THE UNIVERSITY　　　　　**OF HONG KONG**

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

A Stochastic Neural Network for uncertainty quantification of deep neural networks

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Abstract

Uncertainty quantification (UQ) of deep neural networks (DNN) is a fundamental issue in deep learning. In our UQ for DNN framework, the DNN architecture is the neural ordinary differential equations (Neural-ODE), which formulates the evolution of potentially huge hidden layers in the DNN as a discretized ordinary differential equation (ODE) system. To characterize the randomness caused by the uncertainty of models and noises of data, we add a multiplicative Brownian motion noise to the ODE as a stochastic diffusion term, which changes the ODE to a stochastic differential equation (SDE). The deterministic DNN becomes a stochastic neural network (SNN). In the SNN, the drift parameters serve as the prediction of the network, and the stochastic diffusion governs the randomness of network output, which serves to quantify the epistemic uncertainty of deep learning. I will present results on convergence and numerical experiments for the SNN.

Date:	November 16, 2022 (Wednesday)	
Time:	10:00 – 11:00am	
Venue:	ZOOM: https://hku.zoom.us/j/	
	Meeting ID: 913 6532 3891	
	Password: 310656	

All are welcome