



## Exponential-family Approaches to Jointly Mode Network Relations and Endogenous Attributes

Mark Stephen Handcock \*

University of California – United States - [handcock@stat.ucla.edu](mailto:handcock@stat.ucla.edu)

Ian Fellows

Fellows Statistics, Inc.- United States - [ian@fellstat.com](mailto:ian@fellstat.com)

Random graphs, where the connections between nodes are considered random variables, have wide applicability in the social sciences. Exponential-family Random Graph Models (ERGM) have shown themselves to be a useful class of models for representing complex social phenomena. We generalize ERGM by also modeling the attributes of the social actors as random variates, thus creating a random model of both the relational and individual data, which we call Exponential-family Random Network Models (ERNM).

This provides a framework for expanded analysis of network processes, including a new formulation for network regression where the outcomes, covariates and relations are socially endogenous. The framework also sheds light on the degeneracy issues of exponential-family models for complex phenomena. In this talk, we focus on a new class of latent cluster models and network regression.