## Some Statistical Aspects of Exponential Random Graph Models

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June 14, 2009

## Abstract

There has been an explosion of interest in statistical models for analyzing network data, and considerable interest in the class of exponential random graph (ERG) models, especially in connection with difficulties in computing maximum likelihood estimates and assessing their statistical properties. This talk re-examines these issues in three parts. First we consider the Holland-Leinhardt  $p_1$  model using the tools of algebraic geometry and we derive Markov bases and their potential uses. Then, by means of a detailed example, we provide some characterization of the properties of the MLEs for ERG models, and, in particular, of certain behaviors known as degeneracy. Finally, we use these two specific illustrations to describe some open issues relating to MLEs, asymptotics, and the assessment of goodness-of-fit.