STANFORD UNIVERSITY

DEPARTMENT OF STATISTICS

DEPARTMENTAL SEMINAR

4:15 p.m., Tuesday, July 18, 2006
Sequoia Hall Room 200
(Cookies at 3:45 in 1st Floor Lounge)

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Semiparametric Inference for Correlated Data

In this talk, parameter estimation, building regression models and testing of hypotheses for correlated data using quasi-likelihood based techniques is addressed. A semiparametric model is defined by a set of mean zero estimating functions. Based on a quadratic form arising from an approximate covariance matrix for the estimating functions, we can create a pseudo loglikelihood that forms the basis for the *quadratic inference function* (QIF). In a semiparametric approach, we (1) formulate a unified large-sample theoretical framework for the QIF; (2) establish a generalization of the QIF test statistic, along with its asymptotic distribution, for a general linear hypothesis problem involving correlated data; (3) propose an *iteratively reweighted generalized least squares* (IRGLS) algorithm for finding the QIF estimator and show its convergence properties; and (4) discuss novel techniques for building regression models for correlated data using the IRGLS algorithm. Furthermore, we present inferential theory for hypothesis testing under general convex cone alternatives. This fundamental problem is addressed by first establishing that a *generalized quasi-score* statistic is asymptotically equivalent to the squared length of the projection of the standard Gaussian vector onto the convex cone. We show that the asymptotic null distribution of the test statistic is a weighted chi-squared distribution and explicit expressions for these weights are obtained using the volume-of-tube formula around a convex manifold in the unit sphere. We illustrate applications to testing under order restricted alternatives for correlated data.