

Department of Applied and Computational Mathematics and Statistics Colloquium


Sonja Petrovic
Department of Statistics
Pennsylvania State University

will give a lecture entitled:

Algebraic Statistics for Network Models

Abstract

The field of algebraic statistics has flourished in recent years, with work that allows us to use the perspective and methods from algebra and geometry to gain key insights into statistical models. Random graph models and difficulties posed by large sparse data sets are of particular interest. The theory needed for the study of extensions of basic models and applications to social networks is the focus of ongoing research. The p_1 model is a directed random graph model used to describe dyadic interactions in a social network in terms of effects due to differential attraction (popularity) and expansiveness, as well as an additional effect due to reciprocation. It belongs to the most important and flexible class of statistical models for networks. This talk will focus on two problems related to the geometry of the p_1 model, and directly relevant to the estimation and conditional goodness-of-fit testing problems. The first problem is the construction of Markov bases for the model, where sampling constraints present the main difficulty in applying algebraic methods directly, and reveal interesting geometry. The second problem is concerned with the existence of maximum likelihood estimators: when the supremum of the likelihood function is achieved on the boundary of the model polytope, only certain linear combinations of the natural parameters are estimable. I will describe polyhedral conditions for the existence of the MLEs for the p_1 model. The talk will conclude with extensions to other related models and a discussion of asymptotic results.



Monday, December 5th, 2011
4:00 p.m. to 5:00 p.m.
127 Hayes-Healy Center