Institut für Stochastik

In der

AG STOCHASTIK

spricht am Dienstag, den 6. Dezember 2011, um 16.15 Uhr

Dr. Mark Fiecas

Brown University (Providence, USA)

über das Thema

Statistical Methods for Spectral Analysis of Multivariate Time Series

In this talk we look at novel methods for spectral analysis of multivariate time series. First, we discuss the generalized shrinkage estimator for estimating the spectral density matrix. This estimator is a weighted average of a parametric estimator (based on the, e.g., VAR model) and the smoothed periodogram matrix. The optimal weights are frequency-specific and derived under the quadratic risk criterion such that the estimator, either the parametric estimator or the nonparametric estimator, that performs better at a particular frequency receives heavier weight. We show how the generalized shrinkage estimator can be used to improve the numerical stability of the smoothed periodogram matrix while simultaneously obtaining a good fit to the data.

Next, we develop a novel approach to analyzing replicated nonstationary bivariate time series data. In a designed experiment, often many traces, or replicates, of the time series data is collected. We consider two sources of nonstationarity: 1) within each replicate and 2) across the replications, so that the spectral properties of the bivariate time series data are evolving both over time within the replicate and also over the replicates. We propose a novel model and a corresponding two-stage estimation method. In the first stage we account for nonstationarity within a replicate by using local periodogram matrices. In the second stage, we account for nonstationarity over the replications using wavelet regression. We illustrate our approach on a simulated data set and then apply the method to a local field potential data set to study how the coherence between the nucleus accumbens and the hippocampus evolves over the course of a learning association experiment.

Ab 15.45 Uhr findet in unserem Institut im Zimmer 5A-09 ein gemeinsamer Tee statt.

Ort: Raum 1C-04 (Geb. 05.20)

Die Dozentinnen und Dozenten der Stochastik