Graduate Student Seminar Day
Dept. Statistical Sciences

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Dimension Reduction for Sparse Functional Data

Edwin Lei

We propose functional cumulative slicing as an effective means of achieving dimension reduction in the context of multiple index functional regression for a scalar response variable. In many real world scenarios, predictor trajectories are observed intermittently, contaminated with noise, and collected in the form of repeated measurements. These design issues force us to adopt the strategy of pooling data together from the entire sample for consistent estimation and inference. Our proposed method of functional cumulative slicing addresses these sparsely observed, as well as the easier case of densely observed, predictor trajectories. Compared to sliced inverse regression, the nature of cumulative slicing lends itself well to sparse designs because it avoids partitioning the data into an arbitrary number of slices -- thereby ensuring the maximum use of data. We demonstrate the effectiveness of our estimator compared to functional linear model and sliced inverse regression with simulations and data analyses.

Hedging Cost Analysis of Put Option with Application to Variable Annuities

Panpan Wu

In this presentation, we generalize the original semi-analytic algorithm proposed in our earlier paper for move-based discrete hedging to analyze path-dependent VA products. Specially, we consider the discrete hedging problems of annual ratchet VA, structured product based VA with contingent protection, both of which base their payoffs in part on the path assumed by the sub-account. In addition, we make progress to a more fundamental degree by making the sub-account follow a regime switching GBM model.

Local linear Quantile estimator for a class of locally stationary, long memory data

Weichi Wu

We introduce a local linear quantile estimator for a class of locally stationary, long memory data. We obtain the Barhurda Representation of the estimator, and evaluate its maximum deviation. Moreover, we determine the simultaneously confidence band for the estimates and demonstrate our approach using both simulated and real data.

Alex Shestopaloff

Non-linear state space models are a widely used class of models for biological, economic, and physical processes. Fitting these models to observed data is a difficult inference problem that has no straightforward solution. We take a Bayesian approach to the inference of unknown parameters of a non-linear state model; this, in turn, requires the availability of efficient Markov Chain Monte Carlo (MCMC) sampling methods for the latent (hidden) variables and model parameters. We introduce a new Markov Chain Monte Carlo (MCMC) method for non-linear state space models and apply it to the Ricker model of population dynamics.