MATH-IMS Joint Applied Mathematics Colloquium Series
The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

Date: Feb 24, 2023 (Friday)
Time: 16:00-17:00 (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/92775210812

Learning mappings on Wasserstein space with applications to mean-field problems

Speaker: Professor Huyên Pham
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Abstract: We study the machine learning task for models with operators mapping between the Wasserstein space of probability measures and a space of functions, like e.g., in mean-field games/control problems. Two classes of neural networks based on bin density and on cylindrical approximation, are proposed to learn these so-called mean-field functions, and are theoretically supported by universal approximation theorems. We perform several numerical experiments for training these two mean-field neural networks, and show their accuracy and efficiency in the generalization error with various test distributions. Finally, we present different algorithms relying on mean-field neural networks for solving McKean-Vlasov control problems. This talk is based on joint work with Xavier Warin (EDF, Fime).

Bio: Huyên PHAM is a Distinguished Professor of Mathematics at Université Paris Cité. He leads research in stochastic analysis and control, quantitative finance and machine learning, and is the author of more than 100 publications, including the monograph Continuous time Stochastic Control and Optimization with Financial Applications. He serves on the editorial boards of several international journals, and is the co-editor in chief of the journal Applied Mathematics and Optimization. Prof. Pham was appointed member of the Institut Universitaire de France in 2006, awarded the Louis Bachelier prize by the French Academy of Sciences in 2007, and was a plenary speaker at the 9th World congress of the Bachelier Finance Society in 2016, and at the 6th Asian Quantitative Finance Conference in 2018.