

Network Clustering, the Block Stochastic Model, and a Regular Graph

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Clustering is a very important problem in the analysis of large networks, due to its variety of applications in machine learning, data mining, population genetics, and the study of social networks. Mathematically, the simplest model in which one studies clustering is the Block Stochastic Model (BSM), in which two Erdos-Renyi graphs of equal size and same parameter are connected by a bipartite Erdos-Renyi graph with a smaller parameter (creating thus two "denser" clusters which interact more "weakly" with one another). The question is then how strong can the "weak" interactions be, before detection of the clusters becomes impossible. The analysis of the BSM was recently completed by Massoulié and in parallel by Mossel, Neeman, and Sly. Inspired by their results, we have considered a regular version of the BSM (RBSM), and noted that the analysis is in parts more difficult, and in parts easier than for the BSM.

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