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Report

This report analyzes two Twitter interaction subgraphs extracted from the WICO misinformation dataset:

- **One graph from 5G_Conspiracy_Graphs (representing a misinformation cluster).**
- **One graph from Non_Conspiracy_Graphs (representing a normal Twitter conversation).**

Both graphs were processed and analyzed in Gephi using standard network analysis metrics:

nodes, edges, average degree, density, clustering, modularity, centrality, and connected components.

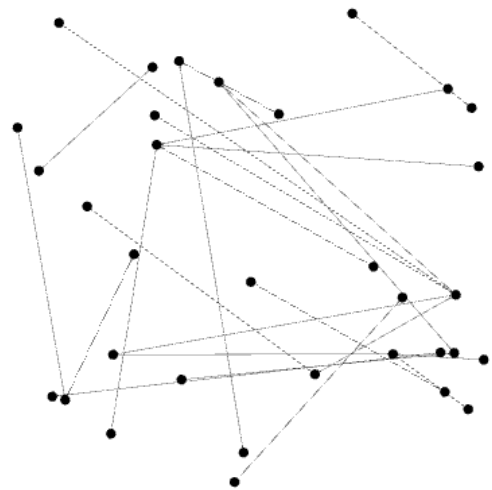
The goal is to understand how misinformation structures differ from normal online communities.

5G_Conspiracy_Graphs

folder:107

Number of Nodes + Edges

Context	×	
Nodes:	33	
Edges:	30	
Directed Graph		



Nodes = 33, Edges = 30

The conspiracy subgraph is small and lightly connected, containing 33 users with only 30 interactions between them.

Average Degree

Average Degree = 0.909

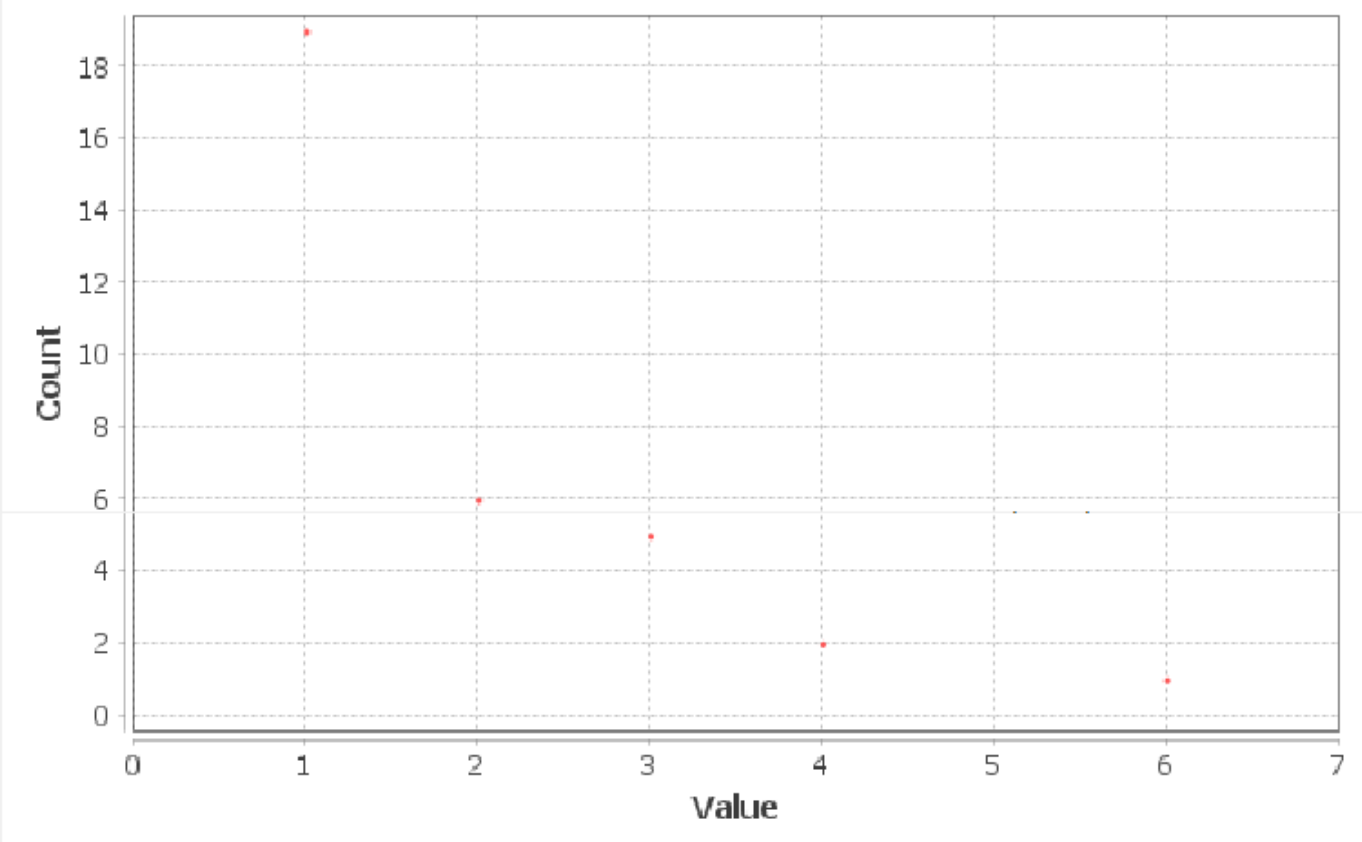
The network shows very low connectivity. On average, each user is connected to less than one other user, meaning interactions are minimal and the flow of communication is weak.

- A value below 1 = very few connections.
- Most users barely interact with anyone.
- The graph is weak, scattered, and not strongly connected.

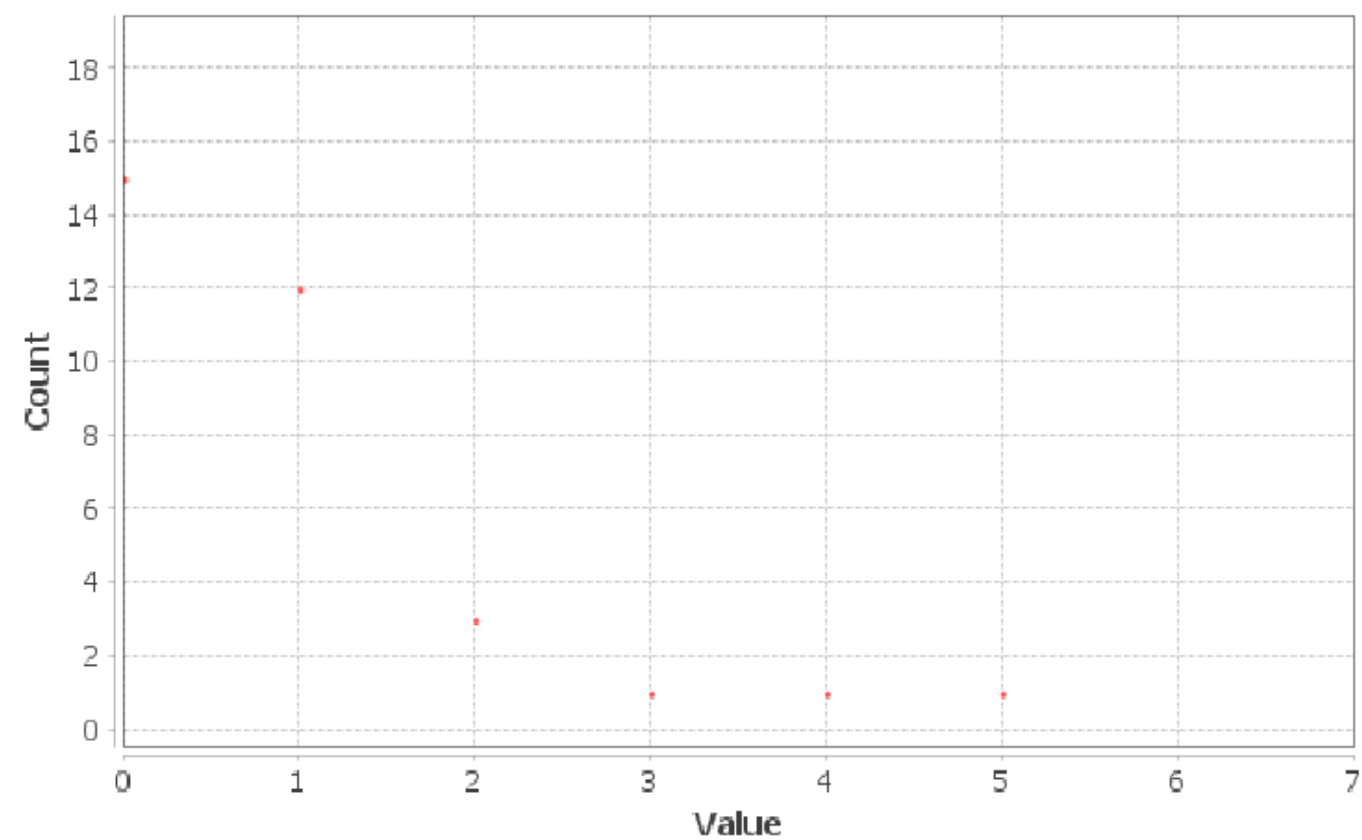
Results:

Average Degree: 0.909

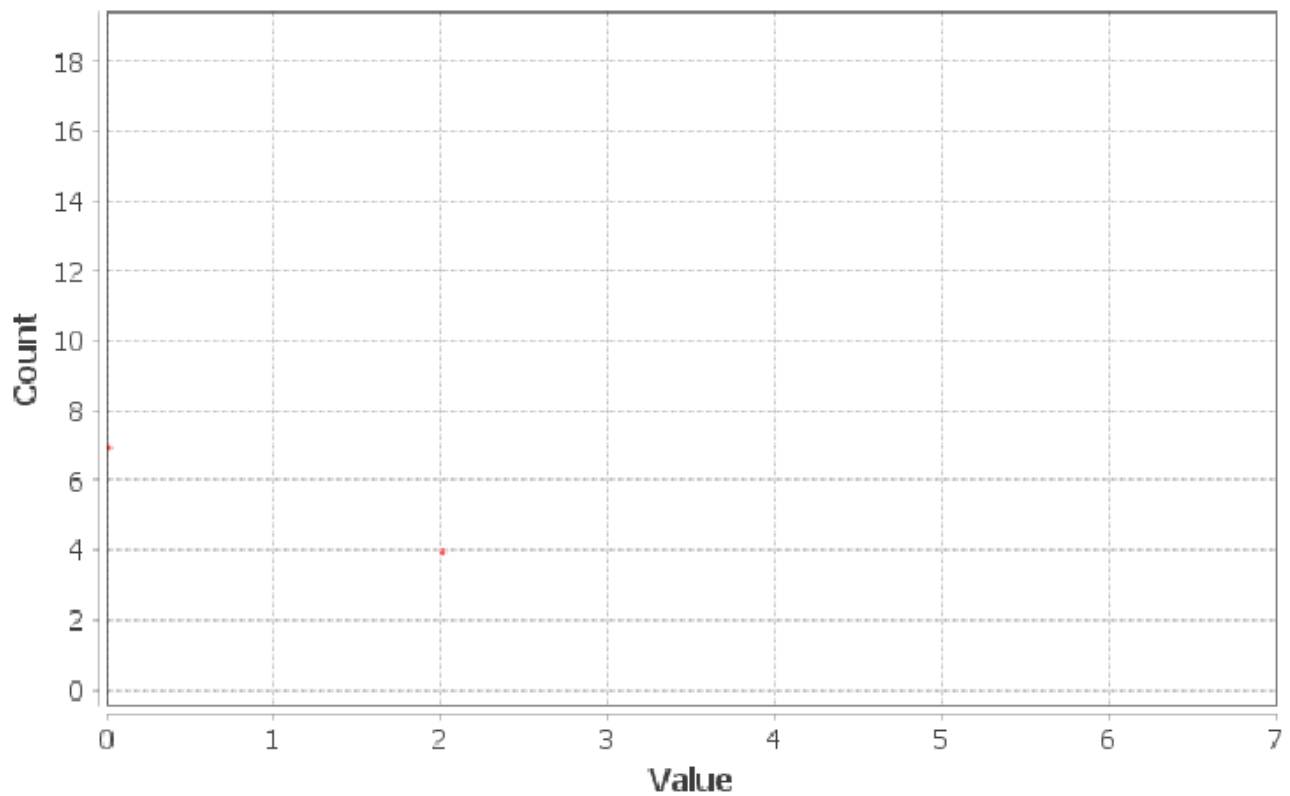
Degree Distribution



In-Degree Distribution



Out-Degree Distribution



Graph Density

Density = 0.028

The network is extremely sparse. Only about 2.8% of all possible connections actually exist, meaning most users are not connected to each other.

- Very low density = weak interaction.
- Most nodes have no direct links.
- The graph is open, scattered, and not tightly connected at all.

Graph Density Report

Parameters:

Network Interpretation: directed

Results:

Density: 0.028

Average Clustering Coefficient

Clustering Coefficient = 0.000

The network has no clustering at all. None of the users form triangles or small tightly-connected groups.

- No triangles = no friend-groups.
- Users do not interact in closed circles.
- The graph is completely unclustered and very open.

Parameters:

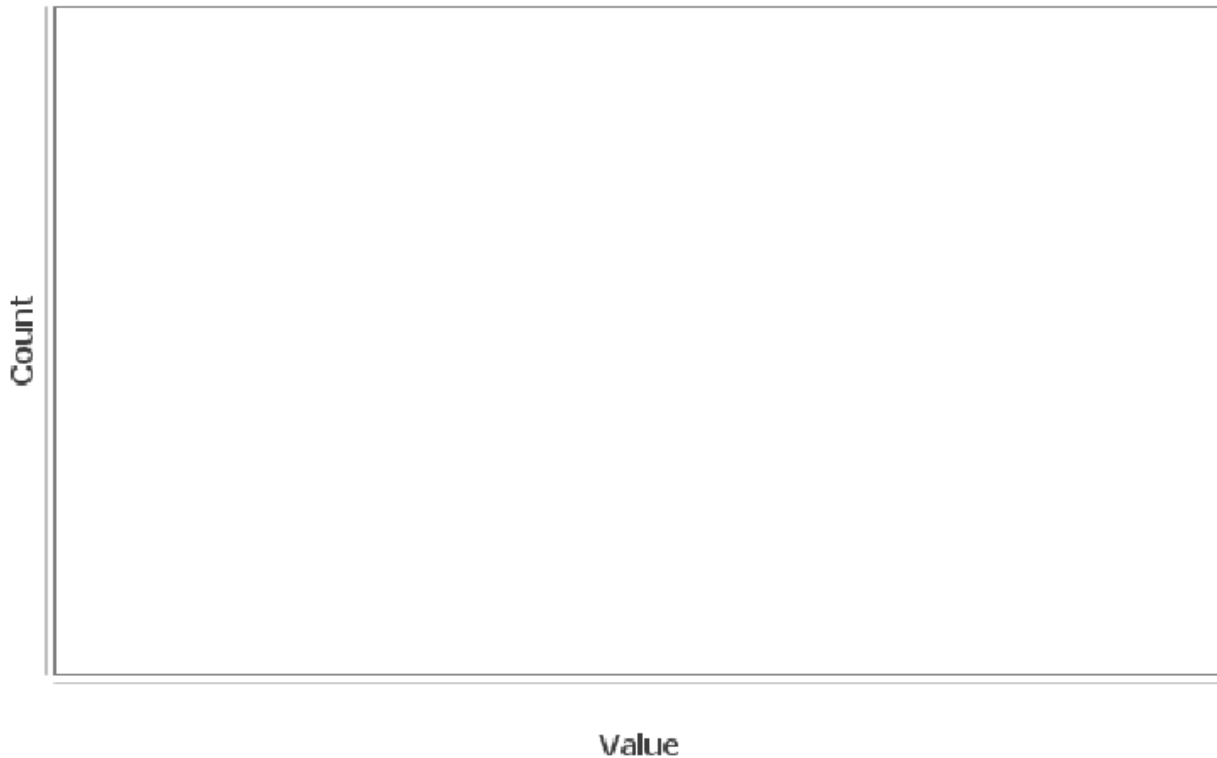
Network Interpretation: directed

Results:

Average Clustering Coefficient: 0.000

The Average Clustering Coefficient is the mean value of individual coefficients.

Clustering Coefficient Distribution



Algorithm:

Simple and slow brute force.

Modularity (Communities)

Modularity = 0.782 | Communities = 11

The graph is highly modular. It splits into 11 small communities, meaning users are separated into many isolated groups rather than interacting in one unified network.

- High modularity = strong separation between groups.
- Many tiny communities = the conversation is fragmented.
- Users stay inside small clusters with almost no cross-interaction.

Parameters:

Randomize: On

Use edge weights: On

Resolution: 1.0

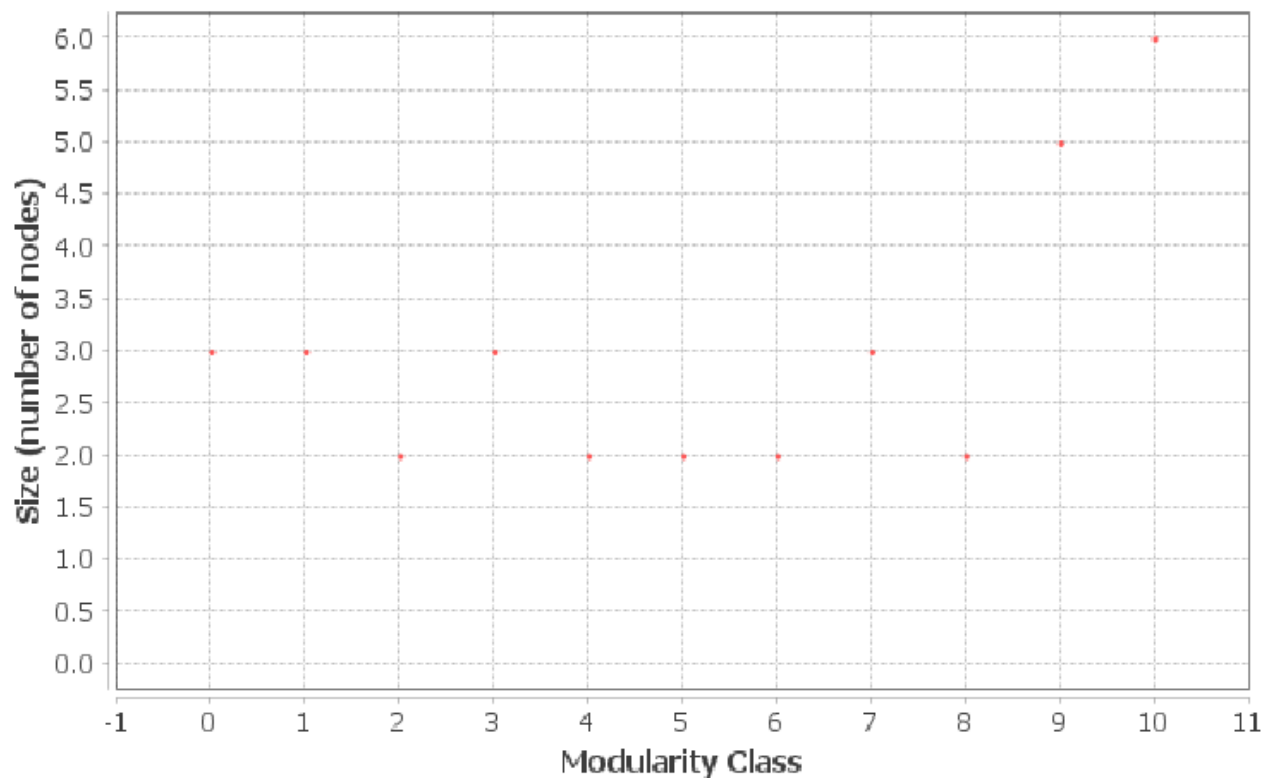
Results:

Modularity: 0.782

Modularity with resolution: 0.782

Number of Communities: 11

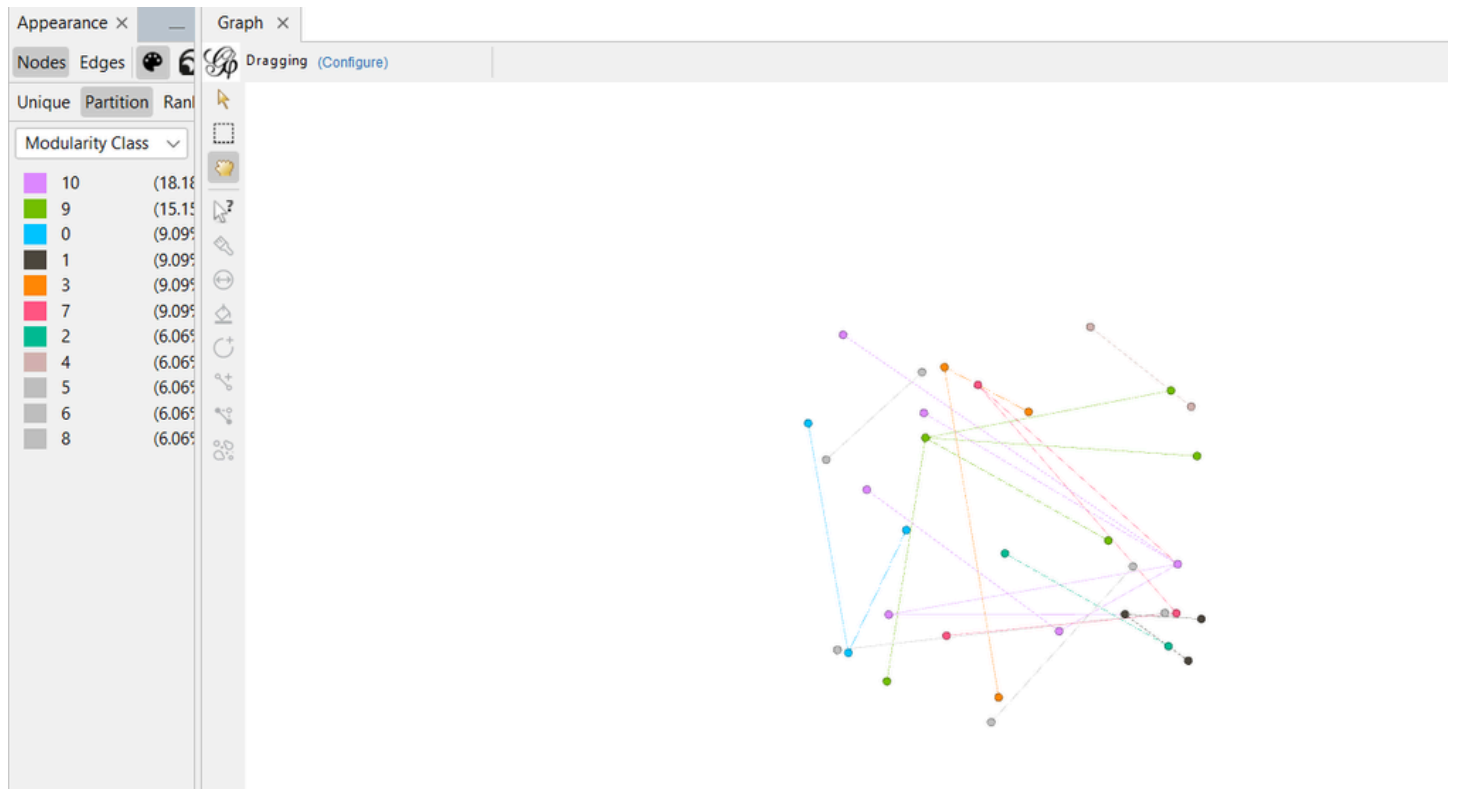
Size Distribution



Color nodes by community:

Each color represents one community, showing that the network is split into many small, disconnected groups rather than one large cohesive structure.

- Nodes from different colors are not well connected.
- Confirms the high modularity you found earlier.



Centrality (Betweenness & Closeness)

Diameter = 5 | Radius = 0 | Average Path Length ≈ 1.65

The network is stretched but loosely connected. Some nodes are 5 steps apart, while others are isolated enough to give a radius of 0.

Betweenness Centrality

Values are very low overall

No node acts as a major bridge. Information does not pass through a single important account in this network.

- No key influencers.
- No node is critical for connecting groups.
- The graph has many disconnected paths.

Closeness Centrality

Values vary but mostly low

Most users are not close to the rest of the network. Reaching other nodes takes several steps, showing weak communication flow.

- Low closeness = slow information spread.
- Users are far apart in the network space.
- Confirms fragmentation and weak structure.

Graph Distance Report

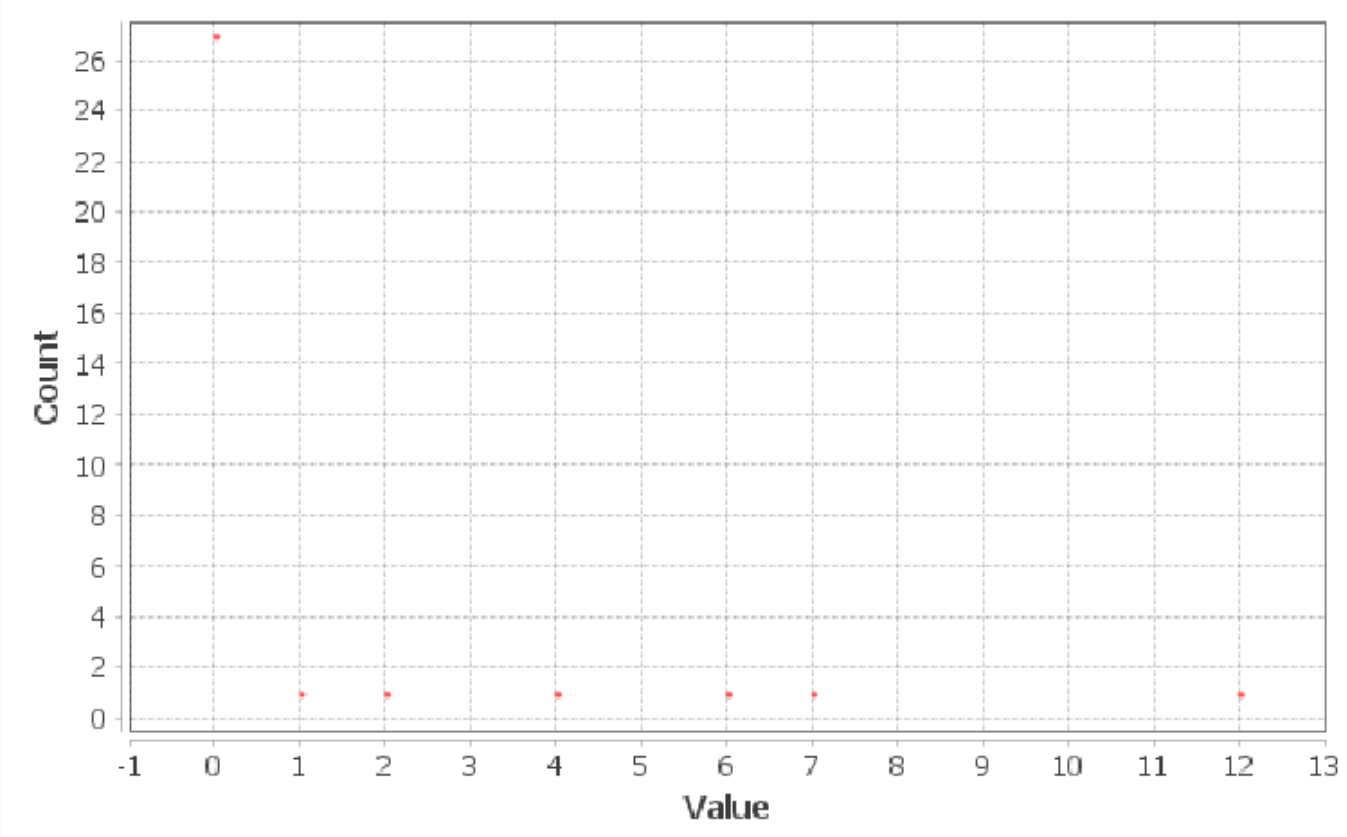
Parameters:

