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Identification of influential nodes in social networks with community structure based on label propagation

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Abstract

Social network is an abstract presentation of social systems where ideas and information propagate through the interactions between individuals. It is an essential issue to find a set of most influential individuals in a social network so that they can spread influence to the largest range on the network. Traditional methods for identifying influential nodes in networks are based on greedy algorithm or specific centrality measures. Some recent researches have shown that community structure, which is a common and important topological property of social networks, has significant effect on the dynamics of networks. However, most influence maximization methods do not take into consideration the community structure in the network, which limits their applications on social networks with community structure. In this paper, we propose a new algorithm for identifying influential nodes in social networks with community structure based on label propagation. The proposed algorithm can find the core nodes of different communities in the network through the label propagation process. Moreover, our algorithm has low time complexity, which makes it applicable to large-scale networks. Extensive experiments on both synthetic and real-world networks under common diffusion models demonstrate the effectiveness and efficiency of our proposed algorithm.

Keywords: Social network, Influential node, Community structure, Label

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