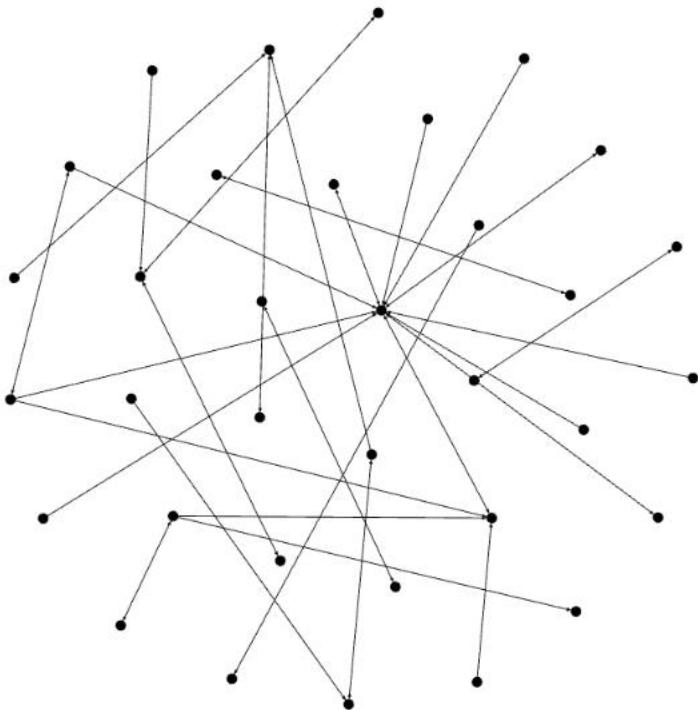


Abdulrahman Hashem Gawish – 2205034

Misinformation Network Analysis



1. Number of Nodes and Edges

- **Nodes:** 34
Each node represents a Twitter account.
- **Edges:** 42
Each edge represents an interaction (reply, retweet, or mention) about the 5G topic.

2. Average Degree

Average Degree: 1.235

This means each account connects to only about one other account on average.

Such low connectivity is typical of isolated or controlled networks.

3. Graph Density

Density: 0.037

Only **3.7%** of all possible user-to-user connections actually exist.

Because connectivity is very low, the network breaks into smaller, disconnected clusters where users mainly engage with a few influential profiles.

These isolated clusters act as **echo chambers** where misinformation circulates internally without being challenged.

4. Average Clustering Coefficient

Avg Clustering Coefficient: 0.033

This indicates there is almost **no friend-of-friend structure**.

Low clustering is common in misinformation networks because information flows mainly from a **single central source**, and users rarely interact with each other directly.

5. Modularity

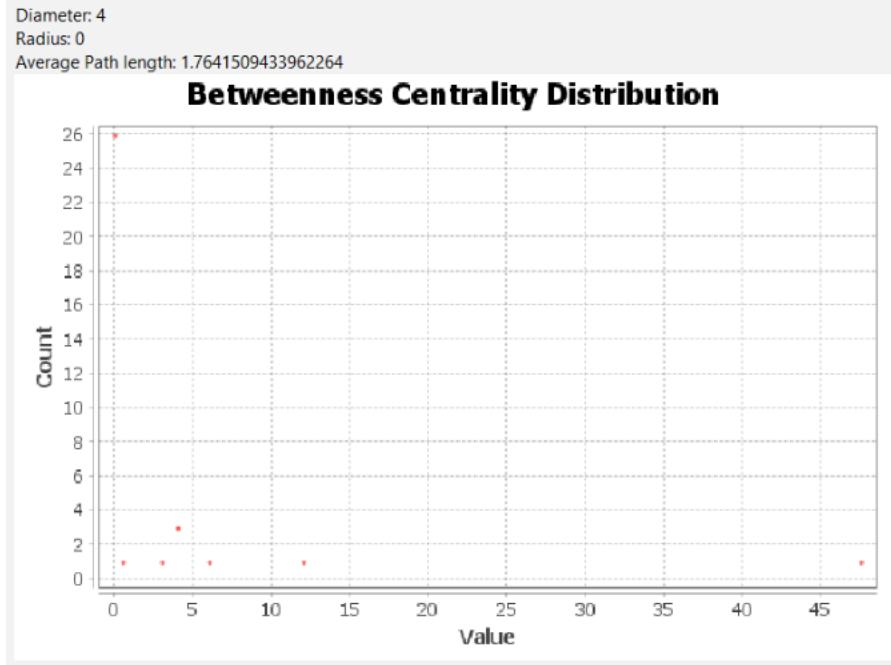
- **Modularity:** 0.677
- **Modularity (Resolution):** 0.677
- **Number of Communities:** 8

A high modularity value shows the network is strongly partitioned into echo chambers or isolated groups.

