Different Approaches to Influence in Social Networks

Agnieszka Rusinowska

1 Extended Abstract

The *influence* phenomenon is faced in all kinds of real life situations, and as a consequence it is studied in many scientific areas: in sociology and social psychology, in political science, in economics, in management and business science. Also different approaches are applied to study influence concepts: research is not restricted only to theoretical investigations, but more and more experiments are conducted to get a deeper insight into these phenomena. In the economics literature, studying different concepts related to influence can find its place in several branches of this field, like, e.g., in labor economics, political and public economics, game theory, contract theory, experimental economics, and industrial organization. One of the game theoretic approaches to influence is based on using *social networks* which are particularly suitable to such an analysis. The **aim of this talk** is to deliver a short overview of different approaches to influence applied in the economics and game-theoretic literature, with a particular focus on *studying influence in networks*.

Concerning the game-theoretic literature, both cooperative and noncooperative approaches to influence have been applied; for a short survey, see e.g. [8]. Already more than fifty years ago the concept of influence relation to qualitatively compare the a priori influence of voters in a simple game was introduced [13], and fifty years later this influence relation was extended to voting games with abstention [15]. The cooperative game theoretical approach to interaction is also used in [11, 12], where the authors apply the command structure to model players' interaction relations by simple games.

A very important game theoretic approach to influence is based on using social networks, since they play a central role in the sharing of information and the formation of opinions. Individual decisions and strategic interaction are both embedded in social networks which are therefore particularly useful in analyzing influence. In the decision process the mutual influence does not stop necessarily after one step but may iterate. In this survey, we particularly discuss the iterated models of influence. The seminar network interaction model of information transmission, opinion formation, and consensus formation is presented in [4]; see also e.g. [5, 14]. In [10] the authors consider a social network in which players make an acceptance/rejection decision on a certain proposal, and each of them has an inclination (preliminary opinion) to say either "yes" or "no". It is assumed that players may influence the decisions of others, and consequently the players' decisions may differ from their preliminary inclinations. For further research on this model, see e.g. [6, 7, 9].

Another interesting approach to influence in social networks is based on using relational algebra and RelView [1, 2] which is a BDD-based tool for the visualization and manipulation of relations and for prototyping and relational programming. In [3] the authors apply relation algebra to measure agents' 'strength' (like power, success, and influence) in a social network. This leads to specifications, which can be executed with the help of the BDD-based tool RelView after a simple translation into the tool's programming language. Determining such measures can become quite complex and requires a lot of computations. Hence, using a computer program to compute the measures is extremely useful for real life applications of the concepts in question.

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Agnieszka Rusinowska
Centre d'Economie de la Sorbonne
CNRS - Université Paris I Panthéon-Sorbonne
106-112 Bd de l'Hôpital
75647 Paris, France
Email: agnieszka.rusinowska@univ-paris1.fr