The COMAP competition is an annual international mathematical modeling competition held in February. Every year there are three problems contestants can choose from with one of them being an interdisciplinary problem. This year, the interdisciplinary problem concerned networking science, charging the participants with the task of developing an algorithm to apply to a network of authors to determine which one is most influential within that network (see attached prompt).

In the digital world we live in today, with the constant flow of information between people, businesses, countries, etc. made possible by the leaps and bounds we have made in technology, analyzing and visualizing these webs of interactions has recently become a hot topic in mathematics. The ability to study and quantify relationships, whether in biological processes, social media, or the publishing network of mathematicians, can reveal many exciting things, and the advancement in technology has also aided us in this area. Combining mathematics with this new technology, a preliminary algorithm has been developed during the COMAP competition to determine the most influential mathematician in what we have labeled as the "Erdos1" network (see attached data sample). The goal is to create an algorithm to predict the most influential member of a network, and optimize its generality, accuracy, and ease of application.

This project will contain elements of computer science, particularly data manipulation, and both applied and pure mathematics when looking at the theory of how to construct a relevant mathematical model and consequently solve it for a prediction.

Ideally, the algorithm would work as follows:  
Data has already been collected (this is the network. Authors and their papers)

There will be information for each node (their articles) to be thought of as attributes (research importance). The more attributes the more accurate. Hopefully it’ll be general enough to handle multiple attributes.

These attributes will be ranked with our first algorithm, which is nested in our main one.

These will result in weights for each node, which will be combined ( and perhaps weighted) to give each node a weight within the network.

Our main algorithm will then predict the most influential “node” given their attributes and structure of network. Emphasize this nestedness

Before continuing further, our vocabulary must be established, as it will be seen throughout the rest of the text.

Merit of Collaboration

Distinct Contribution of each person

What happens if one can't complete