



Department of Decision Sciences
Statistics Seminar

Are Monte Carlo methods dead?

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Abstract

Monte Carlo methods, and in particular Markov chain Monte Carlo techniques, have been the gold standard computational tool for Bayesian modelling over the past 30 years. These algorithms can be applied in general settings, from identifying traits in phylogenetic trees to detecting Earth-like planets in distant solar systems, their supporting theoretical guarantees have led them to be widely used by scientists and industry practitioners alike. However, a significant drawback is that traditional Monte Carlo algorithms scale poorly with large datasets, leading to a computational cost that grows at least proportionally with the data size. This leads to a prohibitive cost for modern-day machine learning and data science applications and has led practitioners towards scalable approximate alternatives, such as variational methods, which have no theoretical guarantees on the resulting approximation error.

In this talk, I'll discuss some recent advances in scalable Monte Carlo methods which maintain the favourable theoretical properties of standard Monte Carlo methods, but which are generalisable and suitable for real-world datasets and industrial-scale models.