New community detection criterion

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Abstract

Complex systems in different areas such as telecommunication, transportation, biology, and social sciences are frequently being presented and modeled at networks. One of the most studied phenomenon in complex networks is community structure, i.e., a division of the network into groups or clusters. Such groups should have a greater density of internal connections and a lower density of external or cut connections. Many criteria have been proposed in the literature to cover obvious fact regarding the homogeneity of entities within cluster and diversity of entities among different clusters at the network. In this talk I will discuss most commonly used criteria, such as modularity and ratio-cut. Moreover, the new criterion for community detection is proposed that, for the first time, recognizes known groups for all well-known small instances from the literature. A quality of the individual community we define as difference between its benefit and cost, where both, benefit and cost greatly depend on the number of internal edges and the number of external edges, respectively. Comparison of the new criterion with modularity and ratio-cut criteria are performed on usual instances from the literature. For all 3 criteria, efficient heuristics based on Variable neighborhood search metaheuristic are designed.