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Social Network Analysis Report

1. Introduction

This report analyzes and compares two Twitter subgraphs processed in Gephi—one representing a **5G Conspiracy (Misinformation)** network and one representing a **Normal Social Network**. The objective is to understand how structural differences (Nodes, Edges, Modularity, etc.) reflect the spread of information in conspiracy circles versus normal online interactions.

2. Overview of Selected Graphs

- **Misinformation Cluster (5G_Conspiracy_Graph):** Represents a network discussing 5G conspiracy theories.
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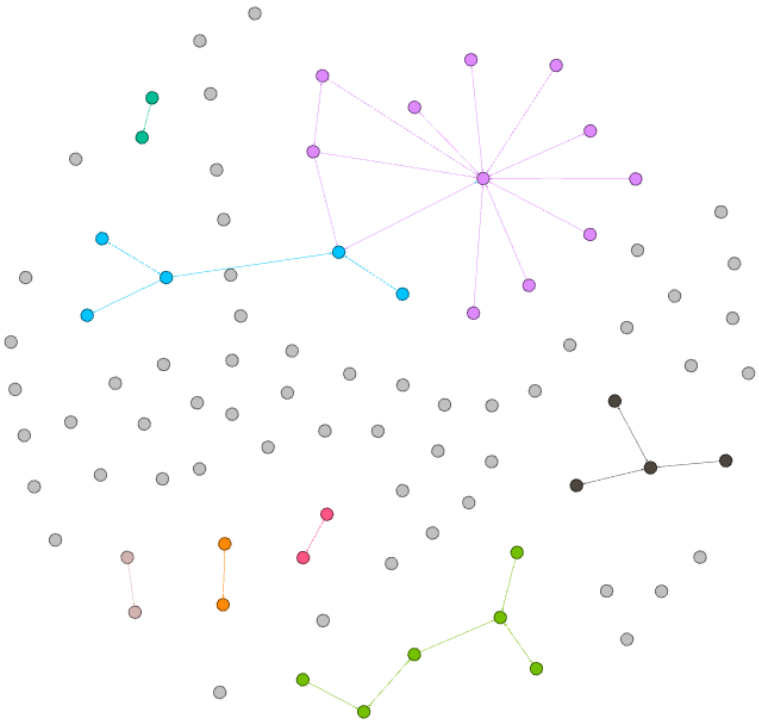
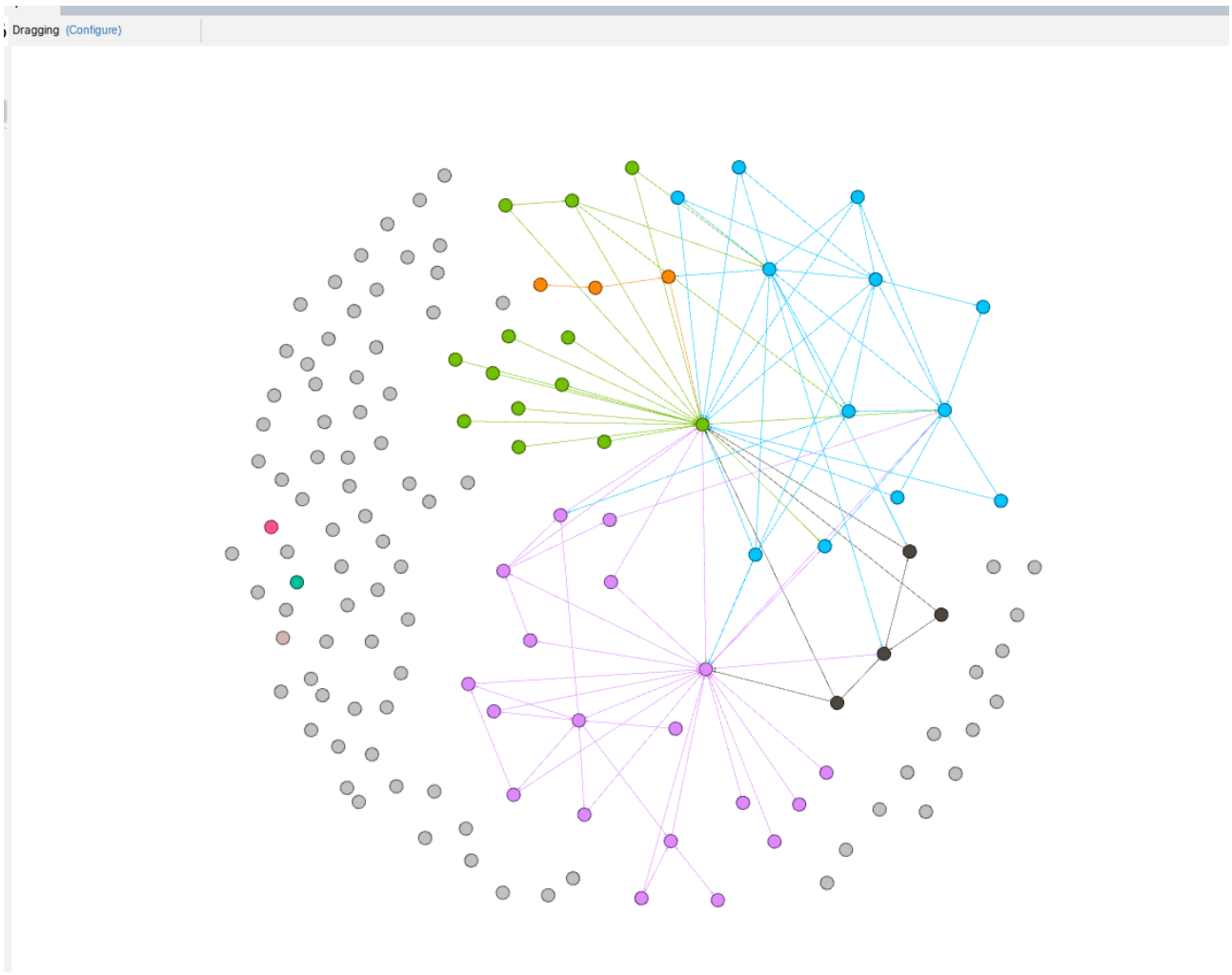
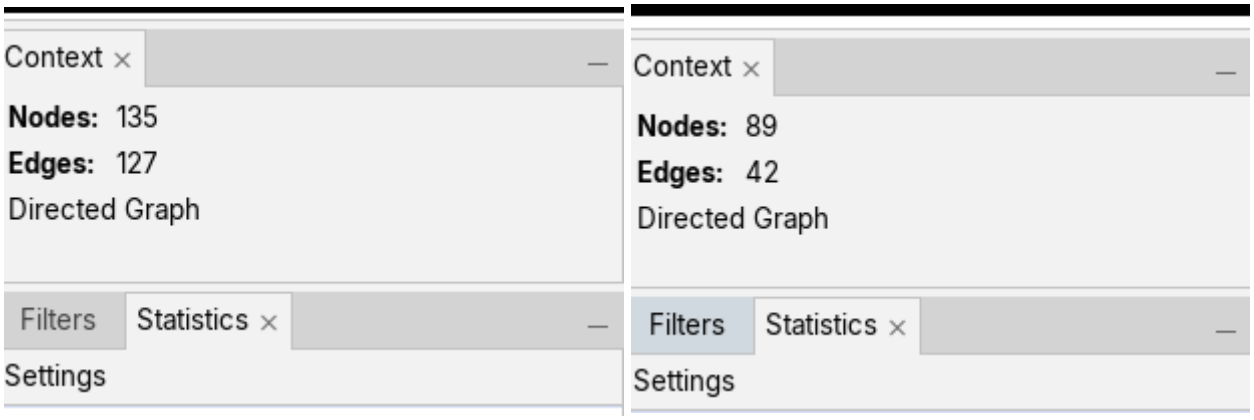