Network Interpretation: directed

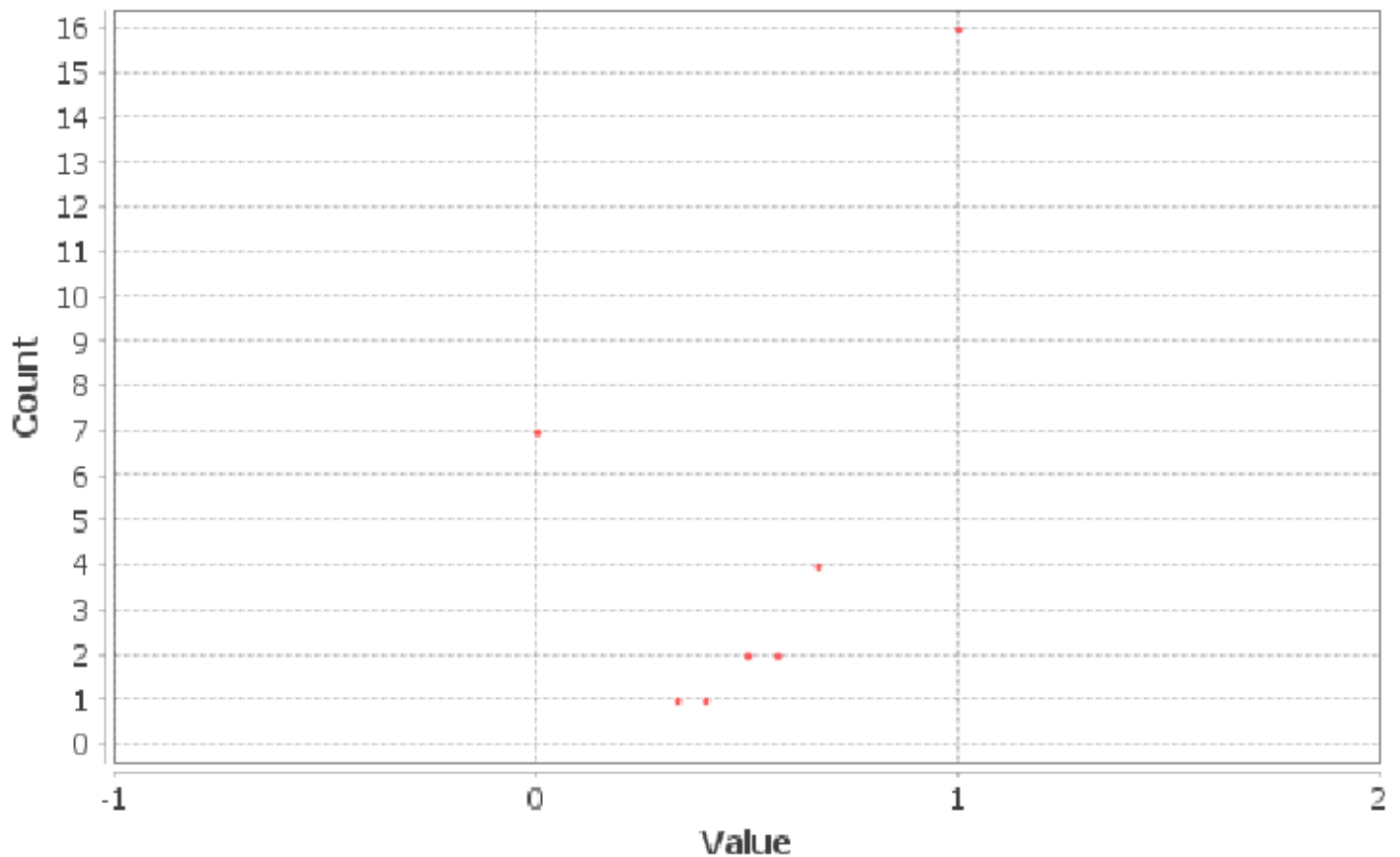
Results:

Diameter: 5
Radius: 0
Average Path length: 1.653061224489796

Betweenness Centrality Distribution



Closeness Centrality Distribution



Connected Components

Weakly Connected Components = 9

Strongly Connected Components = 27

The graph is highly fragmented. It breaks into many separate pieces, meaning most users are not fully connected to each other.

- 9 weak components = only small parts of the graph are loosely linked.
- 27 strong components = many nodes cannot reach each other at all.
- Shows extreme separation and very limited information flow.

Parameters:

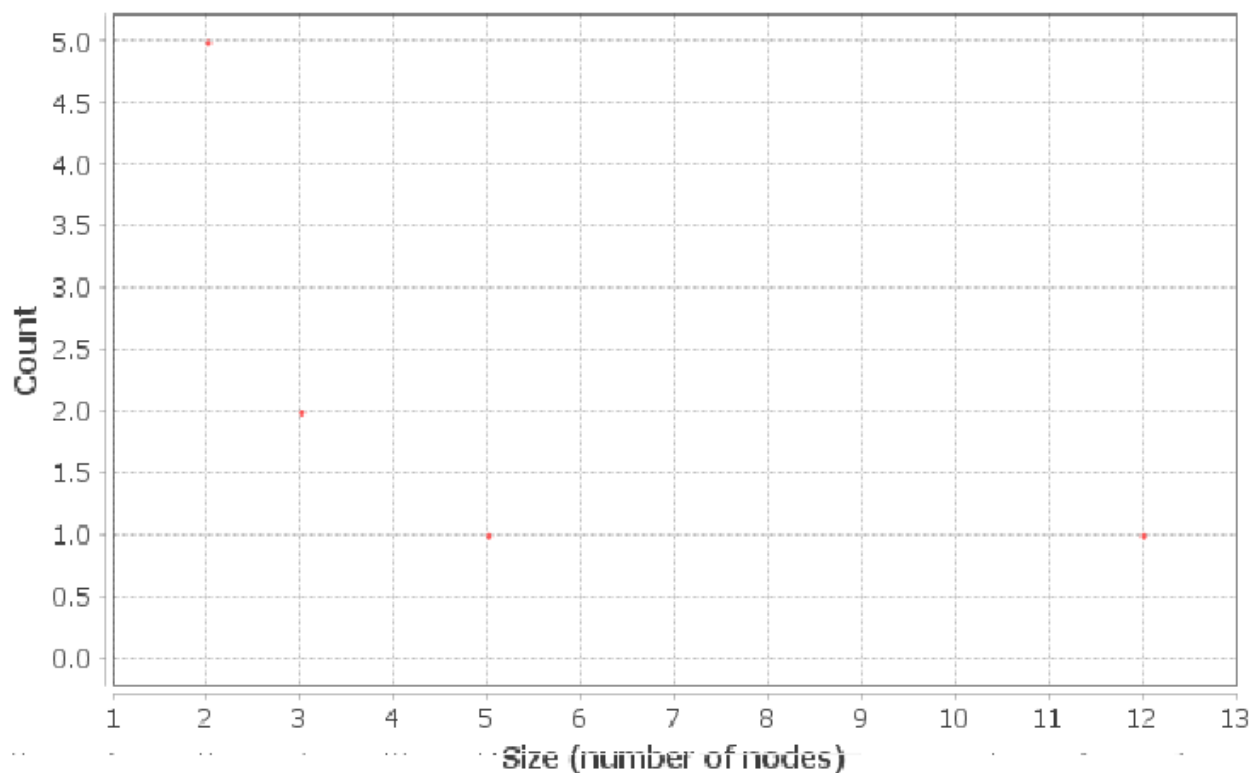
Network Interpretation: directed

Results:

Number of Weakly Connected Components: 9

Number of Strongly Connected Components: 27

Size Distribution



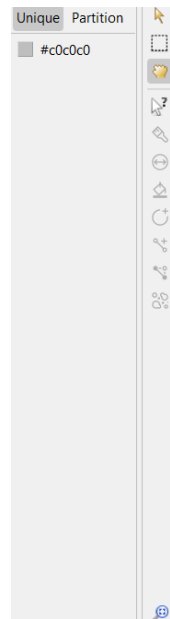
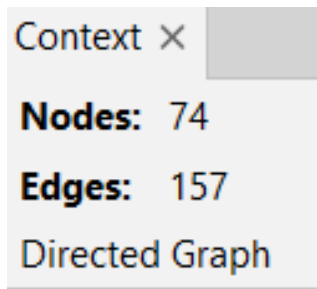
NON-CONSPIRACY FOLDER

folder number 207

Nodes = 74 | Edges = 157

The non-conspiracy network is much larger and more active, with 74 users and 157 interactions. This indicates a richer and more connected conversation compared to the 5G graph.

