Mathematics, Statistics, and Computer Science **@ UIC**

Statistics and Data Science Seminar

Bayesian Inference via Filtering Equations for Financial Ultra-High Frequency Data

Yong Zeng (University of Missouri-Kansas City)

Abstract: We propose a general partially-observed framework of Markov processes with marked point process observations for ultrahigh frequency (UHF) transaction price data, allowing other observable economic or market factors. We develop the corresponding Bayesian inference via filtering equations to quantify parameter and model uncertainty. Specifically, we derive filtering equations, which are SPDEs, to characterize the evolution of the statistical foundation such as likelihoods, posteriors, Bayes factors, and posterior model probabilities. Given the computational challenge, we provide a weak convergence theorem, enabling us to employ the Markov chain approximation method to construct consistent, easily-parallelizable, recursive algorithms. The algorithms calculate the fundamental statistical characteristics and are capable of implementing the Bayesian inference in real-time for streaming UHF data via parallel computing for sophisticated models. The general theory is illustrated by specific models built for U.S. Treasury Notes transactions data from GovPX and a Heston stochastic volatility model for stock transactions data. This talk consists of joint works with B. Bundick, G. X. Hu, D. Kuipers, and J. Yin.

Wednesday, April 13 at 4:00 PM in Zoom