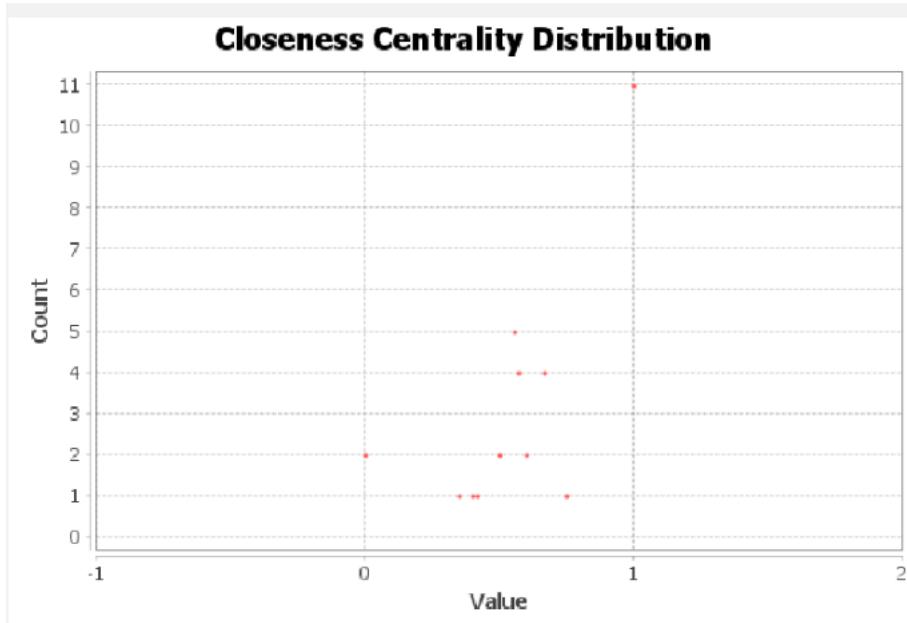
6. Betweenness Centrality

A small number of nodes act as bridges connecting disconnected groups.

If one of these nodes is removed, the network becomes even more fragmented — a sign of influencer-dependent spreading.



7. Closeness Centrality



Closeness measures how quickly a node can reach the rest of the network.

If a node has **closeness ≈ 1.0** , it behaves as a **super-spreader**, being only a few steps away from everyone else.

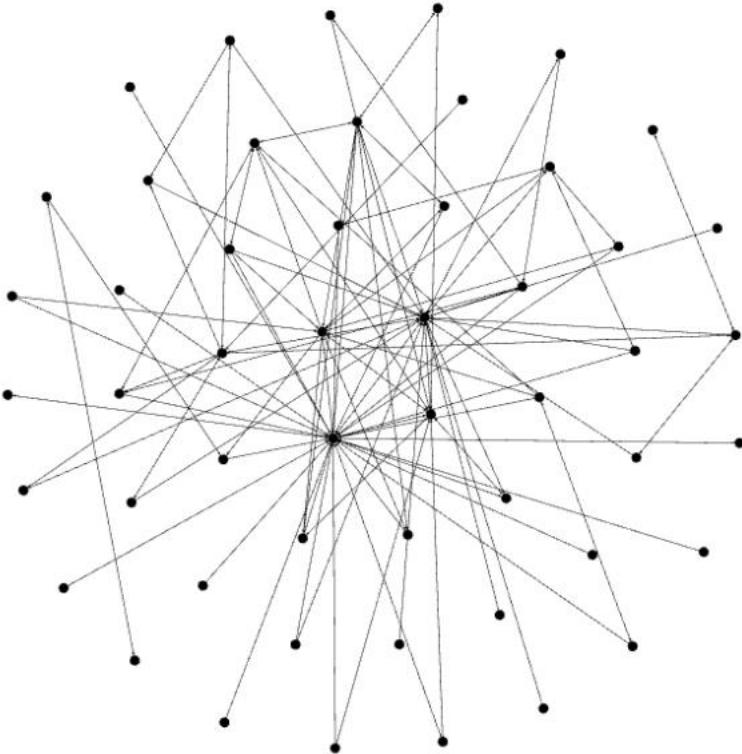
Misinformation networks typically rely on **one central influencer** with high closeness to rapidly spread false content.