- More nodes = more users participating.
- More edges = more replies/mentions happening.
- Shows a larger, healthier, and more engaged community.



Average Degree

Average Degree = 2.122

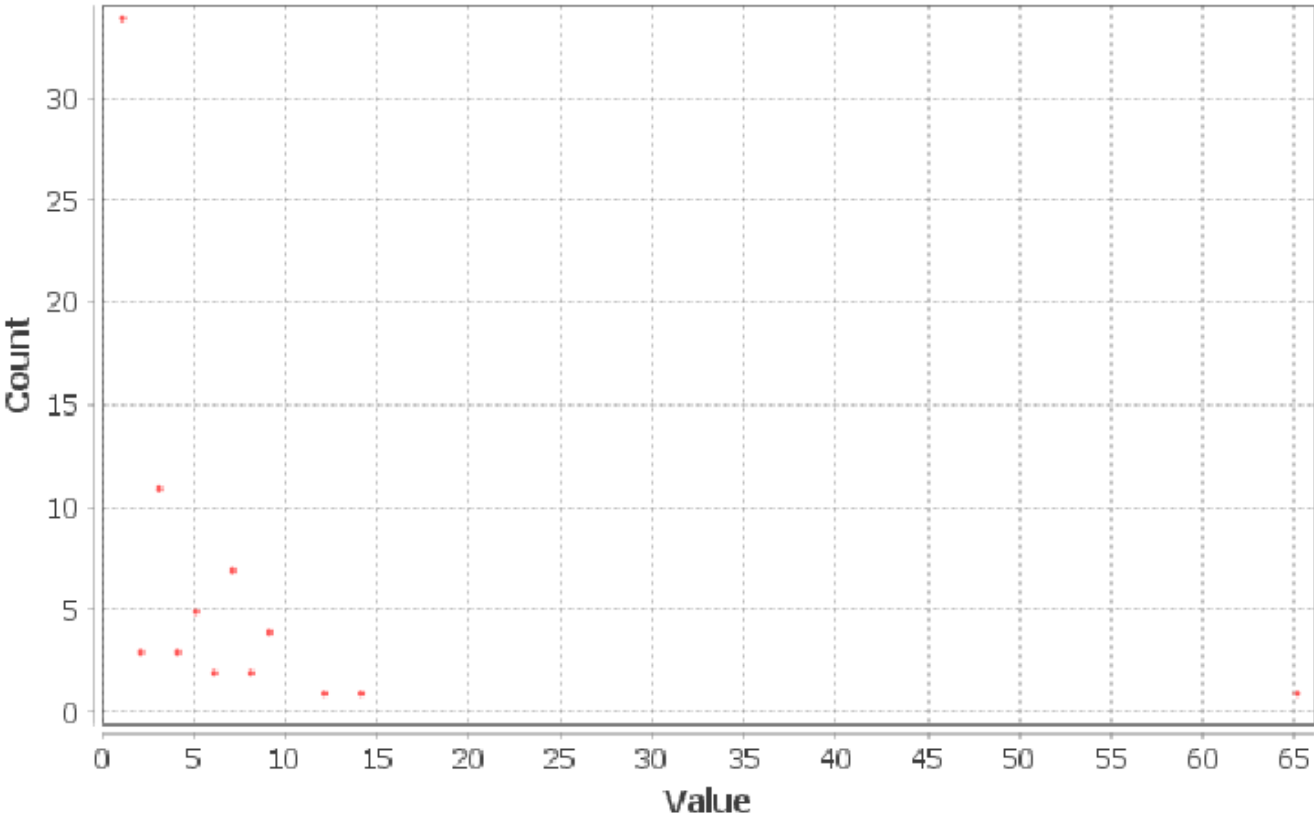
Users in this network interact more actively. On average, each user is connected to about two others, showing stronger communication and a healthier flow of interactions.

- Higher degree = more engagement.
- Many nodes have multiple incoming or outgoing links.
- Shows a more connected and socially active conversation compared to the 5G graph.

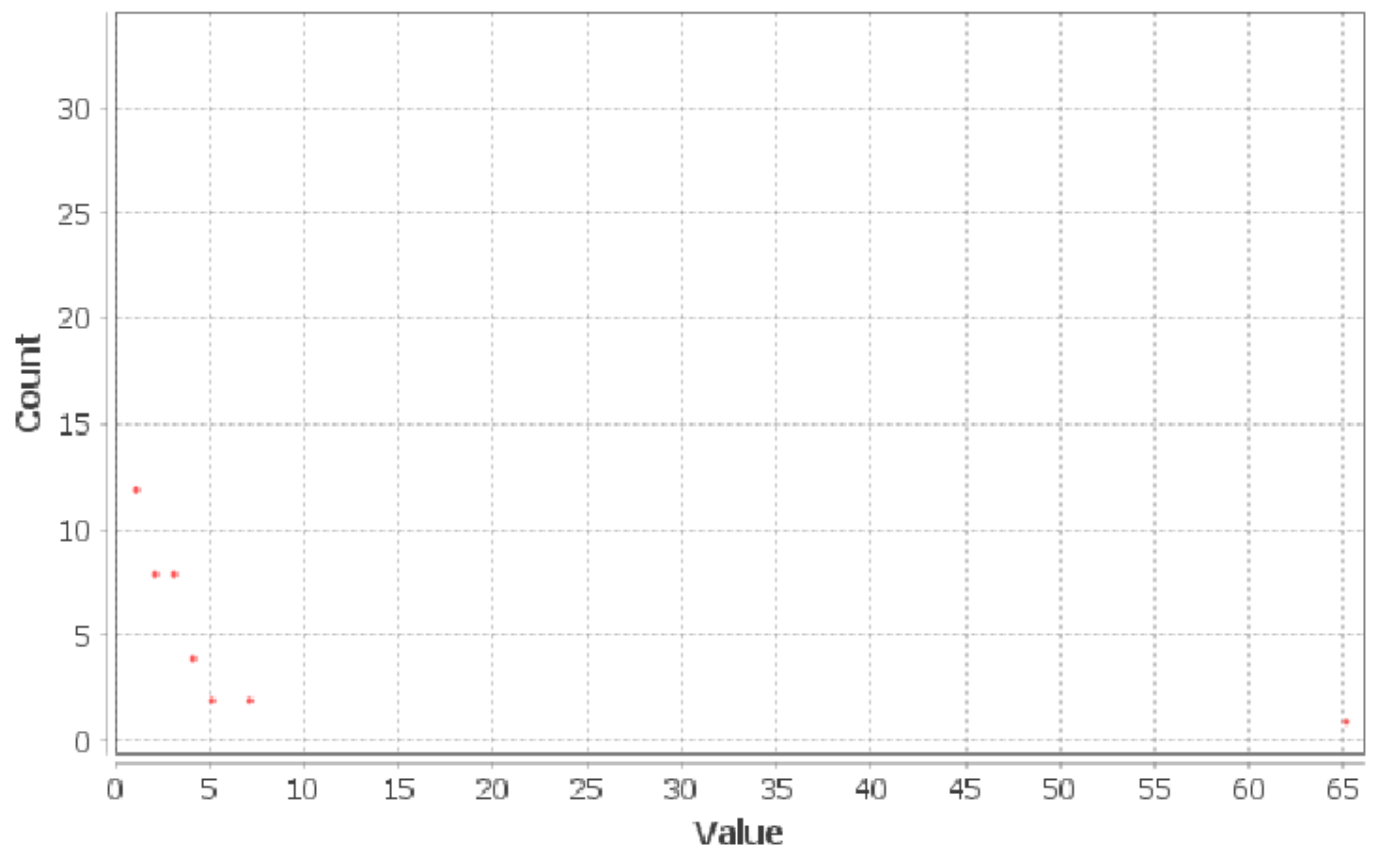
Results:

