Social Network Analysis Report – 5G Conspiracy vs Non-Conspiracy Graphs

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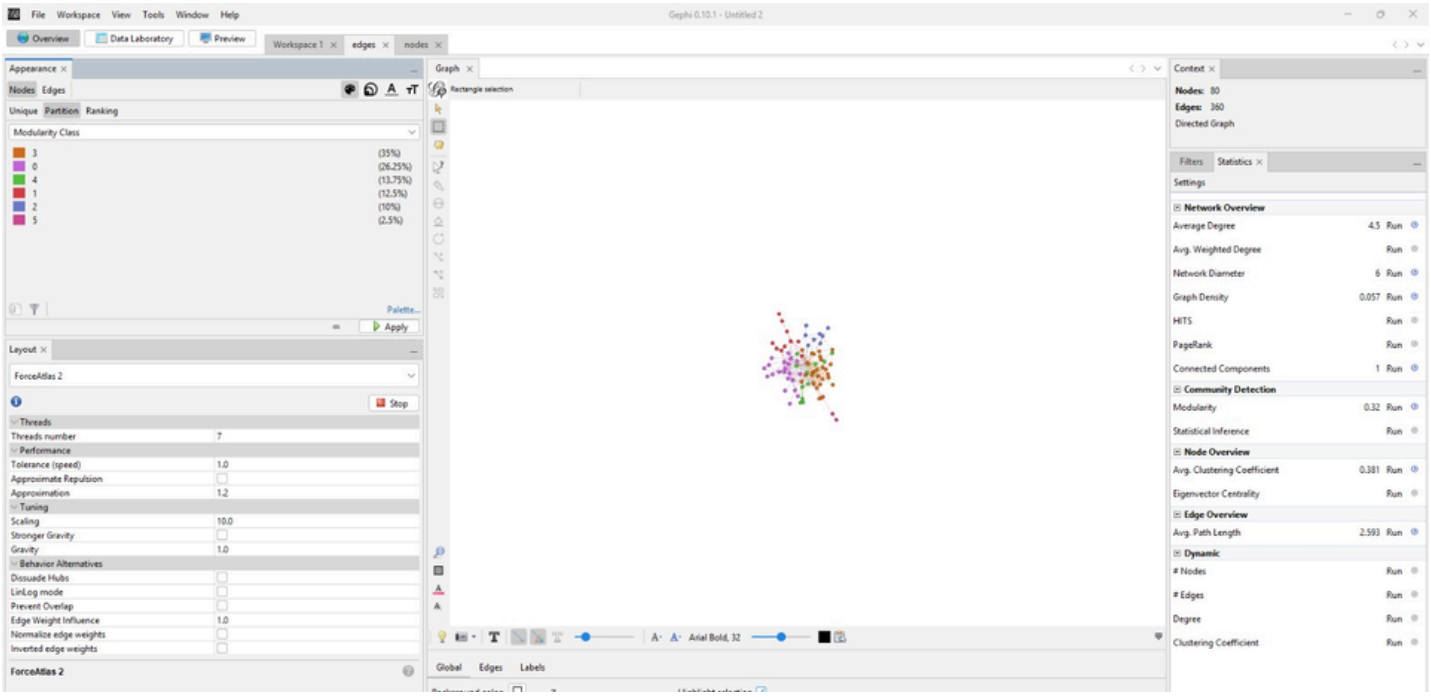
Introduction

This report analyzes and compares two Twitter subgraph communities from the WICO dataset using Gephi:

- A misinformation network from 5G_Conspiracy_Graphs.
- A normal/benign network from Non_Conspiracy_Graphs.

Both graphs were visualized using the ForceAtlas2 layout and evaluated using several social network metrics to understand how misinformation communities differ structurally from normal online communities.

Graph 1: 5G Conspiracy Network (Misinformation Cluster)



