TIME SERIES MODELING WITH APPLICATIONS IN BUSINESS AND FINANCE

ORGANIZER: NALINI RAVISHANKER, UNIVERSITY OF CONNECTICUT, USA

TALK 1: PARTICLE LEARNING FOR BAYESIAN NON-PARAMETRIC MARKOV SWITCHING STOCHASTIC VOLATILITY MODEL

SPEAKER: HEDIBERT F. LOPES, INSPER, BRAZIL

This paper designs a Sequential Monte Carlo (SMC) algorithm for estimation of Bayesian non-parametric Stochastic Volatility (SV) models for financial data. In particular, it makes use of one of the most recent particle filters called Particle Learning (PL). The performance of this particle method is then compared with the standard Markov Chain Monte Carlo (MCMC) methods for non-parametric SV models. PL performs as well as MCMC, and at the same time allows for on-line type inference. The posterior distributions are updated as new data is observed, which is prohibitively costly using MCMC. Further, a new non-parametric SV model is proposed that incorporates Markov switching jumps. The proposed model is estimated by using PL and tested on simulated data. Finally, the performance of the two nonparametric SV models, with and without Markov switching, is compared by using real financial time series. The results show that including a Markov switching specification provides higher predictive power in the tails of the distribution. This is joint work with Virbickaite, Ausin and Galeano.

TALK 2: STATE SPACE MODELING OF MULTIVARIATE TIME SERIES OF COUNTS

SPEAKER: REFIK SOYER, GEORGE WASHINGTON UNIVERSITY, USA

We consider modeling of multivariate time-series of correlated counts which often arise in finance, operations and marketing applications. Dependence among series arises as a result of sharing a common environment. We introduce a class of multivariate Poisson time series models by assuming a common environmental process modulating the rates of the individual series. We develop Bayesian inference for these models using particle filtering and Markov chain Monte Carlo methods. We discuss issues of sequential filtering, smoothing and prediction and show an implementation of the proposed models using actual time-series count data on shopping trips for different households.

Talk 3: CLUSTERING NONLINEAR AND NONSTATIONARY FINANCIAL TIME SERIES

SPEAKER: NALINI RAVISHANKER, UNIVERSITY OF CONNECTICUT, USA

Accurate clustering of time series can often be a challenging problem for data arising in financial markets, biomedical studies, and environmental sciences especially when the series exhibit nonstationarity and nonlinearity. Frequency domain clustering methods are based on higher-order spectral properties such as the bispectra or trispectra. While these address nonlinearity, they assume that the time series are stationary. This talk proposes the Polyspectral Smooth Localized Complex Exponential (PSLEX) approach for clustering which can overcome the challenges arising due to nonlinearity and nonstationary in time series. This is an extension of the SLEX approach that has been used for linear, nonstationary time series The performance of the proposed approach is illustrated via a simulation study to cluster several nonstationary and/or nonlinear time series. A financial application shows how we cluster time series on stock prices for several companies traded on the NYSE and belong from different industry segments. This is joint work with Priya Kohli and Jane Harvill.