Social Networks

Assignment 1

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1. Introduction

"We analyze and compare a Non-Conspiracy Twitter subgraph vs. a 5G Conspiracy subgraph from the WICO dataset to understand structural differences in information diffusion and community behavior."

2. Dataset Description
Files Used:

nodes.csv – Contains user IDs and attributes:
id → Unique user identifier
friends → Number of friends/followings
followers → Number of followers

edges.csv – Contains user interactions as edges:
source → User ID of the origin node
target → User ID of the destination node

Network Type:

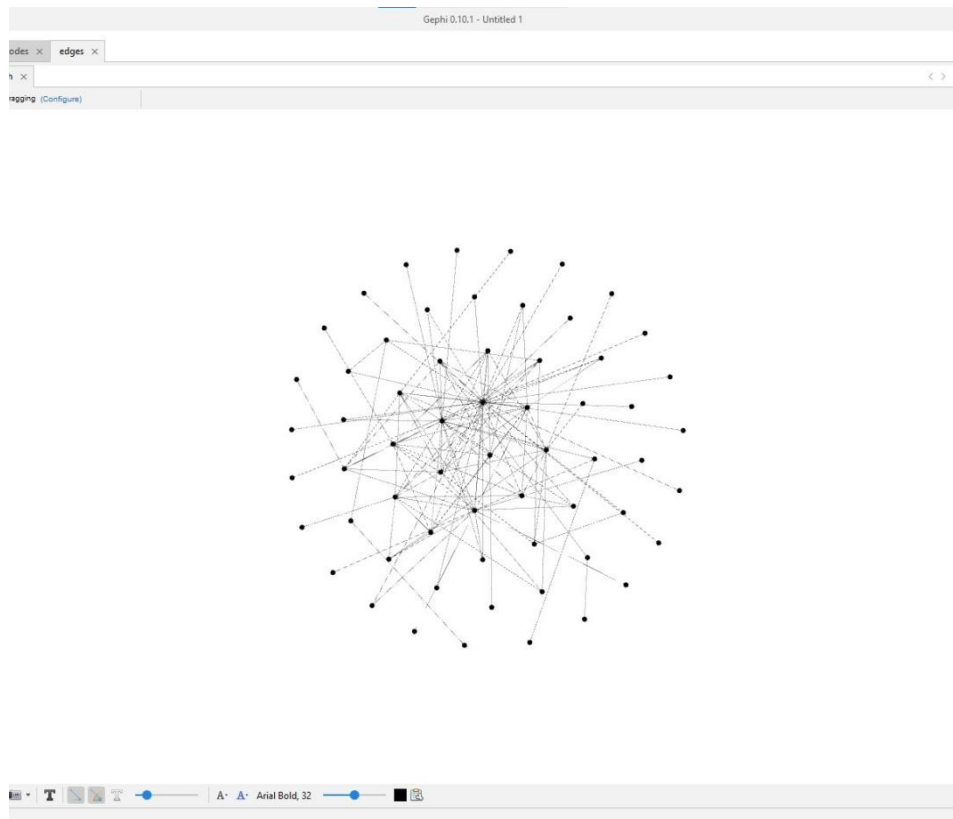Directed graph (edges have a direction from source → target)
Each edge represents a follower/friend relationship or interaction between users

Notes:

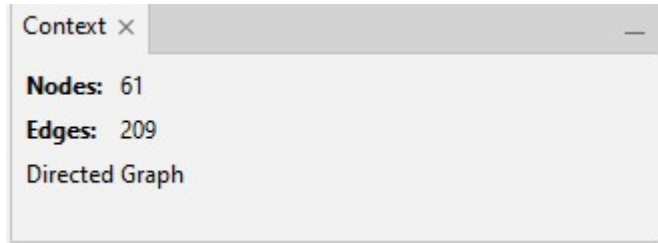Converting edges.txt to CSV ensures Gephi can import it without delimiter issues.

3.Network Statistics (from Gephi)
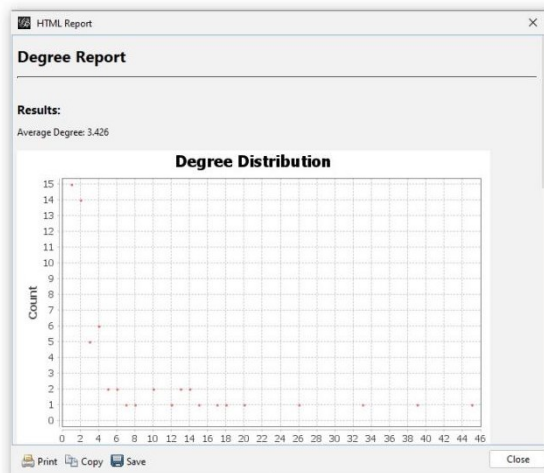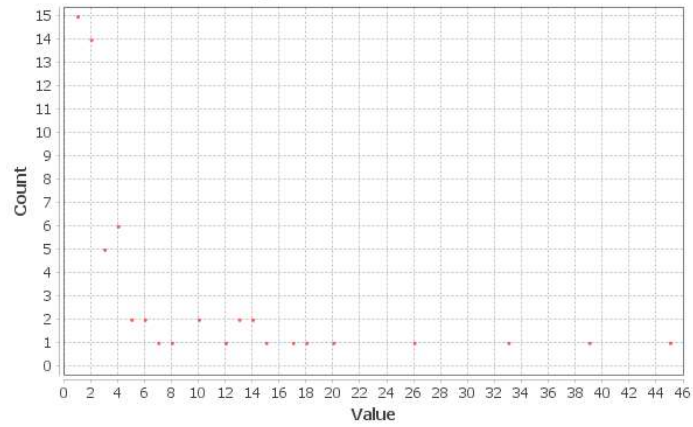## Layout used (Fruchterman Reingold)

