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Computational Mathematics Seminar Series

Distributionally Robust Optimization in Kernel and Unbalanced Transport Geometry

Jia-Jie Zhu

Weierstrass Institute for Applied Analysis and Stochastics, Berlin

Zoom Online Virtual
April 11, 2023 - 03:30 pm

Abstract:

Zoom: https://lsu.zoom.us/j/6653973295

This distribution shift in machine learning (ML) can happen as a consequence of causal confounding, unfairness due to data biases, and adversarial attacks. In such cases, recent optimizers adopt robustification strategies derived from distributionally robust optimization (DRO). For example, one of the most interesting directions of DRO is the adoption of the optimal transport distance, the Wasserstein distance. While the Wasserstein DRO literature has exploded, it is restricted to the pure transport regime, often similar to existing regularization techniques already used by machine learners. To make matters worse, many state-of-the-art Wasserstein DRO methods based place severe limitations on the learning models and scalability, making them inapplicable to modern ML tasks. With those limitations in mind, I will introduce mathematical tools beyond the Wasserstein DRO using unbalanced optimal transport and kernel geometry. I will also discuss ML applications such as robust learning under distribution shift.

Speaker's Bio:

Jia-Jie Zhu is a research group leader at the Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Berlin, Germany. Previously, he worked as a postdoctoral researcher in machine learning at the Max Planck Institute for Intelligent Systems in Tübingen, Germany. He received his Ph.D. in optimization, with William Hager, at the University of Florida. Nowadays, he is interested in the intersection of machine learning, numerical optimization, and dynamical systems theory, on topics such as robustness and gradient flow.

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