



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

Sampling with Preconditioned functional gradient flow

By

Mr. Hanze DONG

Abstract

Particle-based variational inference (VI) minimizes the KL divergence between model samples and the target posterior with gradient flow estimates. With the popularity of Stein variational gradient descent (SVGD), the focus of particle-based VI algorithms has been on the properties of functions in Reproducing Kernel Hilbert Space (RKHS) to approximate the gradient flow. However, the requirement of RKHS restricts the function class and algorithmic flexibility.

This paper offers a general solution to this problem by introducing a functional regularization term that encompasses the RKHS norm as a special case. This allows us to propose a new particle-based VI algorithm called preconditioned functional gradient flow (PFG). Compared to SVGD, PFG has several advantages. It has a larger function class, improved scalability in large particle-size scenarios, better adaptation to ill-conditioned distributions, and provable continuous-time convergence in KL divergence. Additionally, non-linear function classes such as neural networks can be incorporated to estimate the gradient flow. Our theory and experiments demonstrate the effectiveness of the proposed framework.

Date : 20 April 2023 (Thursday)

Time : 5:00pm

Venue: Room 5510 (near Lifts 25/26)

All are Welcome!