Metrics computed:

Number of nodes and edges:

Context ×

Nodes: 61
Edges: 209
Directed Graph

Average degree:

HTML Report ×

Degree Report

Results:

Average Degree: 3.426

Degree Distribution

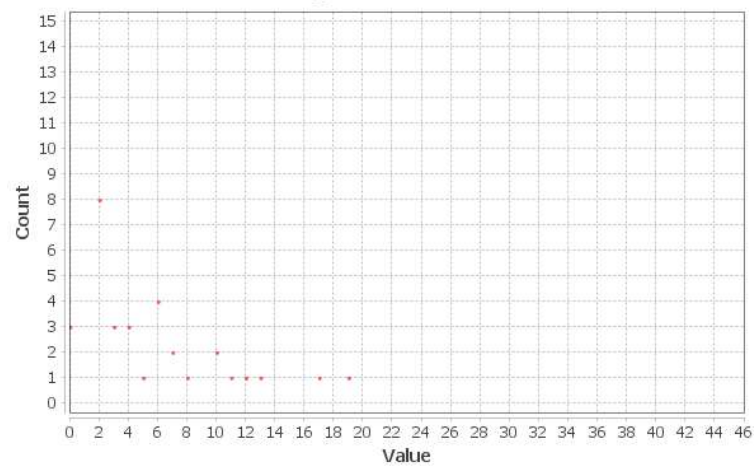Print Copy Save   Close

Degree Distribution

In-Degree Distribution

Out-Degree Distribution

Graph density:

HTML Report   ×

Graph Density Report

Parameters:

Network Interpretation: directed

Results:

Density: 0.057

Print   Copy   Save   Close

Average clustering coefficient

HTML Report   ×

Clustering Coefficient Metric Report

Parameters:

Network Interpretation: directed

Results:

Average Clustering Coefficient: 0.215
The Average Clustering Coefficient is the mean value of individual coefficients.

Clustering Coefficient Distribution

Count

Print   Copy   Save   Close

Modularity (Q) and number of communities:

HTML Report   ×

Modularity Report

Parameters:

Randomize: On
Use edge weights: On
Resolution: 1.0

Results:

Modularity: 0.340
Modularity with resolution: 0.340
Number of Communities: 5
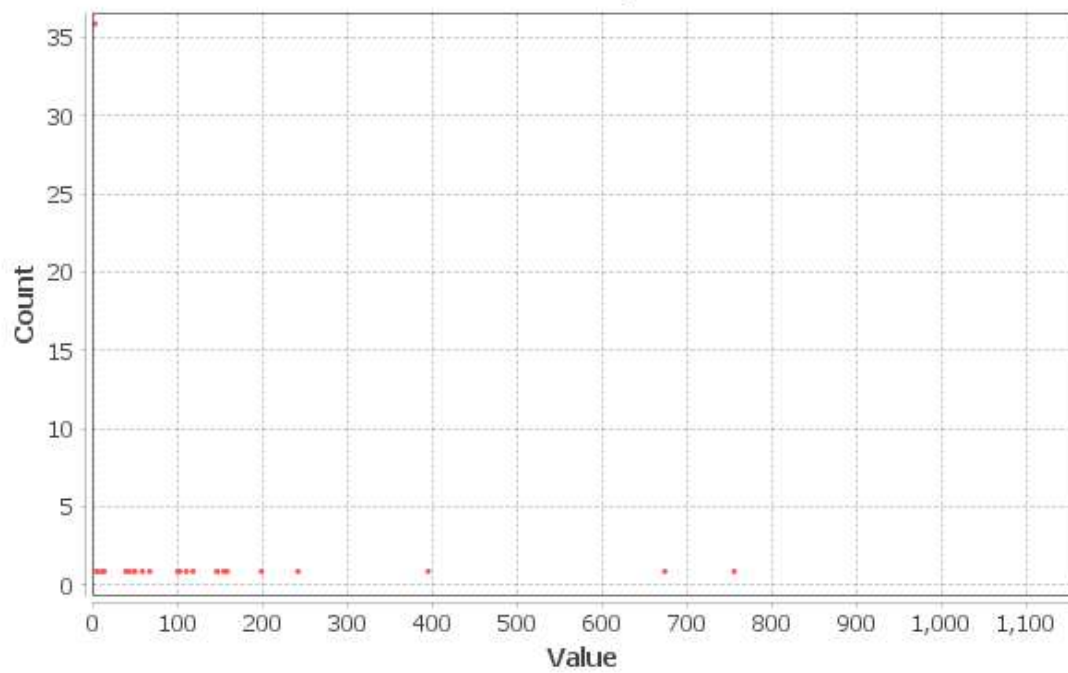
Size Distribution

