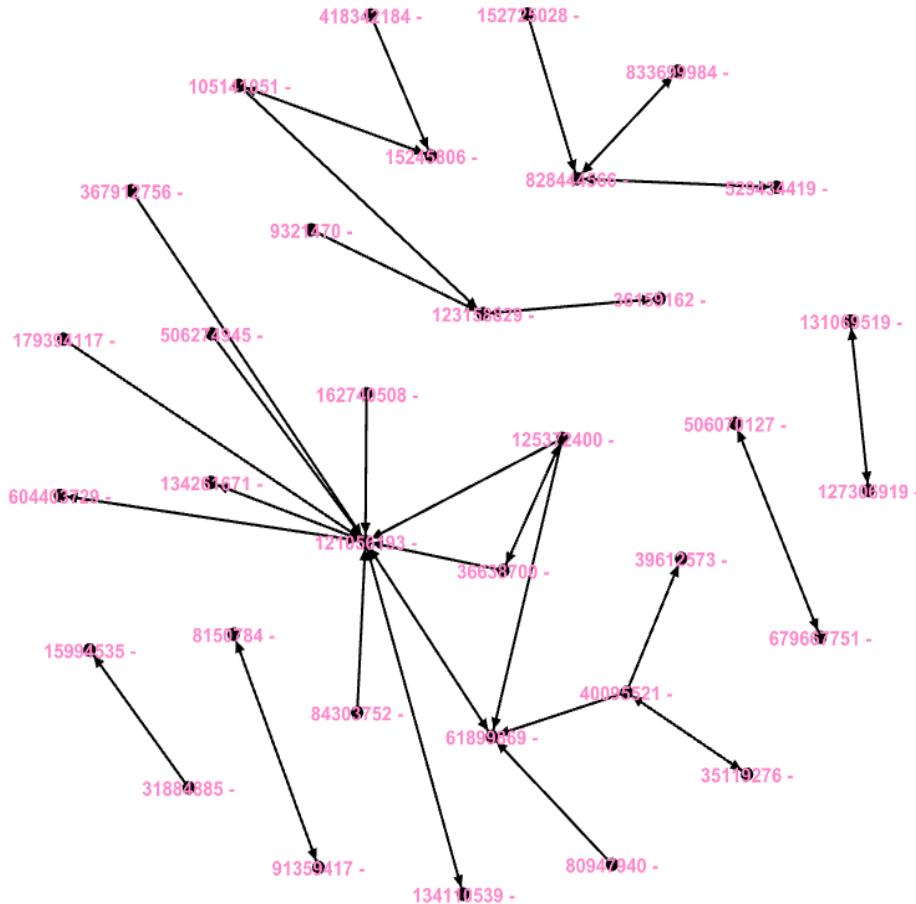


## 1. Misinformation network:



### 1. Number of nodes and edges

- Nodes = 34
- Edges = 42
- Each node = a Twitter account.
- Each edge = an interaction (reply / retweet / mention) about the 5G topic.

### 2. Average degree

- Average degree  $\approx 1.235$
- On average, each account connects to about one other account only.
- Most users do not talk to several others. They interact with just one main account or a single neighbor.

### 3. Graph Density

- Density = 0.037
- Only about 3.7% of all possible connections between users actually exist.
- The network is sparse.
- Most users are not connected to each other. They are only connected to a few specific nodes.

Low density is common in misinformation networks because people don't talk to many others.

Instead of one big connected conversation, the network breaks into small, separated groups (**echo chambers**) that listen to only a few key accounts.

Since these groups are isolated, the false ideas stay inside them and rarely reach people who could correct them.

### 4. Average clustering coefficient

- 0.033 (almost zero)
- This means that there is no friend-of-friend structure

This is a signature of:

- ✓ botnets
- ✓ fake followers
- ✓ broadcast networks (misinformation spread)

Low clustering is a strong indicator of misinformation because misinformation networks do not rely on peer-to-peer discussion. Instead, a single central account broadcasts content and many users amplify it without interacting with each other.

