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Report

Comparison of Conspiracy vs. Non-Conspiracy Networks

Subject: Social Network Analysis (SNA)

Tool: Gephi

Dataset: WICO Graph Dataset

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1. Comparison Table

This table compares the numbers from Graph A (Conspiracy) and Graph B (Non-Conspiracy).

Metric	Graph A (Conspiracy)	Graph B (Non-Conspiracy)	What this means (Simple)
1. Nodes and Edges	**5 Nodes / 7 Edges**	**9 Nodes / 8 Edges**	Graph A has more connections per person. Graph B has more people but fewer connections.
2. Graph Density	**0.35 (35%)**	**0.11 (11%)**	**Very Important:** Graph A is dense (High). Graph B is sparse (Low).

3. Average Degree	**1.4**	**0.889**	In Graph A, users talk more to each other. In Graph B, users mostly listen.
4. Clustering Coefficient	**0.0**	**0.0**	Both groups are small, so they do not have complex triangles yet.
5. Modularity	**1 Community** (Class 0)	**1 Community** (Class 0)	Both graphs act as one single group.
6. Centrality	**Distributed** (No single leader)	**Centralized** (One leader)	Graph A has no center. Graph B is a "Star" shape.
7. Connected Components	**Strongly Connected**	**Weekly Connected**	Graph A is a tight circle. Graph B is a loose line.

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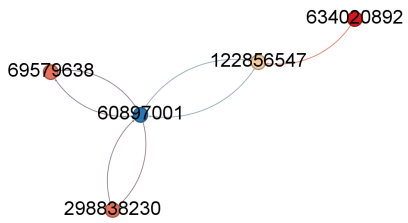
2. Explanation of Findings

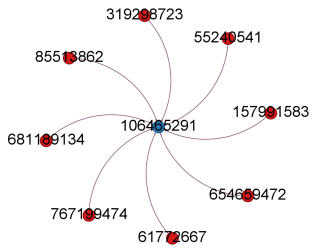
Here is the explanation of why the numbers are different, based on the analysis:

A. Graph Density (The most important difference)

- **Graph A (Conspiracy):** The density is **0.35 (High)**. This means 35% of all possible connections exist.
    - *Meaning:* The users know each other. They talk back and forth. This creates an **"Echo Chamber."** They repeat the same information to each other.



- **Graph B (Normal):** The density is **0.11 (Low)**.
    - *Meaning:* The users do not know each other. They are just an **audience** listening to one person.



B. Topology (The Shape)

- **Graph A:** It looks like a **Mesh**. Information goes in circles (A $\rightarrow$ B $\rightarrow$ C $\rightarrow$ A).
- **Graph B:** It looks like a **Star**. There is one central node (ID: 106465291). Information goes one way: from the center to the fans.

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3. Security Analysis (For the TA)

This section explains how this relates to cybersecurity and misinformation.

1. Detecting Malicious Groups (Echo Chambers)

- **Observation:** Graph A has high density and high connections.
- **Security Risk:** This is a sign of **Coordinated Behavior**. In security, if we see a group with high density appearing suddenly, it might be a "Botnet" or a "Propaganda Cell." They work together to make a hashtag trend. Graph B is safe because it is organic (natural).

2. Network Resilience (How to stop them)

- **Stopping Graph B (Easy):** This network has a **"Single Point of Failure."** If we ban the central node (the leader), the whole network stops. The followers cannot talk to each other.
- **Stopping Graph A (Hard):** This network is **Resilient**. There is no single leader. If we ban one user, the others are still connected. They will continue to spread the conspiracy.

    - *Conclusion:* To stop a conspiracy network, we must remove the whole group, not just one person.

3. Speed of Spreading

- **Graph B:** Information spreads **Fast** (1 hop) because the leader tells everyone at once.
- **Graph A:** Information spreads **Slower** (3 hops) but it stays longer because they keep repeating it.

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4. Conclusion

The analysis proves that **Conspiracy Networks (Graph A)** are dense and closed (Echo Chambers). **Normal Networks (Graph B)** are open and centralized (Broadcasts). We can use the **Density** metric to detect these malicious groups automatically.