Friendship Network Analysis

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**1. Introduction**

This project explores the analysis of friendship networks through matrix representation. Utilizing a matrix to denote friendships and their strengths, we convert this representation into a graph to examine various network characteristics. This methodology allows for an insightful exploration into network dynamics, including connectivity and relationship intensities.

**2. Objectives**

* To apply matrix representation for the analysis of friendship networks.
* To calculate and interpret network metrics such as total friendships, most popular individuals, isolated members, and average friendship strength.
* To demonstrate the utility of ***NumPy***, ***NetworkX, and Matplotlib***in a social network analysis.

**3. Methodology**

The methodology involves representing friendship networks as matrices using the **NumPy** library in Python. These matrices are then converted into graphs with the **NetworkX** library for analysis. From that analysis, **Matplotlib** allowed the visual representation of the graph. This approach facilitates the calculation of key network metrics, providing insights into the social structure represented by the network.

**4. Program Description**

The program uses a matrix where zeros indicate no friendship and integers (1-10) represent the strength of friendships. This matrix is then transformed into a graph to analyze the network. Key metrics such as total friendships, the most popular person, isolated individuals, and average friendship strength are calculated to evaluate the network's characteristics.

A group of people's names connected to each other

Description automatically generated**5. Results Analysis**

* **Total Friendships:** 7, indicating the presence of seven distinct friendship connections within the network.
* **Most Popular Person:** Zach, who has connections with four other individuals (Jeff, Molly, Michael, Artie), making him the most central node in this network.
* A group of names on a white background

  Description automatically generated**Isolated Individuals:** Ryan, who does not have any connections with other members, highlighting a completely detached individual within the network.
* **Average Strength of Friendships:** Approximately 6.14, suggesting moderately strong relationships among the network members overall.

These results provide a comprehensive view of the network's structure, emphasizing Zach's pivotal role and the relatively strong bonds formed between members.

**6. Conclusion**

The findings from this project illustrate a dynamic friendship network characterized by a variety of relationship strengths and one isolated member. The prominent role of Zach as a central figure demonstrates the effectiveness of using matrix representation to uncover key social dynamics within a network. While the results shed valuable light on the network's structure, they also highlight the simplicity of the model and the complexity of real-world social dynamics that might not be fully captured by this analysis.

**7. References**

* [NumPy Documentation](https://numpy.org/doc/stable/reference/generated/numpy.matrix.html)
* [Networkx Documentation](https://networkx.org/documentation/stable/tutorial.html)
* [Matplotlib Documentation](https://matplotlib.org/stable/api/_as_gen/matplotlib.pyplot.plot.html)