Average Degree: 2.122

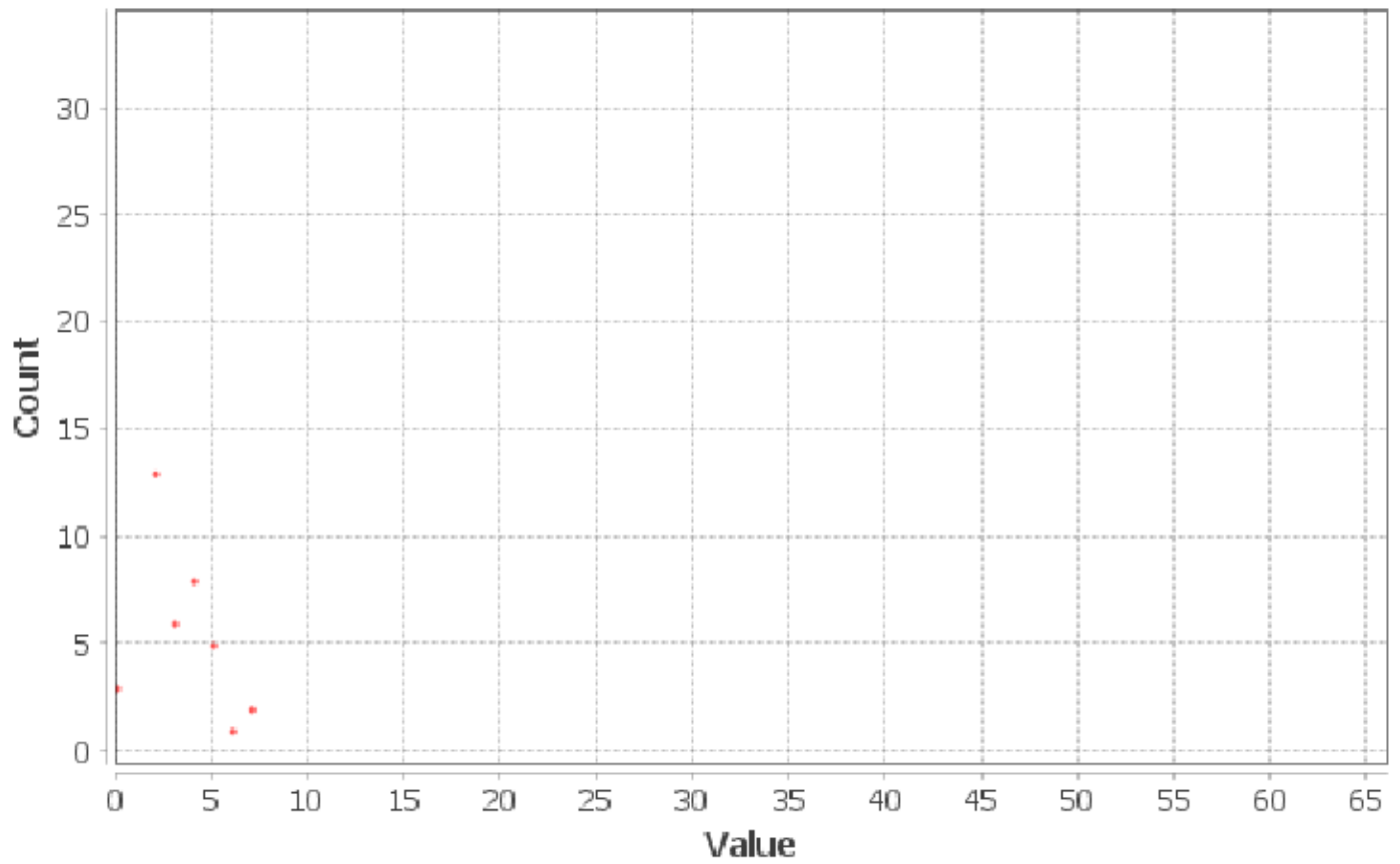
Degree Distribution



In-Degree Distribution



Out-Degree Distribution



Graph Density

Density = 0.029

The network is still sparse, with only about 2.9% of all possible connections present, but it is slightly denser than the 5G graph. This means users interact more, but the structure is still not tightly connected.

- Very low density = the graph is open and not fully connected.
- Higher than the 5G graph → more interaction and activity.
- Shows a lightly connected but more active network.

Graph Density Report

Parameters:

Network Interpretation: directed

Results:

Density: 0.029

Average Clustering Coefficient

Clustering Coefficient = 0.123

The network has a small amount of clustering. Some users form small group connections, showing limited but real community interaction.

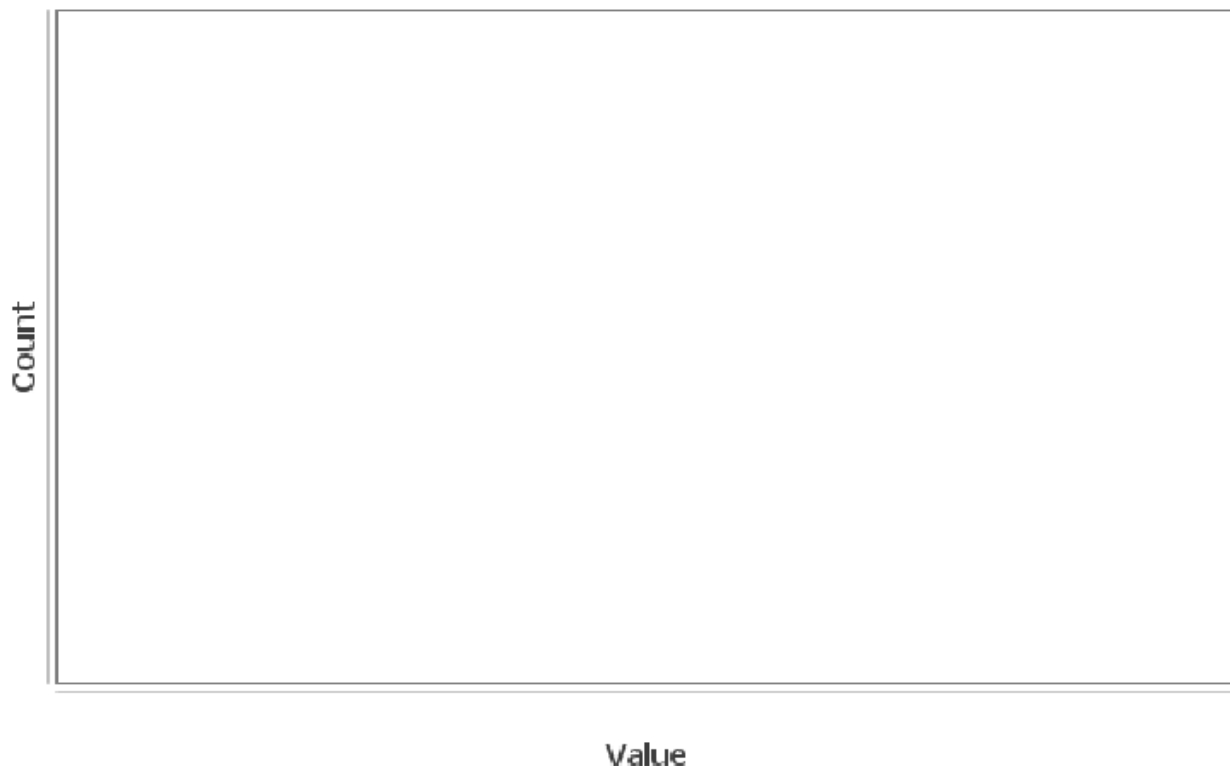
- A value above 0 means there *are* triangles (small friend groups).
- Higher than the 5G graph (which had 0.0).
- Shows that normal users interact in small groups more naturally.

Results:

Average Clustering Coefficient: 0.123

The Average Clustering Coefficient is the mean value of individual coefficients.

Clustering Coefficient Distribution



Algorithm:

Simple and slow brute force.

Modularity (Communities)

Modularity = 0.360 | Communities = 6

The network splits into six moderate-sized communities, showing a clear but not extreme separation of groups. Users form distinct clusters, but the graph is still overall connected.

- Medium modularity = balanced community structure.
- 6 communities = users cluster naturally into discussion groups.
- Much less fragmented than the 5G graph (which had 11 tiny groups).

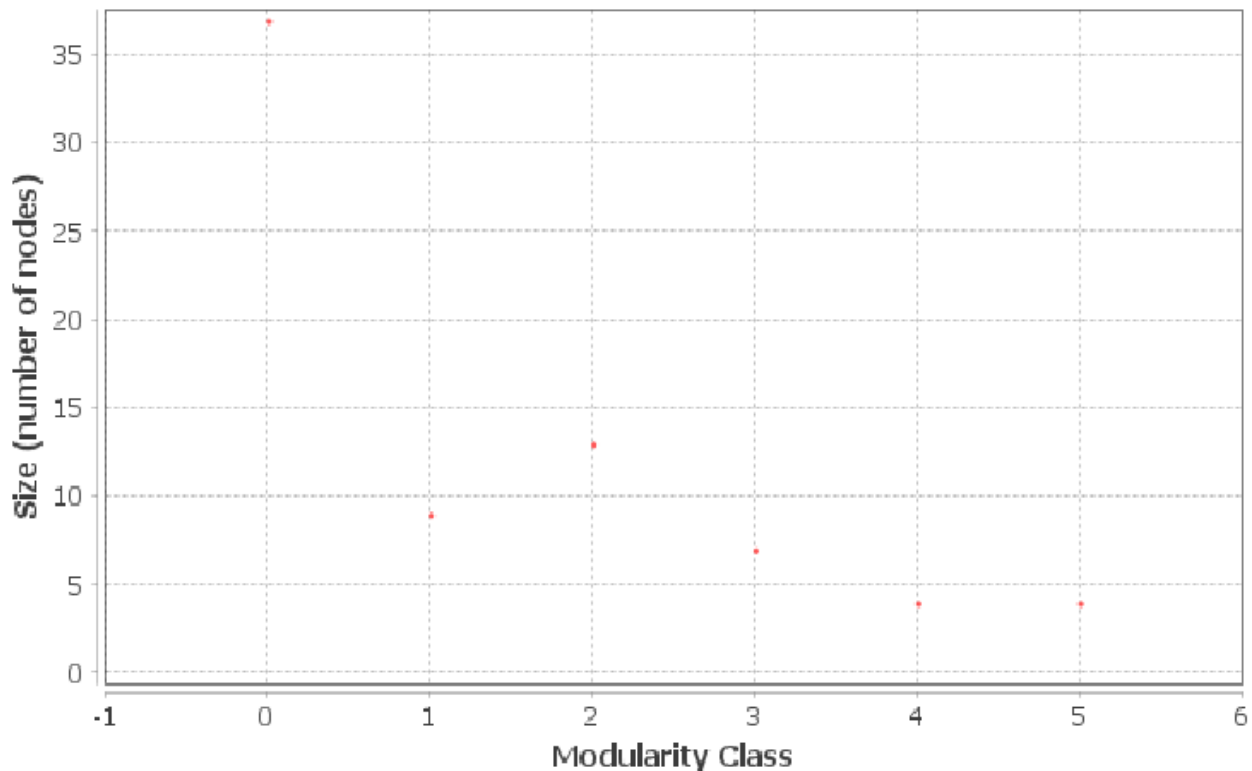
Parameters:

