MARTIN LYSY, University of Waterloo
Parameter Inference for Diffusion Processes via Gaussian Process Regression

Diffusion processes are used to model a wealth of stochastic phenomena in the natural sciences, engineering, and finance. For many such processes, the likelihood function is only available for continuous-time data. Since actual data recordings are discrete, parameter inference is typically achieved by integrating over the missing paths between observations. However, most Markov chain Monte Carlo algorithms used to this end impose a formidable computational burden. Here, we propose an Importance Sampling approach to the missing path imputation via Gaussian Process Regression. To account for the highly non-Gaussian nature of these paths, both model-free and model-dependent features are included in the variance function. The methodology is illustrated with several financial and biological examples.