# Abstract

This is a study on the idea of discovering the most influential nodes in social networks based on the *Authority Discovery* model proposed by a notable research published in 2011 [1]. The paper takes advantage of statistical and data mining techniques to find an efficient set of nodes that if provided with information bits, would maximizes the spread of information throughout a network. In our work, we implement their proposed method called *RankedReplace*, and deploy that in a desktop application called *MOST DESIRED* that we developed as an experimental tool. Using this application, one can visualize a desired network in a graphical panel, adjust the size of the requested set of nodes that they want to be discovered, run the algorithm on it and observe the illustration of the most influential nodes and analyze them.

The second main goal of this work is to evaluate the effectiveness of the `RankedReplace` method not in maximizing the spread but in protecting the network against the spread. To this end, we designed an experiment in our application that "vaccinates" a selected group of most influential nodes against an "infection". We then compared the number of infected nodes in the network with a similar situation in which we vaccinated a different group, i.e. the greatest degrees nodes. We did so to decide whether or not protecting the set of the most influential nodes discovered by the approach in the literature could be a reliable selection in minimizing the damages done to a network.

The result of the experiment confidently indicates that the selection of nodes discovered by *RankedReplace* method should not be used in any tasks in which the protection of the network is desired.

**Keywords:** Data Mining - Network Mining - Virus Spread - Most Influential Nodes - Network Protection - Flow Authorities Model