

## **Nonparametric methods for community discovery in large sparse networks.**

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Fueled by the information wealth emerging from online social media, new methods and models for analysis of complex networks are now attracting skyrocketing attention. Network structures are employed to describe a wide variety of modern disparate social systems and natural phenomena, including, just to name a few, media propagation, communication, power grids, infectious outbreaks and spread of computer viruses. Many real-world networks show the presence of communities, i.e., the phenomena where certain network features, for example, edges, tends to cluster into local groups, with stronger connections within groups and weaker connections between groups. Identification of network communities has a broad range of applications, from developing targeted marketing and efficient recommendation systems to discovering micro ecosystems in food webs to detecting gang formation and terrorist activity in crime networks. Many conventional community detection procedures are sensitive to network outliers. While the problems of outlier and community tracking are intrinsically linked, until recently they have been studied as independent problems. We propose to address the above challenges by introducing a nonparametric concept of data depth into the network community detection that allows to systematically integrate ideas on cohesion, centrality, outliers, and community discovery.