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Heuristics-based Influence Maximization for Opinion Formation in Social Networks

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Abstract

Influence Maximization for Opinion Formation (IMOF) is a significant issue in social networks. In general, the main goal of the IMOF is to determine a set of optimal nodes in an effective way for the maximum propagation of the most ideal opinions. The current studies mainly focus on the control methods for the opinion formation, for example, the informed agents, the improved opinion formation models and the effective initial-node-determination algorithms. However, there are few researches on the mathematical modeling of the IMOF. Additionally, the effective mechanisms should be specifically designed to solve the IMOF. In this paper, a general IMOF model is formulated by the informed agents, and then a 3-hop heuristic algorithm is proposed to deal with the IMOF. Firstly, the IMOF is formulated mathematically as an optimization model. Then, in order to satisfy various preferences among nodes, the weighted bounded confidence model is devised to calculate the opinion of each node effectively. Moreover, the influence spread obeys 3-hop rule, and node influence gradually dissipates and stops beyond 3 hop. Therefore, based on node influence, a 3-hop heuristic algorithm is proposed to effectively determine the top- m influential nodes. With the opinion set initialized, a discount strategy is presented to accelerate the propagation of the selected top- m influential nodes. Finally, the experimental results demonstrate that the proposed method obtains better performance on the average of opinions than the chosen benchmarks.

Keywords: Social Networks; Opinion Formation; Informed Agents; Influence Maximization; Heuristics

1. Introduction

With the great popularity of the Internet, people's attention on social networks (Facebook, Twitter, Wechat, etc.) has surged due to their potential applications in a variety of aspects of people's daily lives [1, 2]. In particular, the Influence Maximization for Opinion Formation (IMOF) is a significant issue in social network applications. For example, many companies usually spread the desirable opinion to the customers. How to make more customers

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