

MATHEMATICS & STATISTICS COLLOQUIUM ANNOUNCEMENT

Friday, February 23, 2007
4:00 p.m.
ARTS 214

SPEAKER

Jiguo CAO
Yale University

TITLE

The Parameter Cascade Method and its Applications in Estimating Air Pollution Models, Fitting HIV Dynamical Models, and Constructing Gene Regulation Network

ABSTRACT

Many statistical models involve with three levels of parameters: (i) nuisance parameters are parameters required to construct models but not of direct interest, (ii) structural parameters are parameters holding our main concern, and (iii) complexity parameters are parameters controlling the effective degrees of freedom of the models. The current methods for estimating these models are computational intensive, and inoperable for “naive” users. In my talk, I will introduce a new method, the parameter cascade method, which estimates parameters in three nested levels of optimization and defines the nuisance parameters as regularized functions of structural parameters, and structural parameters in turn as functions of complexity parameters. This approach has several unique aspects. Firstly, the computation is fast and stable with the gradients and Hessian matrices worked out analytically. Secondly, the unconditional variance estimates are attained, which include the uncertainty coming from other parameter estimates. Finally, each level allows for a different optimization criterion, otherwise the biases in parameter estimation may be induced.

The parameter cascade method will be illustrated by estimating generalized semiparametric additive models for air pollution data, fitting HIV dynamical models (ordinary differential equations) to clinical trials, and constructing gene regulation networks from time course microarray data.

Coffee and Cookies at 3:30 pm in the lounge.