

Detection and Estimation of Inhomogeneous Regions in Communications Graphs

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Abstract

We discuss the problem of detecting inhomogeneities in communications graphs: detecting a small number of vertices who are communicating at a higher rate amongst themselves than is typical in the rest of the graph. Assuming that the existence of such a group has been detected, we consider the further problem of determining which vertices belong to the group. We discuss various methods for detection including those based on vertex degree and scan neighborhood, and one based on a random dot product model of the graph. This latter approach embeds the vertices into a low dimensional space and utilizes clustering methods to group the vertices. We will illustrate the performance of the various methods via simulation, and discuss the regimes in which different methods are most powerful.

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