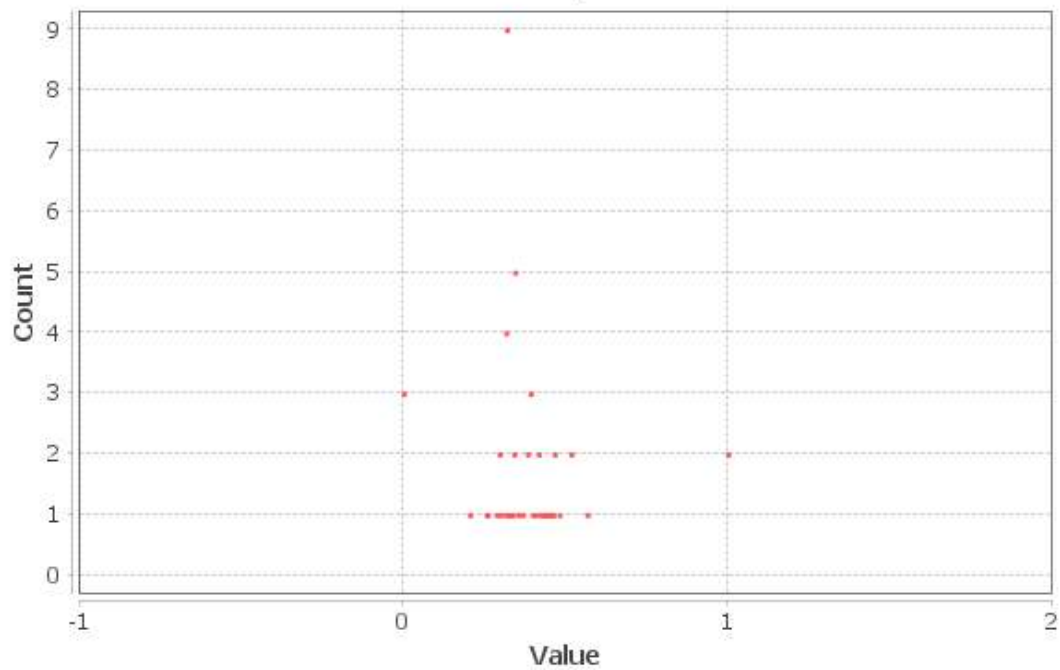Print   Copy   Save   Close

Betweenness and closeness centrality:

Betweenness Centrality Distribution

Closeness Centrality Distribution

Connected components

HTML Report

Results:

Number of Weakly Connected Components: 1
Number of Strongly Connected Components: 18

Size Distribution

Print   Copy   Save   Close
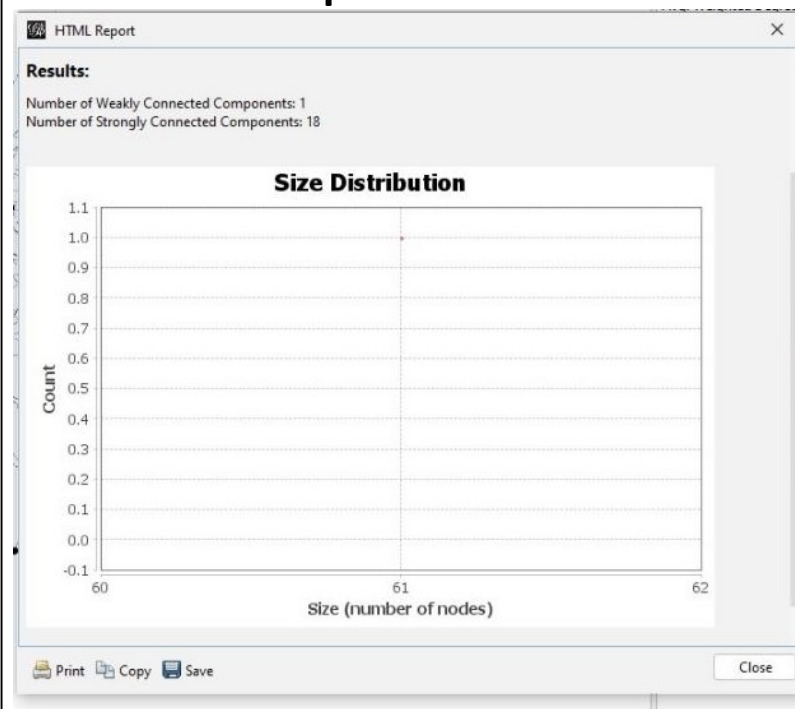
5G Conspiracy Graph

1. Introduction

This report analyzes a misinformation network from the WICO 5G_Conspiracy_Graphs dataset.