Randomize: On
Use edge weights: On
Resolution: 1.0

Results:

Modularity: 0.360
Modularity with resolution: 0.360
Number of Communities: 6

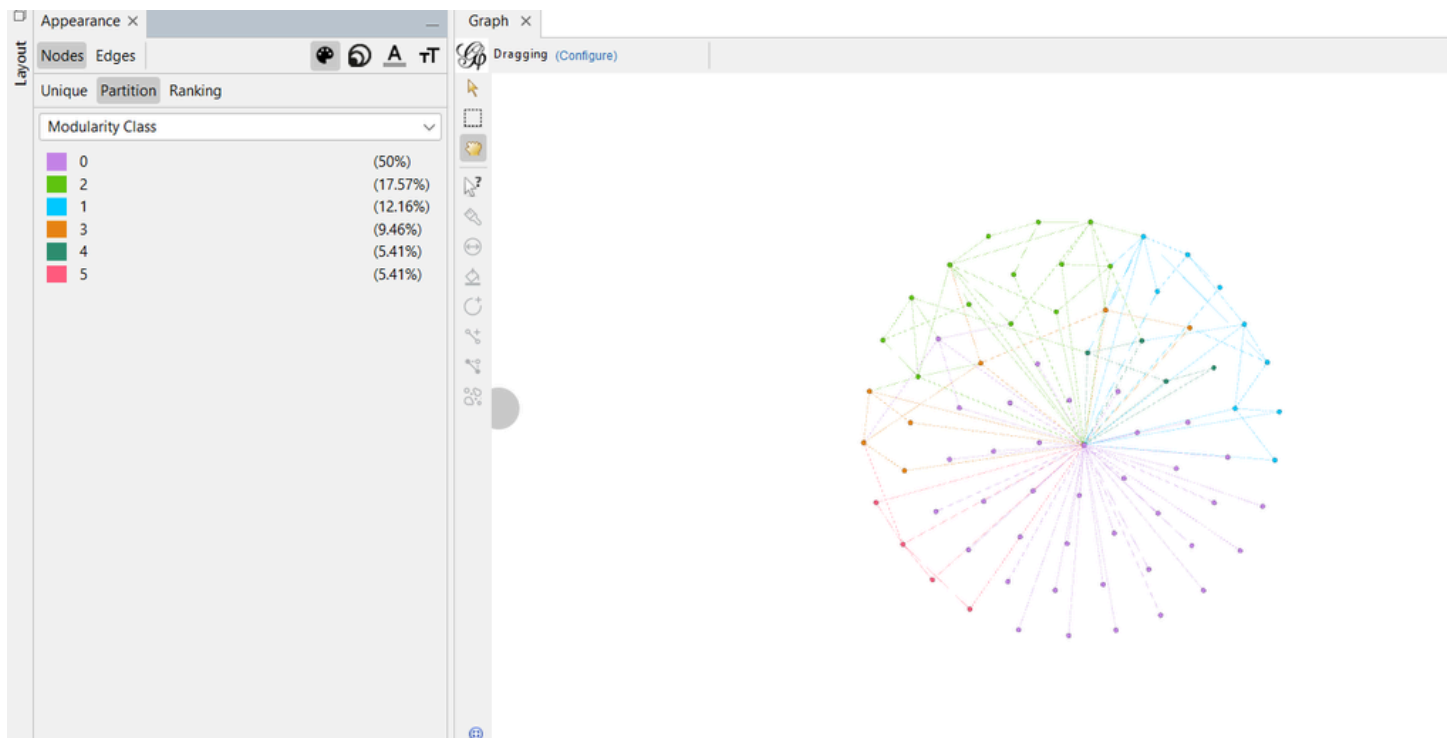
Size Distribution



Color nodes by community:

Each color represents one of the six communities in the network. The colors show clear clusters, but the graph stays well-connected overall.

- Only 6 colors = 6 communities.
- The clusters are bigger and more organized than in the 5G graph.
- Shows a healthier, more natural social structure.



Centrality (Betweenness & Closeness)

Diameter = 10 | Radius = 0 | Average Path Length \approx 3.42

The network is larger and more spread out. Some users are up to 10 steps apart, showing a wide conversation structure.

Betweenness Centrality

Values are higher and more varied than the 5G graph

A few nodes act as bridges connecting different parts of the network. These users help information move between communities.

- Some accounts play a central role.
- Information flows through certain key users.
- Shows natural influencers inside the conversation.

Closeness Centrality

Several nodes have high closeness values

Some users can reach others quickly, making them well-positioned in the network.

- High closeness = users well connected to many others.
- Faster communication compared to the 5G graph.
- The network structure supports smoother information spread.

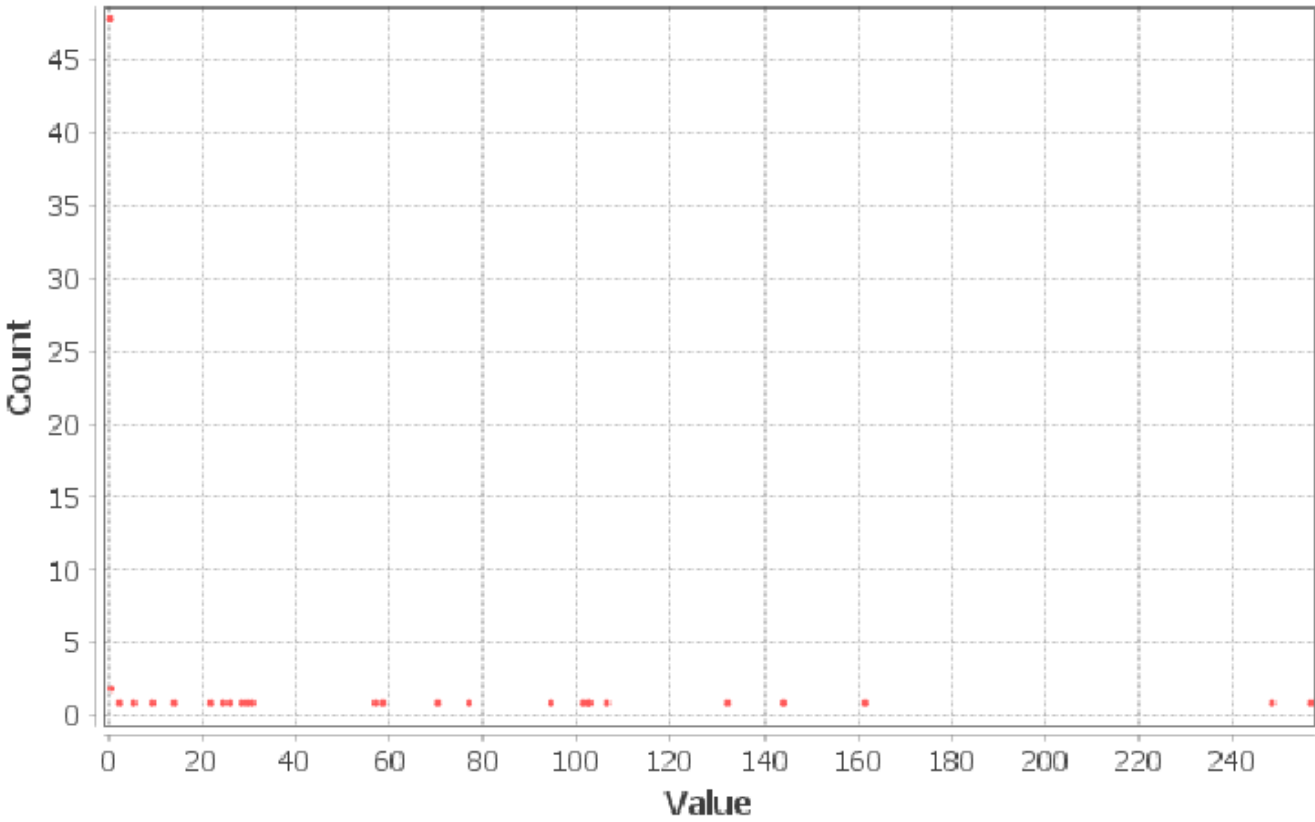
Results:

