"The Degree Ratio Ranking Method for Directed Networks" (joint work with René van den Brink)

Abstract:
One of the most famous ranking methods for digraphs is the ranking by Copeland score. The Copeland score of a node in a digraph is the difference between its outdegree (i.e. its number of outgoing arcs) and its indegree (i.e. its number of ingoing arcs). In the ranking by Copeland score a node is ranked higher, the higher is its Copeland score.
In this paper, we deal with an alternative to rank nodes according to their out- and indegree, namely rank the nodes according to their degree ratio, i.e. the outdegree divided by the indegree. In order to avoid dividing by a zero indegree, we implicitly take the out- and indegree of the reflexive digraph. We provide an axiomatization of the ranking by degree ratio using a clone property which says that cloning a node (in a specific way), does not change the ranking among the original nodes. We also provide a new axiomatization of the ranking by Copeland score using the same axioms except that this ranking method satisfies a different cloning property. Finally, we modify the ranking by degree ratio by not considering the reflexive digraph, and by definition assume nodes with indegree zero to be ranked higher than nodes with a positive indegree.

"Targeting in social networks"

Abstract:
Social networks play a central role in most of our everyday activities, communicating and exchanging information, sharing knowledge, research and development, advertisement, among many others. A process that can perfectly be modeled by social networks is the one of opinion formation in a society. An accompanying question being particularly important, e.g., in lobbying, political campaigning, marketing, or counter-terrorism, is how to identify optimal targets to achieve social impact. Indeed, the reliance on others to form opinions lies at the heart of advertising, efforts to make people aware of different issues, preventing criminal social groups and organizations, or attempts of capturing votes in elections. In computer science literature usually an algorithmic perspective is used to study the target selection for the optimal adoption and diffusion of innovation. In economics such models are used to study competition between firms and product differentiation. In political science, they are applied for determining equilibrium outcomes of electoral competitions. In this lecture we give a short overview of different models of targeting in social networks.