The goal is to understand the structural patterns of misinformation communities on Twitter and how they differ from normal, non-conspiracy networks.

Using Gephi, we performed:

- Graph visualization (ForceAtlas2 layout)
- Basic network statistics
- Centrality analysis
- Community detection through modularity
- Structural comparisons with a non-conspiracy Twitter graph

2. Dataset Description

Files Used

nodes.csv
- ◆ Contains user metadata:
- ◆ id — Twitter user ID
- ◆ time — Activity timestamp
- ◆ friends — Number of accounts the user follows
- ◆ followers — Number of followers

edges.csv
- ◆ Directed interactions:
- ◆ source → User sending the interaction
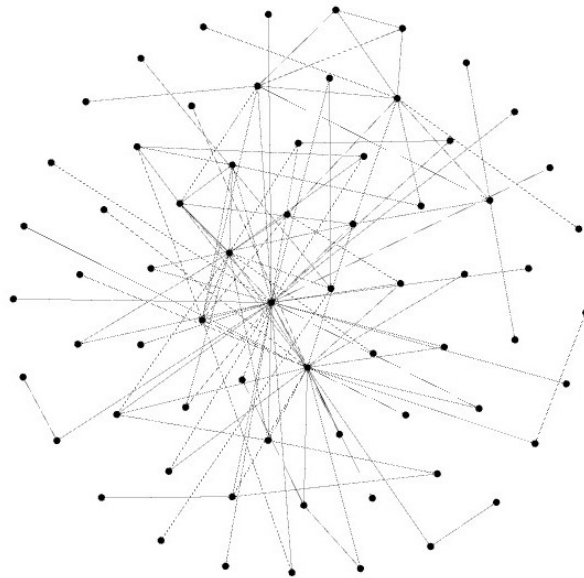- ◆ target → User receiving the interaction

Network Type
- ◆ Directed graph

◆ Nodes represent Twitter accounts
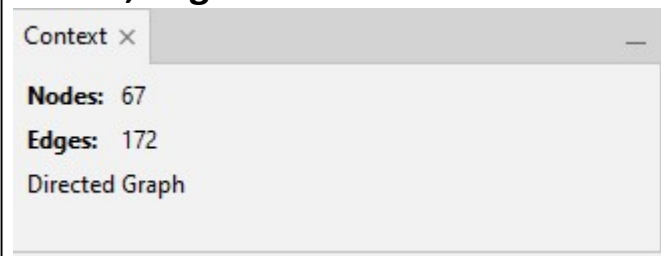◆ Edges represent interactions such as mentions, replies, or retweets

2. *Visualization*

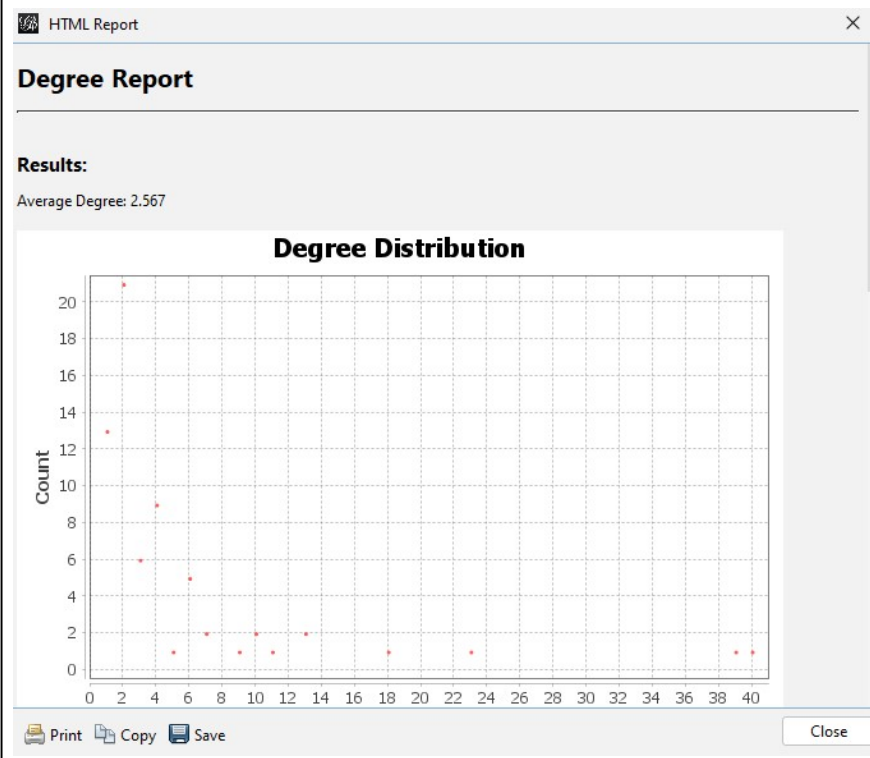The network was visualized using ForceAtlas2, which showed:
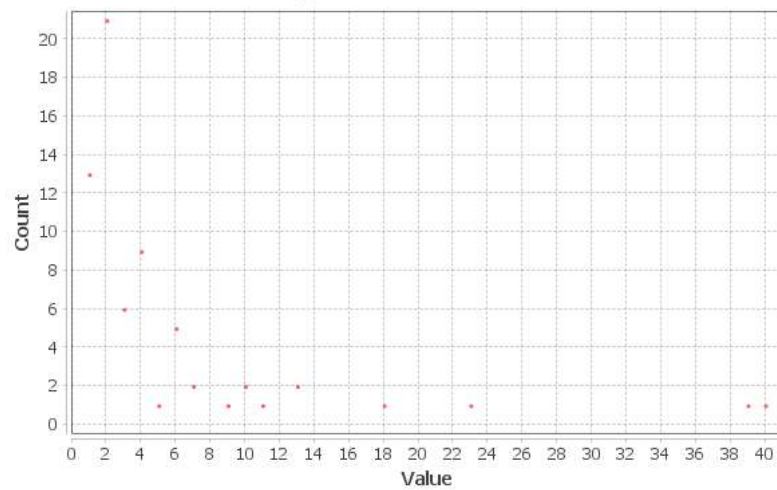
3. Network Statistics (from Gephi)

