Department of
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Efficient Machine Learning: with Applications in Robust Matrix Recovery and Quantization

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Abstract

In the current era of large-scale machine learning models, efficiency across various stages of model development and deployment is becoming increasingly crucial. This talk addresses three key aspects of efficiency: training efficiency, inference efficiency, and sample efficiency, with a focus on their applications in robust matrix recovery and quantization. First, we introduce a framework for robust matrix recovery that leverages robust loss in conjunction with the subgradient method. Our results demonstrate that this approach achieves near-optimal sample and computational complexities, even in scenarios where the data is heavily corrupted. Second, we present an efficient quantization-aware training algorithm based on a piecewise-affine regularizer. This method not only enhances computational efficiency but also shows theoretical and empirical superiority over existing techniques.

About the Speaker

Jianhao Ma is a final-year Ph.D. student in the Industrial and Operations Engineering Department at the University of Michigan, Ann Arbor. His research spans optimization, statistics, and machine learning, with a particular emphasis on developing efficient, theoretically sound optimization algorithms for high-dimensional machine learning problems involving noisy data. He is a recipient of the Rackham Predoctoral Fellowship from the University of Michigan. His work has also earned the INFORMS JFIG Best Paper Award (second prize) and the Katta Murty Prize for Best Research Paper on Optimization from the IOE Department.

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