

Workshop on exponential random graph (p^*) models

Garry Robins
School of Behavioural Science,
University of Melbourne 3010
Australia

garrylr@unimelb.edu.au

Keywords

Statistical network models

ABSTRACT

This workshop provides an introduction to the formulation and application of exponential random graph models for social networks. The possible ties among nodes of a network are regarded as random variables, and assumptions about dependencies among these random tie variables determine the general form of the exponential random graph model for the network. Examples of different dependence assumptions and their associated models are given, including Bernoulli, dyad-independent and Markov random graph models. The incorporation of actor attributes in social selection models is also reviewed. Newer, more complex dependence assumptions are outlined. Estimation procedures are discussed, including new methods for Monte Carlo maximum likelihood estimation. We discuss the problems with degeneracy faced by the homogeneous Markov random graph models of Frank and Strauss (1986) and introduce the new specifications proposed by Snijders, Pattison, Robins & Handcock (2006). Not only do the new specifications show improvements in goodness of fit for various data sets, they are much more successful at avoiding degeneracy, particularly for network data exhibiting high levels of transitivity. We present examples of fitting the new models to various well-known data sets.

References

Frank, O., & Strauss, D. (1986). Markov graphs. *Journal of the American Statistical Association*, *81*, 832-842.

Snijders, T.A.B., Pattison, P., Robins, G., & Handcock, M. (2006) New specifications for exponential random graph models. *Sociological Methodology*.