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Title : *A Marginal Modeling Approach for Curved Exponential Random Graph Models*

Abstract: Analyzing social networks, such as Facebook, terrorist networks, best friends, etc., is becoming more and more important in modern society. Data on relationships can be represented in networks, or mathematical graphs, consisting of a set of nodes and a set of edges (unordered or ordered set of nodes), connecting some pairs of nodes.

A popular modeling approach for networks is to consider exponential family models, often referred to as exponential random graph models (ERGM). Fitting such models is difficult and until recently inference was only based on a pseudo-maximum likelihood method. In recent years much progress has been made in maximum likelihood (ML) estimation by the application of Monte Carlo Marko Chain algorithms. These models have been extended to curved ERGM, that are based on network statistics for which ML estimation seems less problematic. However interpretation of parameters remains difficult, because they do not allow interpretation of marginal but only of conditional probabilities.
In particular, when additionally node attributes are collected, one is more interested in a marginal interpretation of probabilities (using the odds ratio) depending on these node attributes. In this talk, I propose a marginal model approach using the existing framework of curved ERGM and will discuss in detail ML estimation for such models.
As an example, I consider the collaborative working relations of 36 partners of a New England Law firm with node attributes: seniority (rank number of entry into the firm), gender, office (three offices in different cities), and practice (litigation = 0, and corporate law = 1).