

The paper "The Friendship Paradox: An Analysis on Signed Social Networks with Positive and Negative Links" by Catherine Yang, Yuying Zhao, and Tyler Derr explores the Friendship Paradox (FP) and its generalized version (GFP) within the context of signed social networks that include both positive and negative relationships. Traditional studies on FP and GFP focus primarily on positive relationships, where an individual's friends tend to have more friends than the individual. This paper extends the concept to signed networks, proposing new metrics to capture the nuances introduced by negative relationships (e.g., foes).

The authors introduce first-order and second-order signed neighbor metrics to analyze these networks. The first-order metric considers the traditional FP in the context of both positive and negative links, examining how an individual's friends and foes compare to their neighbors' friends and foes. The second-order metric delves deeper by analyzing the relationships between an individual's friends and their foes, and vice versa. The study includes empirical analyses using datasets from various real-world signed networks, such as Bitcoin Alpha, Wiki Elections, Slashdot, Epinions, and a Honduras village network.

The results reveal that the Friendship Paradox extends to signed networks, with significant insights into how negative relationships interact with positive ones. For instance, individuals are more likely to have friends with more friends and foes with more foes. However, the nature of negative relationships introduces variations not seen in purely positive networks, emphasizing the complexity of social interactions. The study concludes by highlighting the importance of considering both positive and negative links in social network analyses and suggests avenues for further research, including the incorporation of edge weights to account for relationship strength.