Nodes, Edges

Context ✕   —

Nodes: 67

Edges: 172

Directed Graph

Average Degree

HTML Report   ✕

Degree Report

Results:

Average Degree: 2.567

Degree Distribution
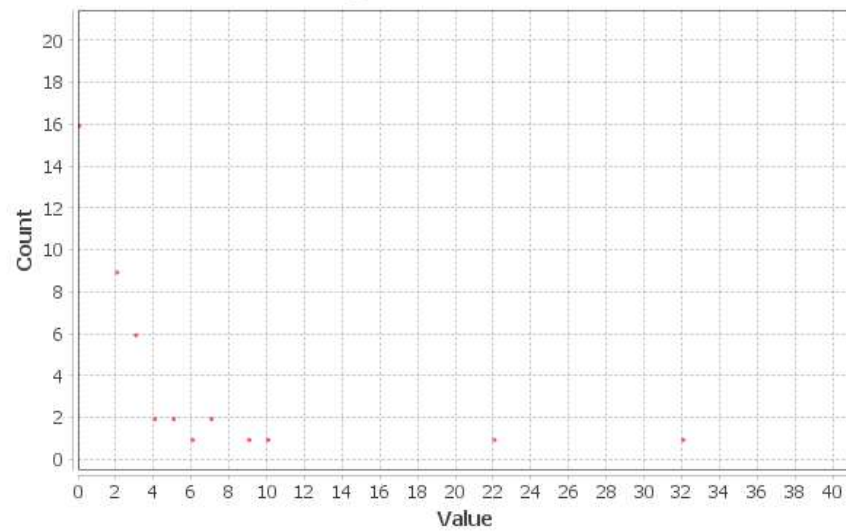
Print   Copy   Save   Close

Degree Distribution

In-Degree Distribution

Out-Degree Distribution

Graph Density

HTML Report   ✕

Graph Density Report

Parameters:

Network Interpretation: directed

Results:

Density: 0.039

Average Clustering Coefficient

HTML Report   ✕

Results:

Average Clustering Coefficient: 0.188
The Average Clustering Coefficient is the mean value of individual coefficients.

