Project Overview

This project is focused on analyzing a network graph representing scientific collaborations. Utilizing graph theory principles, I explore and analyze the connectivity and centrality of researchers within the network. The tool aims to identify key scientists, understand collaboration patterns, and discover community structures within the scientific community.

Objectives

The main objectives of this project are:

- Node Degree Analysis: Calculate the connectivity degree of each researcher to identify highly connected individuals and those with fewer collaborations.
- Mean/median of how each scientist has collaborated

Methodology

The project employs a structured approach:

1. Data Collection: Collect data on scientific collaborations, detailing which researchers have co-authored papers together.
2. Graph Construction: Build a graph where nodes represent researchers and edges represent co-authorship between them.
3. Degree distribution Analysis: Analyze the computed metrics to identify prominent researchers and examine the structure of scientific collaboration.

Results

From the network analysis, I obtained the following insights:

- Degree Distribution:
    - Most connected (Top 1%): [21012, 21281, 12365, 22691, 9785, 6610, 21508, 17655, 2741, 19423, 15003, 14807, 15244, 12781, 7956, 1653, 25346, 773, 4164, 23293, 25758, 24955, 3372, 11241, 6512, 45, 21847, 570, 12496, 2212, 18894, 20635, 22887, 14540, 6179, 17692, 15659, 11472, 13801, 6830, 19961, 20108, 2952, 4511, 20562, 12851, 8879, 13929, 18866, 4513, 10350, 14766]

        - Least connected (Top 1%): [22435, 7055, 23480, 15422, 18151, 21288, 5548, 24732, 3748, 13481, 7590, 3946, 14132, 14498, 23138, 17191, 1050, 9922, 82, 9130, 11892, 25112, 15665, 25852, 20233, 22645, 25668, 23248, 11842, 19712, 14154, 12749, 10468, 25231, 5119, 15718, 8717, 16729, 22976, 17174, 5361, 25856, 11583, 1187, 7588, 1551, 22244, 21588, 20317, 4272, 4196, 22031]
- Mean/ media:
    - The mean degree of the graph is 11.06
    - The median degree of the graph is 6

Conclusion

This project highlights the utility of network analysis in deciphering complex structures and relationships within scientific collaborations. The insights into how researchers collaborate can aid in understanding the dissemination of ideas, the formation of scientific thought schools, and the evolution of research fields. Moreover, this analysis can assist funding agencies, academic institutions, and policy-makers in making informed decisions to foster innovation and collaboration in science.