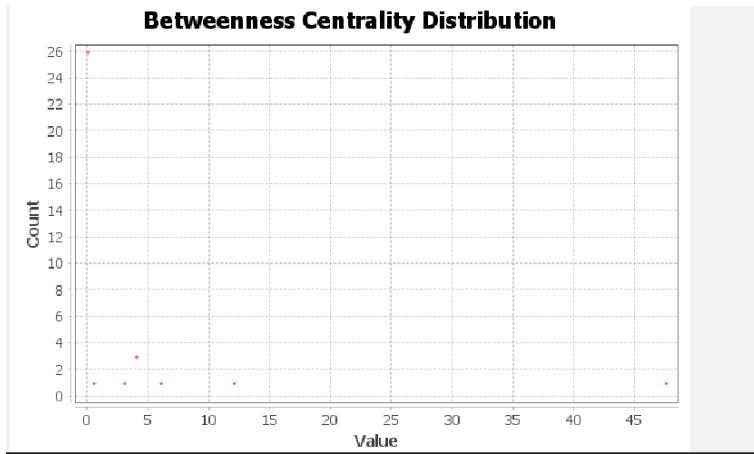
### 5. Modularity (Q)

Modularity measures how strongly a network splits into separate communities.

The misinformation graph shows a high modularity score (**Q = 0.677**) with eight distinct communities. This indicates that the network is highly fragmented into multiple isolated clusters. Users interact mainly within small groups and share little communication with other parts of the network. Such fragmentation is a known characteristic of misinformation ecosystems, where content spreads inside echo chambers rather than through open, interconnected social interaction.

### 6. Betweenness Centrality

- One node has very high betweenness (~47)
- Most other nodes have betweenness close to 0–3



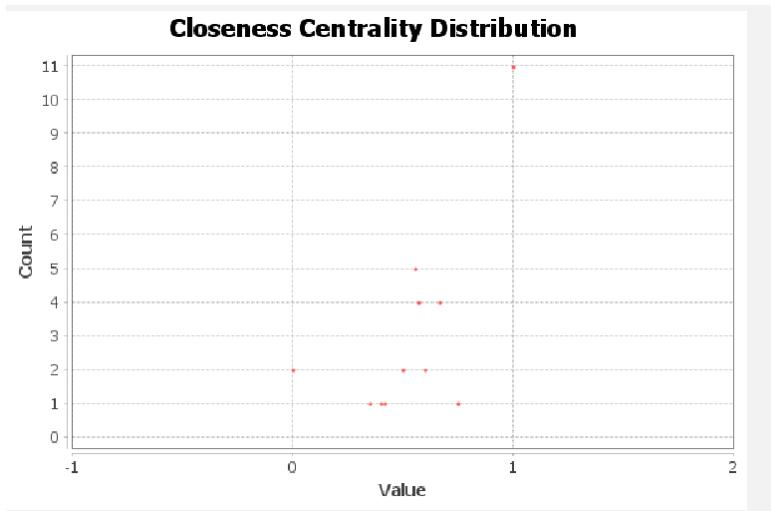
- The high-betweenness node (ID 121056193) sits between many other users on the shortest paths.
- It acts as a bridge between different parts of the network.
- If this node is removed, the graph would split into several separated components.

Relation to misinformation

- This node is the central influencer.
- Many users depend on it to get and pass on the content.

## 7. Closeness Centrality

It tells how quickly a node can reach all other nodes in the network.



One node has closeness ≈ 1.0, That is the super spreader node.

Meaning:

- This node is very close to all other nodes.
- It needs fewer hops to reach anyone else.

Misinformation networks often rely on a single central influencer so this node can spread misinformation easily.

## 8. Connected Components

- Weakly connected components = 7
- Strongly connected components = 21

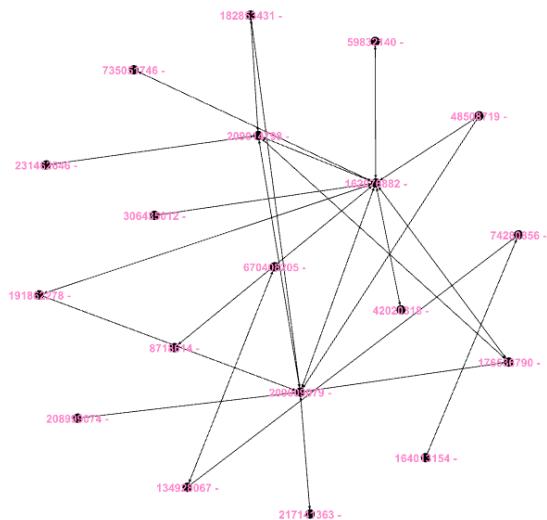
This means that the network is highly fragmented.

- followers do not interact with each other
- accounts only connect to the main influencer
- tiny groups act as echo chambers

## Botnets and Fake Followers in the Network

This network shows signs of bot-like or fake follower activity. Several nodes appear in very small, isolated pairs (for example: 159906535 → 318804885). These accounts do not interact with anyone else and only point toward a single target.

