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PhD Dissertation Defense

Dissertation Title

Community Detection and Influence Maximization in Online Social Networks

Student

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Time, Date and Location

10:00 AM

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Abstract:

Detecting and clustering users and data into communities in the social Web are important and complex issues, to develop smart marketing models within a changing and evolving social ecosystem. These marketing models are induced by the observation that individuals' decisions to purchase a product or adopt a certain innovation are influenced by recommendations from communities of friends or acquaintances. This observation leads to novel marketing models, which view users as members of online social network communities, rather than the traditional view of marketing to solitary individuals.

In this thesis, we start by revealing and examining the performance of models that detect communities in online social networks. Then we suggest our first contribution, which is an enhanced approach to automate community detection through a judicious technique, which clusters similar nodes together. Within a community, social relationships play an important role in determining users' behaviours. For example, a user might purchase a product that his friend recently bought. Such phenomenon is called Social Influence, which is used to study how far the action of one user can affect the behaviour of his neighbours in the social network. Our second contribution is an original metric used to compute the influence power of social network users, based on logs of common actions data to infer probabilistic influence propagation models. Finally, our third contribution combines the proposed community detection algorithm and the suggested influence propagation approach to reveal a new influence maximization model by identifying and using the most influential users within their communities. In doing so, we employ a fuzzy-logic based technique to determine key users who drive influence within their communities to diffuse a behaviour or an innovation. This original approach contrasts with previous influence propagation models, which do not seize the similarity opportunities among members of potential communities in order to maximize influence propagation, although community members are perceived to have higher influence on individuals of their own community. Performance results show that our model "activates" a higher number of nodes overall in contemporary social networks starting from a smaller seed set of key users, compared to existing landmark approaches which influence less nodes, yet employing a larger seed set of key users.

Keywords:

Social networks, community detection, social influence, influence maximization, influence metrics, social Web, fuzzy logic.