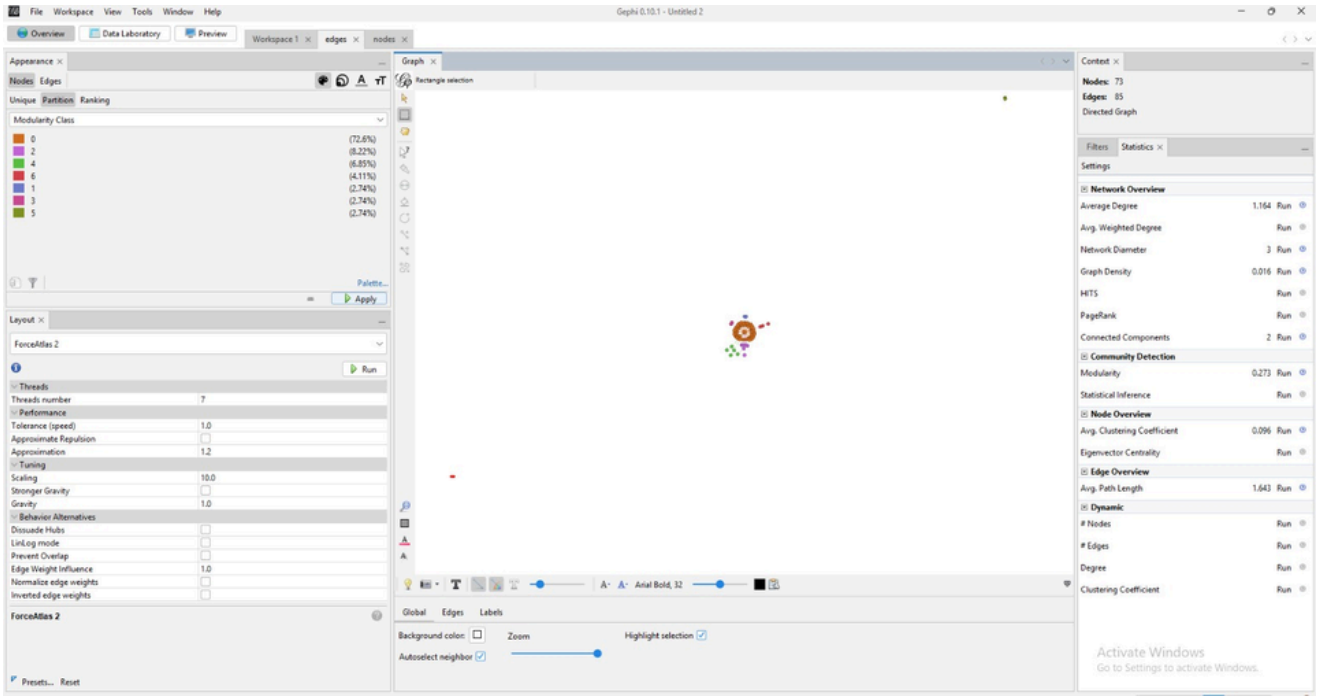
Statistics:

- Nodes: 80
- Edges: 360
- Average Degree: 4.5
- Graph Density: 0.057
- Average Clustering Coefficient: 0.381
- Modularity: 0.32 → 6 clear communities
- Connected Components: 1
- Average Path Length: 2.593

Interpretation:

- The high number of edges and high average degree indicate strong interactions among users spreading misinformation.
- The density (0.057) is relatively high, showing that users are more connected than typical Twitter communities.
- The clustering coefficient (0.381) indicates tight groups where nodes are connected to each other.
- Having only 1 connected component shows that all users are part of one large conversation or rumor chain.
- Modularity (0.32) with 6 communities shows strong internal connectivity within the misinformation network.

Graph 2: Non-Conspiracy Network (Benign Cluster)



Statistics:

- Nodes: 73
- Edges: 85
- Average Degree: 1.164
- Graph Density: 0.016
- Average Clustering Coefficient: 0.096
- Modularity: 0.273 → 8 small communities
- Connected Components: 2
- Average Path Length: 1.643

Interpretation:

- The low number of edges and very low average degree show weak interaction among users.
- The density (0.016) is low, meaning most users are not connected.
- The clustering coefficient (0.096) shows limited group formation.
- The presence of 2 connected components indicates split conversations.
- Modularity (0.273) suggests small, loosely connected communities.

Comparative Analysis

Connectivity:

The misinformation graph is strongly connected (1 component), while the benign graph is fragmented (2 components).
This means misinformation can spread faster since all nodes belong to one conversation.

Interaction Level:

The conspiracy graph has an average degree of 4.5, while the benign graph has 1.164.
This shows much higher interaction in the misinformation network.

Structure:

The conspiracy graph is dense and highly clustered.
The benign graph is sparse and less coordinated.
Misinformation communities behave like tight groups supporting the same narrative.

Community Formation:

Conspiracy network: 6 medium communities.
Benign network: 8 small communities.
Normal discussions are scattered, while misinformation networks show higher organization.

Information Flow:

The misinformation graph has a structure that supports faster information spreading due to high connectivity and clustering.

Conclusion

Misinformation networks have stronger, denser, and more organized structures than normal Twitter discussions.
They show higher connectivity, more clustering, more coordinated communities, and faster potential information flow.
The benign graph is fragmented, sparse, and less interactive, with weaker community structure.