



Numerical Analysis Seminar

Efficient, Multimodal, and Derivative-Free Bayesian Sampling with Fisher-Rao Gradient Flows

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Abstract

Sampling a target distribution with an unknown normalization constant is a fundamental challenge in computational science and engineering. Particularly in the context of large-scale Bayesian inverse problems, several key difficulties can manifest: (i) the evaluation of likelihood is computationally expensive; (ii) the target distribution may exhibit multimodality; and (iii) feasibly computing gradient information is not always possible. In this talk, we discuss how to systematically address these issues using the Fisher-Rao gradient flow. We will explain how the Fisher-Rao gradient flow emerges as a natural and unique choice within the broader framework of employing flows for sampling and, we connect such methodology to classical sampling approaches in sequential Monte Carlo, MCMC and variational inference. Our work integrates Fisher-Rao gradient flows with Gaussian mixture approximations and Kalman's methodology, resulting in an efficient, multimodal, and derivative-free sampling algorithm. We will provide both theoretical insights and numerical demonstrations to underscore the effectiveness of this approach.

Date: Dec. 11, 2023 (Monday)

Time: 10:00am - 11:00am

Venue: ZOOM: <https://hku.zoom.us/j/>

Meeting ID: 913 6532 3891

Password: 310656