Clustering Coefficient Distribution

Count

Value
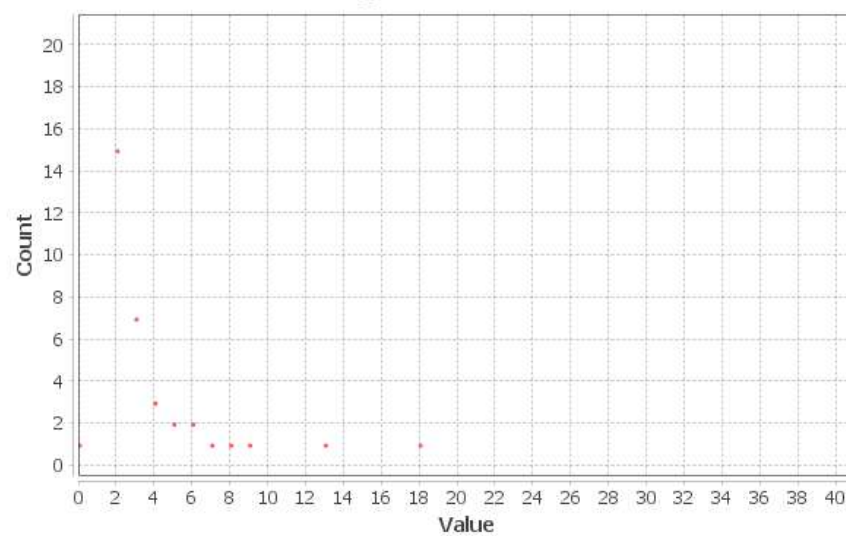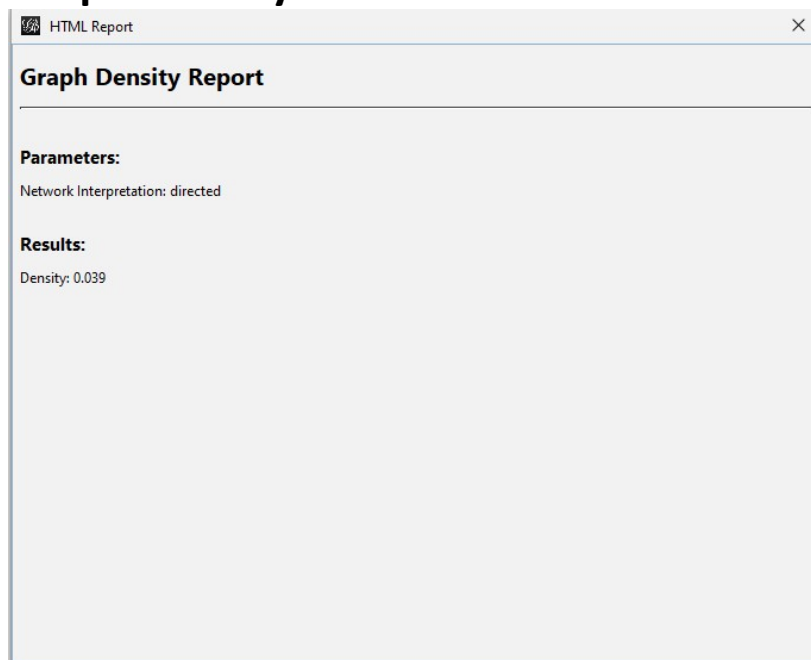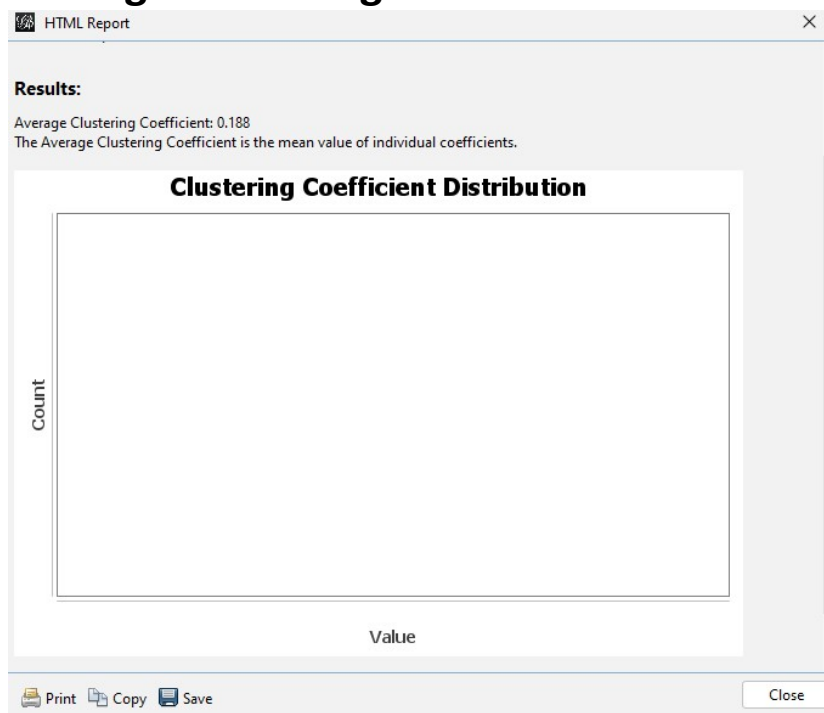
🖶 Print   🗐 Copy   💾 Save   Close

Modularity (Q) and Number of Communities

Results:

Modularity: 0.447
Modularity with resolution: 0.447
Number of Communities: 6
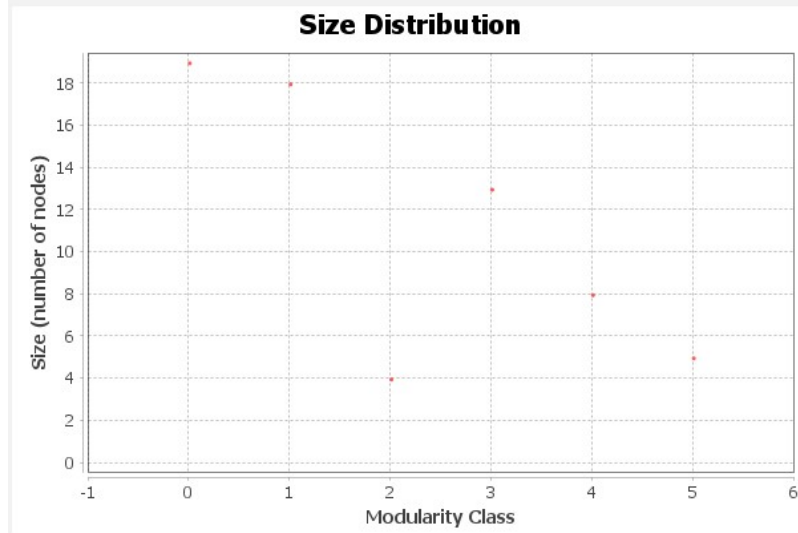
Size Distribution
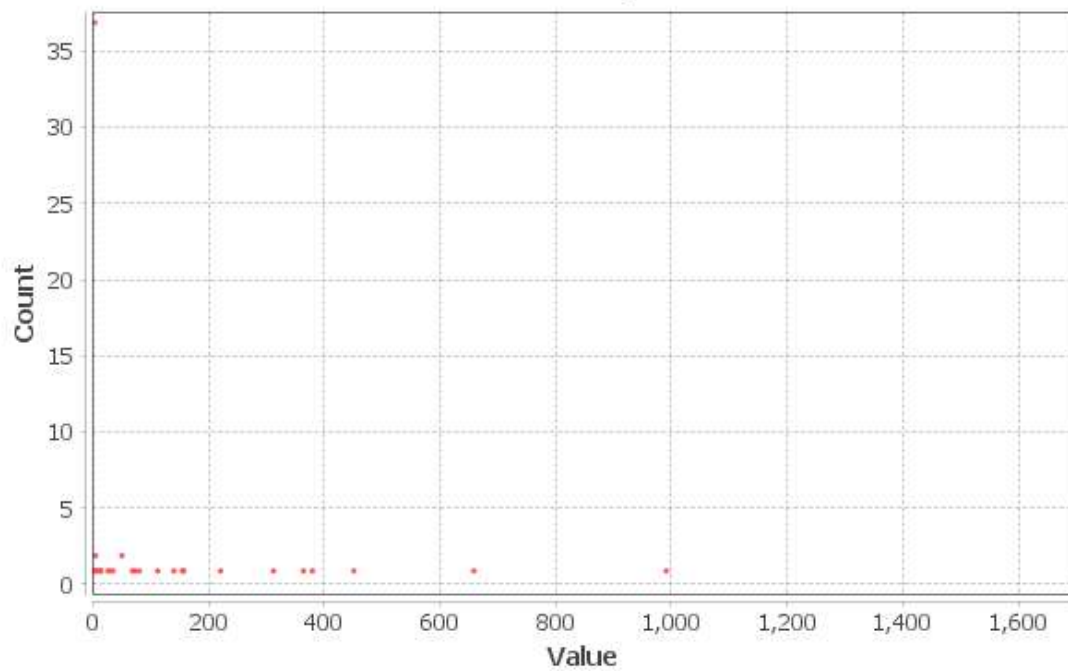

Print   Copy   Save   Close
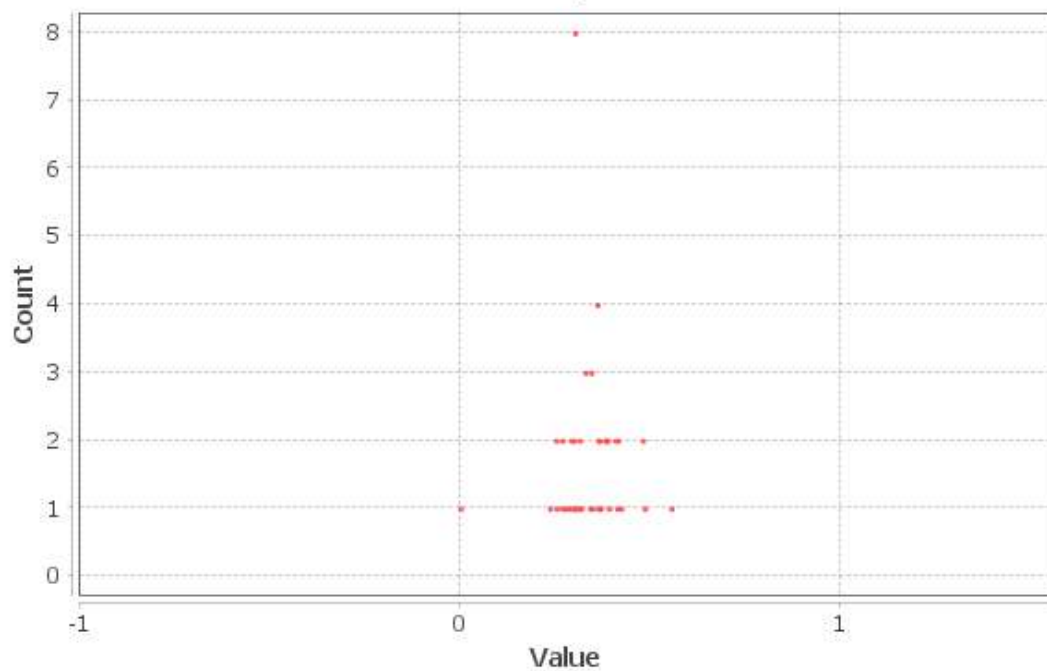
Betweenness & Closeness Centrality