Diameter: 10

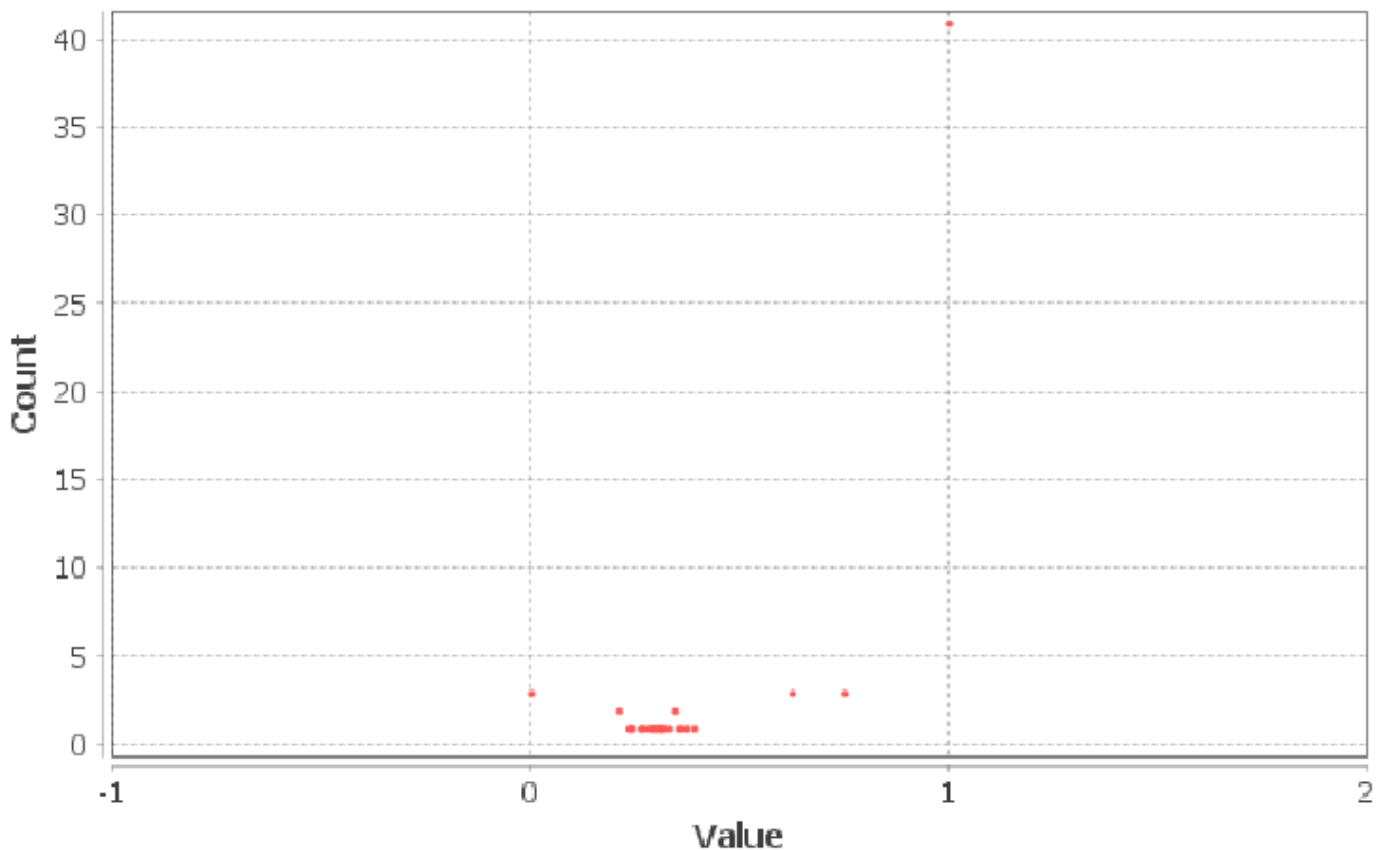
Radius: 0

Average Path length: 3.245260663507109

Betweenness Centrality Distribution



Closeness Centrality Distribution



Connected Components

Weakly Connected Components = 1

Strongly Connected Components = 46

Almost the entire network is connected together in one big weakly connected component, meaning all users are part of the same overall conversation.

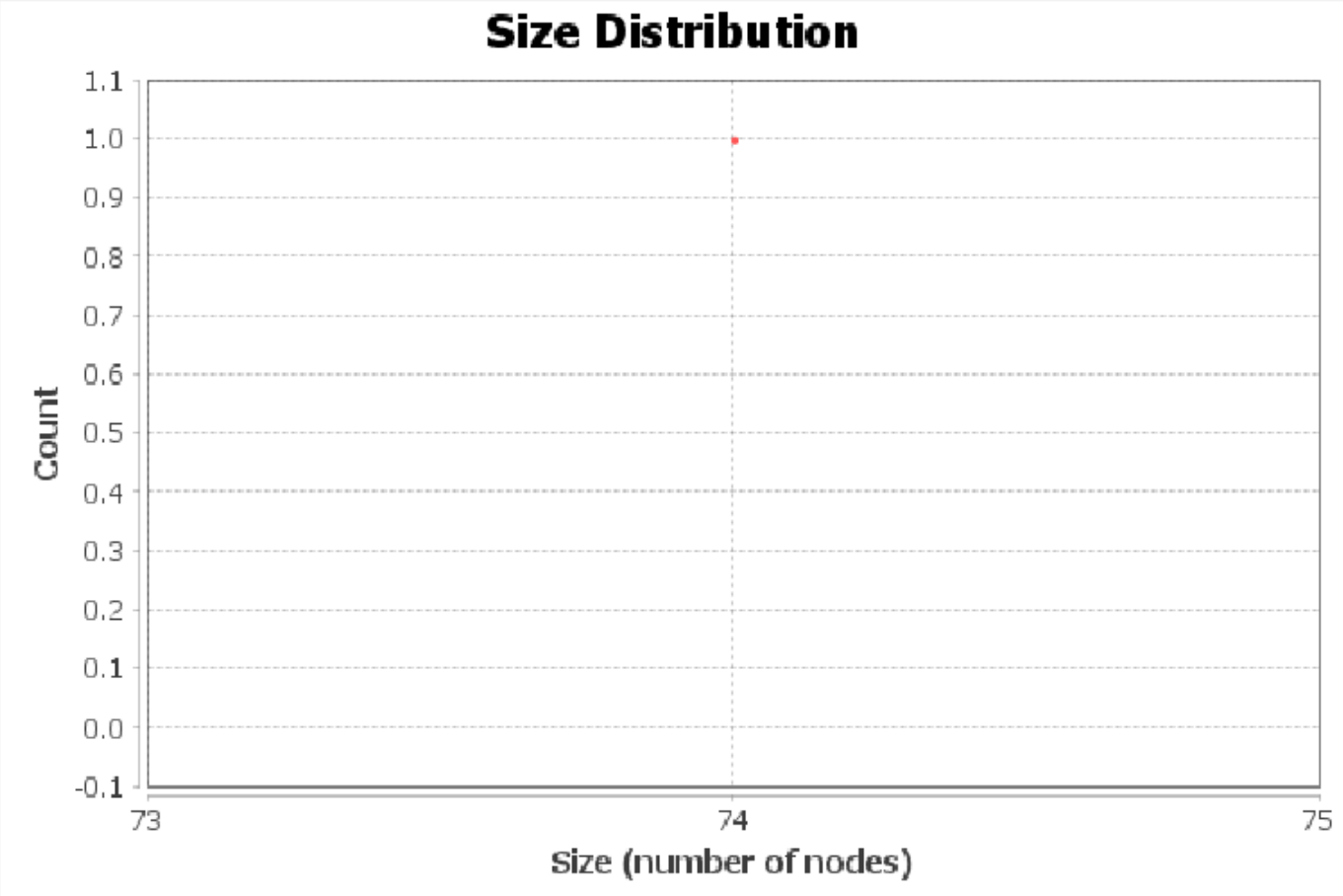
- **1 weak component** → the whole graph is united; no major separation.
- **46 strong components** → direction of edges matters, but users are still reachable in the larger structure.
- Shows a **cohesive, well-connected** discussion, much stronger than the fragmented 5G graph.

Parameters:

Network Interpretation: directed

Results:

Number of Weakly Connected Components: 1
Number of Strongly Connected Components: 46



5G Conspiracy vs Non-Conspiracy Networks

Metric	5G Conspiracy Graph (Folder 107)	Non-Conspiracy Graph (Folder 207)	Comparison Summary
Nodes	33	74	Non-conspiracy graph is more active and includes far more users.
Edges	30	157	Non-conspiracy graph has much richer interaction.
Average Degree	0.909	2.122	Non-conspiracy users interact over twice as much.
Graph Density	0.028	0.029	Both are sparse, but non-conspiracy is slightly more connected.
Clustering Coefficient	0.000	0.123	Non-conspiracy graph has small friend-groups; 5G graph has none.
Modularity	0.782 (11 communities)	0.360 (6 communities)	5G graph is highly fragmented; non-conspiracy graph is more cohesive.
Betweenness Centrality	Very low; no bridge nodes	Higher; some strong bridge nodes	Non-conspiracy has key users enabling communication flow.
Closeness Centrality	Mostly low	Some high values	Non-conspiracy users can reach others faster.
Connected	9 weak	1 weak component	5G network is split;

Components	components	non-conspiracy network is unified.
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The 5G conspiracy network is small, fragmented, and weakly connected, while the non-conspiracy network is larger, more cohesive, and supports stronger communication and community interaction.