
Stochastic Processes and Their Applications

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MIKLOS CSORGO, Carleton University

Randomized Empirical Processes with Applications to Infinite Super-Populations and Big Data Sets

A super-population outlook regards a finite population as a large imaginary random sample of N labeled units $\{X_1, \dots, X_N\}$ of real valued random variables from a hypothetical infinite super-population. One may also view a Big Data set of univariate observations as if it were a large imaginary random sample of N labeled units. In both of these scenarios, instead of trying to process the entire data set, we sample it via its index set $\{1, \dots, N\}$ and thus reduce the problem to dealing with significantly smaller sub-samples that, in turn, we study with the help of appropriately randomized empirical processes.

DON DAWSON, Carleton University

Long Time Behaviour of a Class of Multidimensional Diffusions

We consider some classes of Markov diffusion processes with values in the positive quadrant and related systems of interacting diffusions on the hierarchical group and their hierarchical mean field and continuum limits. In particular we consider the behaviour of catalytic branching and mutually catalytic branching systems. A review of recent results and open problems will be given.

DON MCLEISH, University of Waterloo

The Importance of Importance Sampling: Measure Change in Probability, Statistics and Rare Event Simulation

Arguably nothing has contributed more to the practice of statistics than measure change and likelihood ratios. These are fundamental objects throughout statistics, probability and finance and provide the underpinning of much of statistical estimation and testing, and much of modern finance theory. We provide a brief review of many uses of Radon-Nikodym derivatives or likelihood ratios, together with some practical cautionary notes on their use. We will show examples of the extraordinary power of importance sampling, especially for simulation of stochastic processes and for rare event simulation, including the use of the generalized extreme value distributions for rare event simulation.