Betweenness Centrality Distribution

Closeness Centrality Distribution

Connected Components

Results:

Number of Weakly Connected Components: 1
Number of Strongly Connected Components: 20

Size Distribution
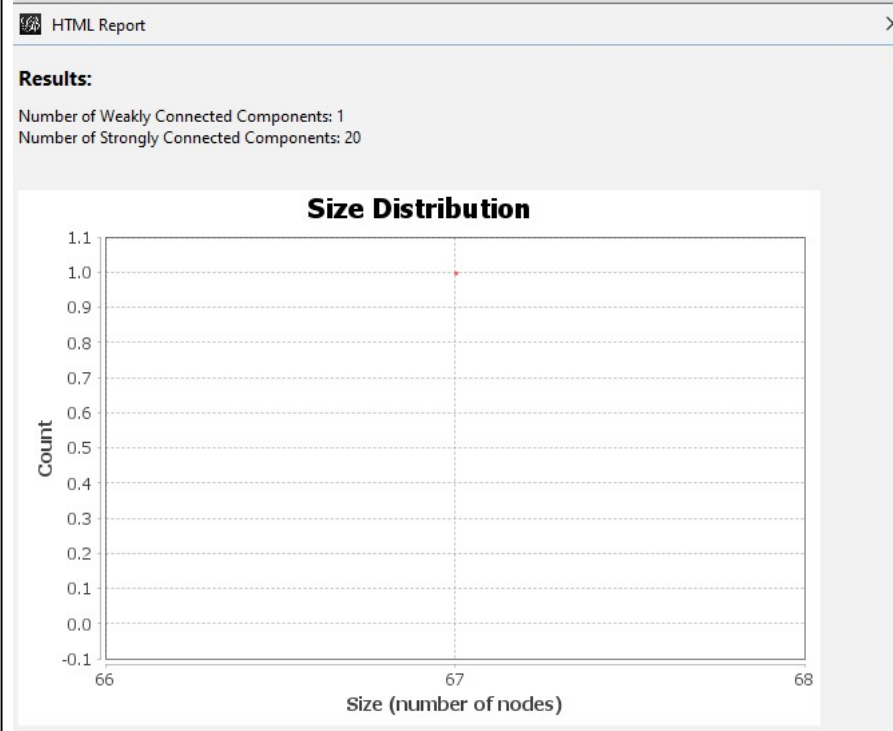
Simple Comparison Between the Non-Conspiracy Network and the 5G Conspiracy Network

1. Number of Users (Nodes) and Connections (Edges)

Non-conspiracy network:
Has more users and more connections.

5G conspiracy network:
Has fewer users and fewer connections.

So: The non-conspiracy network is bigger.

2. Average Degree (How many connections each user has)

Non-conspiracy:
Users have a normal number of connections.

5G conspiracy:
Users often have more connections with each other.

So: Conspiracy users interact more inside their group.

3. Density (How tightly connected the network is)

Non-conspiracy:
Not very dense. People are spread out.

5G conspiracy:
More dense. People interact more often.

So: The conspiracy network is more tightly connected.

4. Clustering (How much users group together)

Non-conspiracy:
Medium clustering.

5G conspiracy:
High clustering. Users stick together and repeat similar ideas.

So: Conspiracy users form stronger groups.

5. Modularity (Number of communities)

Non-conspiracy:
Has many different communities/topics.

5G conspiracy:
Has fewer communities, and they are very similar.

So: Non-conspiracy is diverse; conspiracy is focused on one topic.

6. Central Users (Most influential users)

Non-conspiracy:
Influence is spread between many users.

5G conspiracy:
A few users are very influential and spread the misinformation.

So: Conspiracy networks depend on a few strong "leaders."

7. Visualization (How the graph looks)

Non-conspiracy:
Looks wide, open, and spread out.

5G conspiracy:
Looks tight and centered, with many users around the same core group.

Final Simple Summary

The non-conspiracy network is bigger, more diverse, and more spread out.
The 5G conspiracy network is smaller, more connected, more clustered, and controlled by a few important users.