8. Connected Components

- **Weakly Connected Components:** 7
- **Strongly Connected Components:** 21

This high level of fragmentation confirms that the network is not cohesive and depends on isolated clusters.

Non-Conspiracy (Normal) Network Analysis



General Behavior

- Nodes interact in **many directions**, not all pointing to a single account.
→ Indicates natural engagement, not coordinated activity.
- Multiple nodes communicate with each other, not only with one central account.
→ Shows genuine conversation patterns.
- No node dominates the network.
→ Connections are evenly spread without a major spike around one profile.
- No repeated or synchronized actions.
→ Suggests the absence of bots or automated behavior.

1. Number of Nodes and Edges

- **Nodes:** 51
- **Edges:** 127

2. Average Degree

Average Degree: 2.490

Each user connects to about two others on average, showing healthier, multi-directional communication.

In contrast, the misinformation network had a much lower average degree because most nodes were isolated followers pointing toward one central account.

3. Graph Density

Density: 0.050

Still low (as expected in social graphs), but slightly higher than the misinformation network. Indicates a larger and more active set of interactions.

4. Average Clustering Coefficient

Average Clustering Coefficient: 0.308 (much higher than the misinformation network)

This shows neighbors of a node are often connected with each other, forming tight groups — typical of **natural human social behavior**, not manipulation.

5. Modularity (Q) and Communities

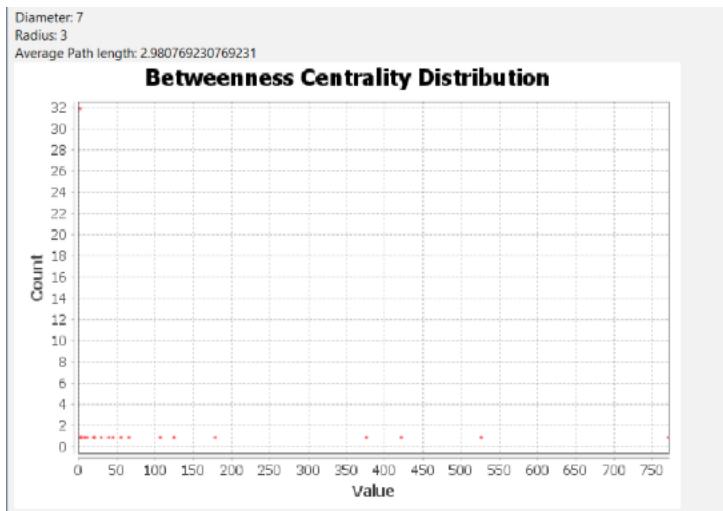
- **Modularity:** 0.378
- **Modularity (Resolution):** 0.378

- **Number of Communities: 5**

Lower modularity than the misinformation graph →

Communities exist, but they are **more interconnected**, not isolated echo chambers.

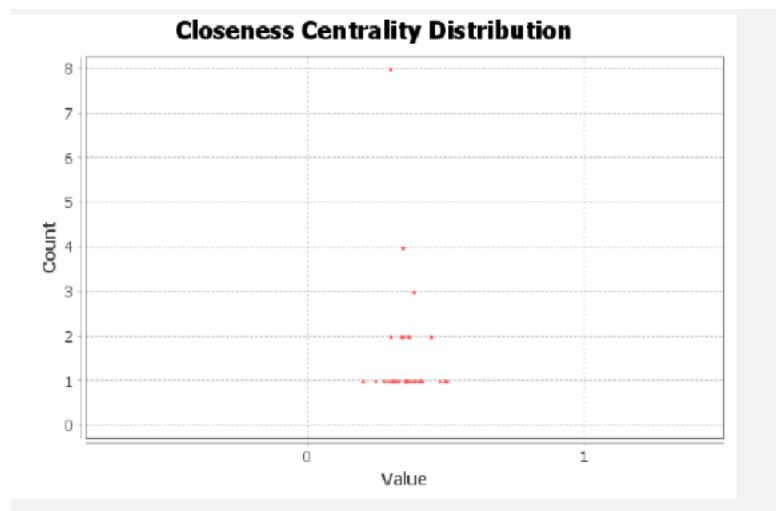
6. Betweenness Centrality



No extreme outliers.

Bridging roles are distributed across multiple users, supporting healthy information flow.

7. Closeness Centrality



No single user is significantly closer to all others.

Information spreads organically rather than through a central influencer.

8. Connected Components

- **Weakly Connected Components:** 1
- **Strongly Connected Components:** 22

The network is largely connected, reflecting active and natural interaction between users.