The University of Chicago
Department of Statistics
Practice Job Seminar

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"Fourier Analysis in Time Series: Some Theory and an Application to Space-Time Modeling"

Thursday January 26, 2006 at 12:00 pm
110 Eckhart Hall, 5734 S. University Avenue

ABSTRACT

Part I: Estimation and testing of long memory are a central interest in time series analysis. For local Whittle estimation, the existing asymptotic theory usually imposes conditional homoscedasticity. To allow various types of conditional heteroscedasticity, which is often seen in econometric time series, we adopt a framework of fractionally integrated nonlinear processes and establish an asymptotic theory. Our result is also applicable to a class of nonlinear time series models. Under the same framework, we obtain the exact local asymptotic powers of nonparametric and semiparametric tests for long memory.

Part II: CMAQ (Community Multi-scale Air Quality modeling system) is a numerical model that gives concentrations and depositions of various air pollutants. CMAQ runs are often performed at multiple resolutions and high resolution runs are very computationally expensive. The high resolution runs can be used as surrogates to the sparsely collected monitoring data. In the situation where one has low resolution runs for a long period and only a few days' high resolution runs, it would be valuable to simulate the high resolution runs that capture the space-time character of the real high resolution runs. In this work, we divide the runs we have (24 days) into a training set (Day 1-12) and a testing set (Day 13-24) and develop an algorithm to conditionally simulate the high resolution runs based on the high resolution runs in the training set and all the low resolution runs. The main idea is to do nonlinear filtering in the frequency domain and block bootstrap the residuals in the time domain simultaneously over space. Various criteria are examined and issues of conditional modeling will be discussed.

Information about building access for persons with disabilities may be obtained in advance by calling the department office at (773) 702-8333.