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A Cooperative Game Framework for Detecting Overlapping Communities in Social Networks

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Abstract

Community detection in social networks is a challenging and complex task, which received much attention from researchers of multiple domains in recent years. The evolution of communities in social networks happens merely due to the self-interest of the nodes. The interesting feature of community structure in social networks is the multi membership of the nodes resulting in overlapping communities. Assuming the nodes of the social network as self-interested players, the dynamics of community formation can be captured in the form of a game. In this paper, we propose a greedy algorithm, namely, *Weighted Graph Community Game* (WGCG), in order to model the interactions among the self-interested nodes of the social network. The proposed algorithm employs the Shapley value mechanism to discover the inherent communities of the underlying social network. The experimental evaluation on the real-world and synthetic benchmark networks demonstrates that the performance of the proposed algorithm is superior to the state-of-the-art overlapping community detection algorithms.

Keywords: Coalitional game, Game theory, Shapley value, Overlapping community detection, Weighted graph game

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