Network-based targeting in the early diffusion process*

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Abstract

Many policies and marketing campaigns aim to accelerate the adoption of new technologies in networks. In such environments, what matters is often not only the eventual outcome but also the level of adoption at a given date. We study a planner's targeting problem in a network game with strategic interactions, where the planner chooses individual incentives subject to a budget constraint to maximize the average action at horizon t. We characterize the optimal intervention in general networks and show that it is proportional to diffusion centrality, a time-indexed influence measure that aggregates walks of length up to t. We then evaluate simple, implementable heuristics in stochastic network environments and numerical simulations. Degree-based targeting approximates the short run optimal targeting strategy and Katz–Bonacich-based targeting captures the intermediate and long horizons. In addition, both targeting strategies provide a robust approximation across a wide range of network structures. Finally, we study the extension of upper bounds on individual incentives, leading a planner to care about not only high influence nodes but also the risk of waste due to saturation.

Keywords: social networks, centrality measures, random networks, network analysis, targeting, strategic interactions

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