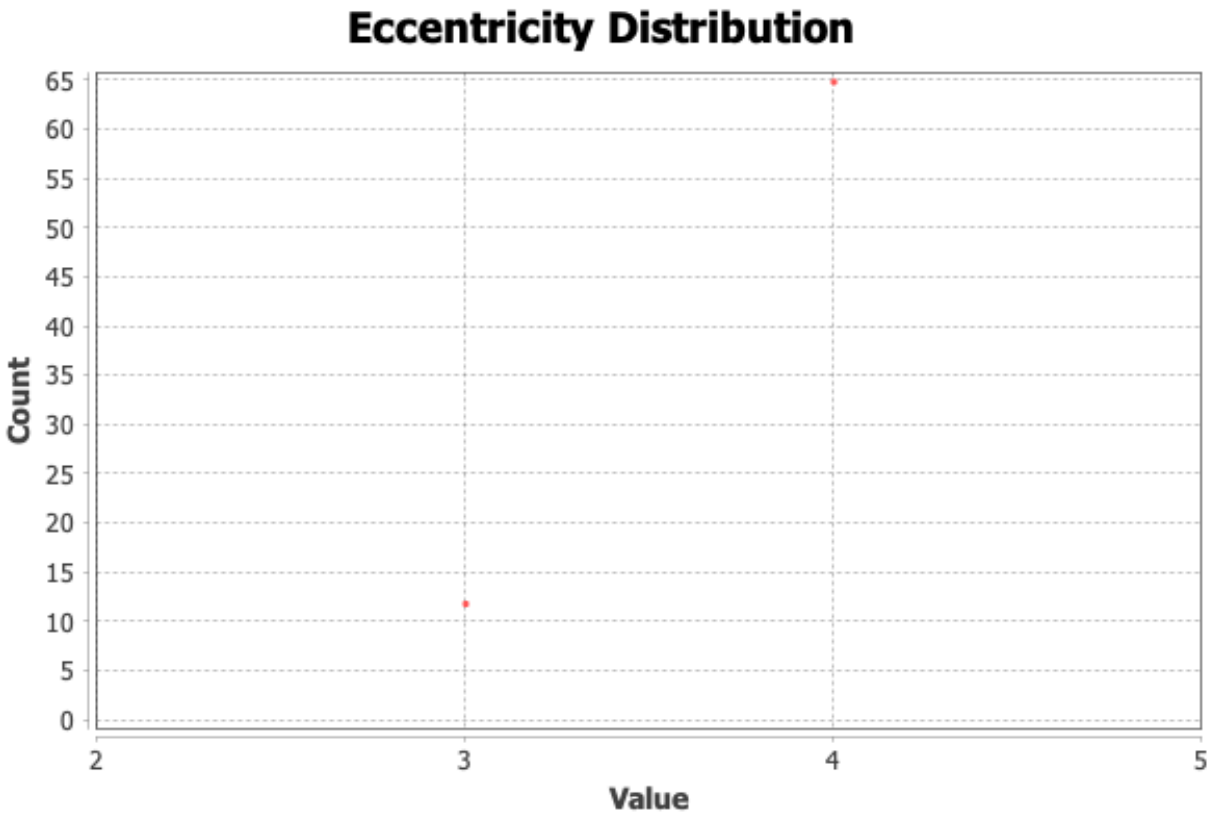
Betweenness Centrality Distribution



Closeness Centrality Distribution




Harmonic Closeness Centrality Distribution
Count
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
1
Value



Algorithm:

Ulrik Brandes, *A Faster Algorithm for Betweenness Centrality*, in Journal of Mathematical Sociology 25(2):163-177, (2001)

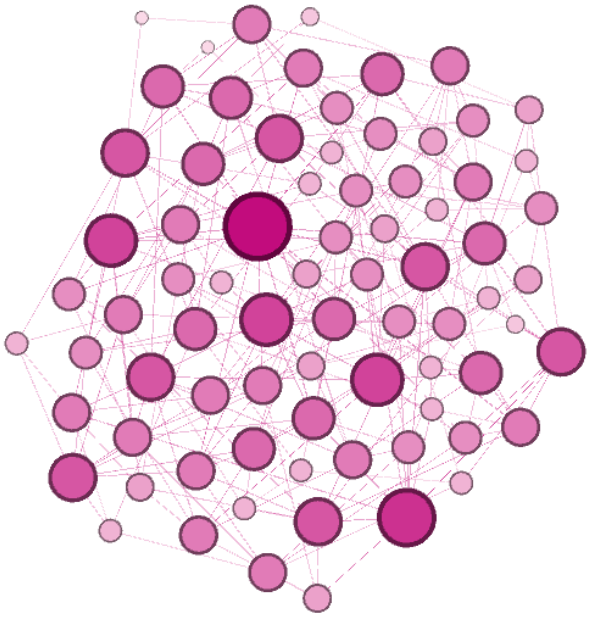
VISUALIZATION

Layout: Force Atlas 2

Node size set with ranking degree (min=10, max=50)

node color set by ranking (degree -light to dark)

Force Atlas 2 - default settings(except Behavior alternatives ~Prevent overlap: Enabled, Tuning~ Scaling: 50.0)



1. How do the degree distributions of the real graph and random graph compare? Explain any differences or similarities you see and consider why they might exist.

The degree distribution of the real graph (Les Miserables) follows about an inverse logarithmic curve. The majority of the values are to the left of the plot, and a much smaller portion are to the right.
The random network's degree distribution looks much more like a normal distribution. It is a bell shaped curve with a peak at value 15, thus it is following the Binomial or Poisson distribution.
It is unsurprising to see that most nodes in the real network have a degree of 11 or less. This makes logical sense because the interaction among the majority of subjects seems centered around a few selected number of people rather than a larger population. However, it is also not surprising to see some nodes with very high degrees certain factors could bring the characters in contact with a greater number of people.

The degree distribution of the random network is as expected given how the graph is created. The average degree is 6.42, and the peak in the clustering coefficient plot is at 6 and 7 and degree distribution is at 15. The aim when creating the random graph was to achieve an average degree similar to that of the real network which was about 6.6. We calculated a probability given a target number of nodes to achieve this, and the end result, from this viewpoint is what we wanted and predicted.

2. Is the real graph more clustered or less than the random one? What might this tell you about the organizing principles of the real graph?

The average clustering coefficient values indicate that the real graph (0.102 has a tendency towards clustering, whereas the random graph (0.736) does not. This follows with what we have learnt and the observations by Watts-Strogatz: most real networks create groups with a high density of ties. However, the random network will expectedly have ties which connect groups but the density within a group that increases inter-connectivity will not be present.

3. Does the real graph exhibit the small-world property?

The real network has an average path length of 2.64 and average clustering coefficient of 0.736. Watts-Strogatz indicate that small world networks have "distinctive combination of high clustering with short characteristic path length." So, we can conclude that the real graph does exhibit the small-world property.