THE CHINESE UNIVERSITY OF HONG KONG
Department of Electronic Engineering
Seminar

Development of accurate, robust, scalable machine learning models and algorithms through the lens of nonconvex optimization

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Time: **10:45 am – 12:00 nn**
Venue: **SHB222**

Abstract

The rapid advances in sensor, communication, and storage technologies have made data acquisition more ubiquitous than at any time in the past. Making sense of data of such a scale is expected to bring ground-breaking advances across many industries and disciplines. However, to effectively handle data of such scale and complexity, and to better extract information from large-scale data for inference, learning, and decision-making, increasingly complex mathematical models are needed. These models are often highly non-convex and can have millions or even billions of variables, making existing methods no longer applicable.

In this talk, I will present a few recent works that design accurate, robust, and scalable algorithms for solving non-convex machine learning problems. My focus will be given to discussing the theoretical properties of three classes of gradient-based algorithms for respectively solving three popular families of structured non-convex optimization problems, including the min-max optimization, functional constrained optimization, and bilevel optimization. Next, I will showcase the practical performance of these algorithms in applications such as adversarial learning, trustworthy learning, safe reinforcement learning (RL), and personalized learning. Finally, I will briefly introduce some extensions of our framework to other emerging problems, such as unsupervised learning, multi-agent RL, etc.

Biography

Songtao Lu is currently a senior research scientist with the mathematics of artificial intelligence (AI) group at the IBM Thomas J. Watson Research Center, Yorktown Heights. He obtained his doctoral degree in electrical engineering from Iowa State University in 2018. He was a post-doctoral associate with the department of electrical and computer engineering at the University of Minnesota Twin Cities from 2018 to 2019. Dr. Lu is a recipient of the best paper runner-up award of UAI (2022), the outstanding paper award of NeurIPS workshop on federated learning (2022), the IBM research accomplishment award (2021), and the ICML (2019) and AISTATS (2017) travel awards. His recent works have been published at multiple top-tier AI and machine learning conferences, including ICML, NeurIPS, AAAI, ICLR, UAI, IJCAI, AISTATS, etc. His primary research interests lie in machine learning, optimization, AI, and data science.

***** ALL ARE WELCOME *****

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