

Influence maximization problem: properties and algorithms

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Influence maximization problem has become one of the fundamental problems in online social network in the recent decade due to its extensive application. Although a $1-1/e$ approximation ratio is easily obtained with greedy algorithm for the submodular case, how to solve the non-submodular case and enhance the solution quality is deserving further study. In this talk, the property of the optimal solution is comprehensively proposed in marginal increment form, a non-decrease decomposition property (NDP) is first obtained explicitly. A necessary condition is also proposed which is on the basis of exchange improvement (EI) to judge whether a solution is optimal or not. Followed by the NDP and EI condition, an exchange improvement algorithm (EIA) is proposed to further enhance the quality of the solution to the sub-modular function maximization problem. For the most popular case of IM, efficient and effective methods to compute the spread value and marginal gain are also presented in a successive iteration update manner. Then two extensions to the non-submodular cases are given and constant approximation ratio algorithm for bounded modularity set case and data dependent approximation ratio algorithm for topology change case are proposed respectively.