## 2. Non-Conspiracy Graph:



- Nodes interact in many directions, not all pointing to one account.  
This means people are replying and engaging naturally, not being controlled.
- Several nodes talk to each other not just to one central user.  
This shows real conversation
- Connections are spread out, with no huge spike in activity around a single node.  
This is what normal human interaction looks like.
- No repeated patterns (like many accounts doing the same action).  
That means no bot behavior.

## 1. Number of nodes and edges

- Nodes = 19
- Edges = 39

## 2. Average degree

- Average degree  $\approx 2.053$
- Nodes interact more normally. Each user connects to about 2 others on average.

-> The misinfo graph had a lower average degree because most nodes were isolated followers pointing to one central account. That is typical of echo chambers and bot behavior.

## 3. Graph Density

- Density = 0.114
- This network is more connected, 11% of all possible connections exist.

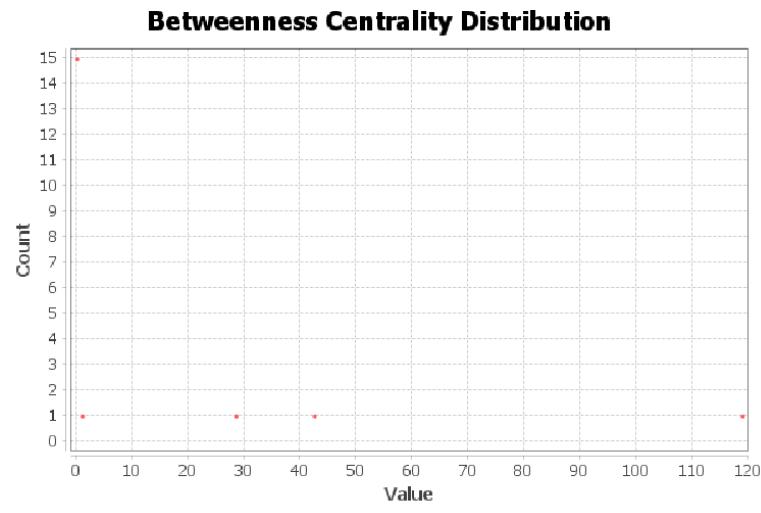
## 4. Average clustering coefficient

- 0.245 (greater than misinformation network)
- neighbors of a node often know each other
- this looks like real conversations

## 5. Modularity (Q) and community count

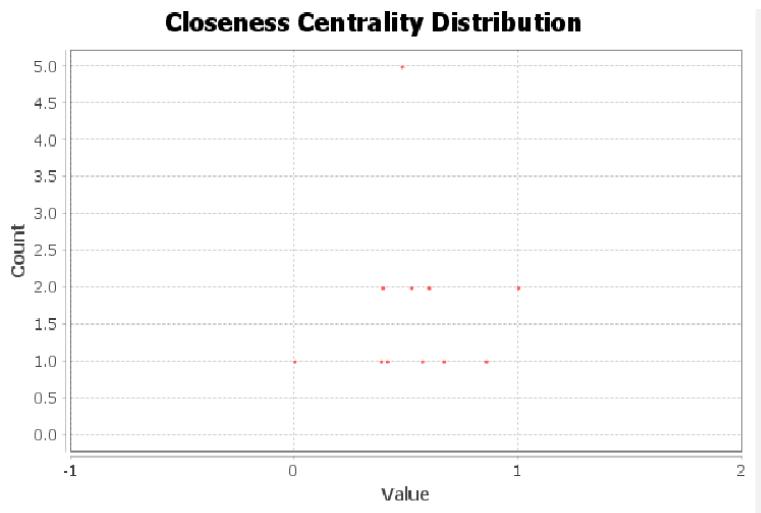
- Modularity: 0.379 (lower than missinformation network)
- Communities: 4
- communities exist, but they are not extremely separated
- they still interact with each other

## 6. Betweenness Centrality



Some nodes in the normal network show high betweenness because they act as natural bridges between different parts of the graph. This is typical in real social interaction, where one or two users often connect multiple groups together. Unlike the misinformation network, the high betweenness here does not come from fake follower patterns or isolated echo chambers it comes from natural communication flow between communities.

## 7. Closeness Centrality



- Values spread between 0.4 and 1.0, with no extreme zeros.

Meaning:

- nodes are reachable
- no one is isolated
- information flows smoothly

## 8. Connected Components

Normal graph:

- Weakly Connected Components = 2
- Strongly Connected Components = 6

Misinformation graph:

- Weakly = 7
- Strongly = 21

Only 2 weakly connected components means the network is mostly connected.

Six strongly connected components means:

some subgroups exist but they still interact (no massive fragmentation)