THE UNIVERSITY   **OF HONG KONG**

Institute of Mathematical Research
Department of Mathematics

Optimization and Machine Learning Seminar

Learning operators using deep neural networks for diverse applications

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Abstract

It is widely known that neural networks (NNs) are universal approximators of continuous functions. However, a less known but powerful result is that a NN can accurately approximate any nonlinear continuous operator. This universal approximation theorem of operators is suggestive of the structure and potential of deep neural networks (DNNs) in learning continuous operators or complex systems from streams of scattered data. In this talk, I will present the deep operator network (DeepONet) to learn various explicit operators, such as integrals and fractional Laplacians, as well as implicit operators that represent deterministic and stochastic differential equations. More generally, DeepONet can learn multiscale operators spanning across many scales and trained by diverse sources of data simultaneously. I will demonstrate the effectiveness of DeepONet to multiphysics and multiscale problems. I will also present several extensions of DeepONet for realistic diverse applications.

Date:	April 8, 2022 (Friday)
Time:	10:00 – 11:00am (Hong Kong Time)
Venue:	ZOOM: https://hku.zoom.us/j/
	Meeting ID: 940 0962 9889
	Password: 286660

All are welcome