Normal Cluster (Normal_Social_Network): Represents a baseline network of normal social interactions.

- 

3. Network Statistics



Metric	5G Conspiracy Graph (Misinformation)	Normal Social Network (Normal)
Number of Nodes	89	135
Number of Edges	42	127
Average Degree	0.472	0.941

Metric	5G Conspiracy Graph (Misinformation)	Normal Social Network (Normal)
Graph Density	0.005	0.007
Modularity	0.885	0.388
Network Diameter	4	7
Average Path Length	1.764	2.981
Connected Components	62	*(Not explicitly listed, but visually lower)*

4. Interpretation of Results

4.1 Degree Metrics and Connectivity

The **Normal Social Network** shows a significantly higher level of interaction compared to the conspiracy graph.

- **Normal Graph (Avg Degree 0.941):** With nearly 1 edge per node, and a ratio of edges to nodes (127/135) that is close to 1:1, this network shows established relationships and information exchange.
- **Misinformation Graph (Avg Degree 0.472):** The degree is extremely low (less than 0.5). With only 42 edges for 89 nodes, more than half of the network consists of isolated actors who are not interacting with anyone.

4.2 Density

- **Normal Graph (0.007):** While still sparse (common in social networks), it is slightly denser than the conspiracy graph.
- **Misinformation Graph (0.005):** The extremely low density confirms that this is not a community, but rather a collection of disconnected individuals broadcasting without engagement.

4.3 Modularity and Community Structure

This is the most distinct difference between the two graphs:

- **Misinformation Graph (Modularity = 0.885):** A very high modularity score indicates extreme fragmentation. The network is broken into tiny, disconnected islands (as

seen in the visualization). There is no "central discussion"; instead, there are isolated echo chambers or individual accounts shouting into the void.
- **Normal Graph (Modularity = 0.388):** A moderate modularity score is typical for healthy social networks. It indicates the presence of distinct communities (the different colored clusters in the visualization) that are still linked to the larger whole.

4.4 Diameter & Average Path Length

- **Normal Graph (Diameter 7, Path Length 2.98):** A larger diameter and longer path length indicate a connected structure where information can travel across the network through multiple hops (friends of friends).
- **Misinformation Graph (Diameter 4, Path Length 1.76):** The numbers are deceptive here. The diameter is small not because the world is "small," but because the connected components are tiny. Information cannot travel far because the road ends quickly.

4.5 Visual Analysis (Components)

- **5G Conspiracy:** The visual output shows mostly grey, unconnected nodes (isolates) and a few small "star" patterns (one person speaking to a few others, but those listeners don't speak to each other).
- **Normal Network:** The visual output shows a "Giant Component"—a large, colorful, interconnected web where the majority of nodes are linked together. This represents a functional social environment where discourse happens.
