Social Network (WICO Graph Dataset)

1. Purpose of the Study

This report examines two Twitter subgraphs from the **WICO Graph Dataset** to understand how structural properties differ between:

- A **misinformation-oriented network** (5G_Conspiracy_Graph)
- A **normal interaction network** (Non_Conspiracy_Graph)

By comparing their metrics, we highlight how misinformation tends to spread in fragmented and weakly connected structures.

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2. Description of the Networks

2.1 Misinformation Network

The 5G conspiracy subgraph shows a scattered collection of accounts with minimal interconnection.

Most nodes form isolated or nearly isolated points, suggesting limited reciprocal interaction and possible automated behavior.

2.2 Normal Interaction Network

The non-conspiracy subgraph appears more cohesive, with clusters of nodes forming denser interaction zones.

This indicates active exchanges and multi-directional communication between users.

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3. Quantitative Network Metrics

3.1 Basic Size Metrics

Metric	Misinformation Graph	Normal Graph
Nodes	89	58
Edges	42	127

3.2 Structural Density & Degree

- **Average Degree:**
  - Misinformation: **0.472**
  - Normal: **2.190**
- **Graph Density:**
  - Misinformation: **0.005**
  - Normal: **0.038**

The normal network shows significantly richer interactions.

3.3 Clustering Behavior

- **Clustering Coefficient:**
  - Misinformation: **0.012**
  - Normal: **0.271**

The normal network forms cohesive triads, unlike the conspiracy network.

3.4 Community Structure

- **Modularity:**
  - Misinformation: **0.685**
  - Normal: **0.396**
- **Number of Communities:**
  - Misinformation: **63**
  - Normal: **13**

The misinformation network is far more fragmented.

3.5 Connectivity

- **Weakly Connected Components:**
  - Misinformation: **62**
  - Normal: **8**
- **Strongly Connected Components:**
  - Misinformation: **76**
  - Normal: **29**

3.6 Path Characteristics

- **Diameter:**
  - Misinformation: **4**
  - Normal: **7**
- **Average Path Length:**
  - Misinformation: **1.764**
  - Normal: **2.980**

The misinformation network spreads information quickly through simplified, shallow paths.

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4. Interpretation of Findings

4.1 Interaction Levels

The normal network features multi-node conversations, while the misinformation network shows mostly one-directional or minimal interactions.

4.2 Density and Engagement

Higher density in the normal graph suggests active user engagement.

The extremely low density in the misinformation graph aligns with bots or broadcast-style posting.

4.3 Community Fragmentation

The large number of small communities in the conspiracy network indicates isolated pockets with little cross-communication.

4.4 Connectivity Patterns

The misinformation graph’s numerous disconnected components reflect a lack of cohesive discussion or debate.

4.5 Information Flow

Shorter paths and a smaller diameter in the conspiracy network point to rapid, shallow dissemination of content.

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5. Conclusion

Overall, the **normal Twitter network** demonstrates healthy interaction, clustering, and community integration.

In contrast, the **misinformation network** is marked by fragmentation, low engagement, and minimal reciprocal communication—patterns commonly associated with the spread of misleading or automated content.