



Optimization and Machine Learning Seminar

The Benefits of Aggressive Updates in Machine Learning: Large Stepsizes, Local Training, and Learning Dynamics

Prof. Mingrui Liu

George Mason University, United States

Abstract

Large stepsizes and local training are often viewed as aggressive algorithmic choices in machine learning. Large stepsizes may lead to instability or oscillation, while local training in distributed and federated learning may introduce drift under data heterogeneity. In this talk, I will discuss a series of results showing that this conservative view can be incomplete: in several learning problems, aggressive updates can be beneficial.

I will first use logistic regression as a clean mathematical model to study the optimization dynamics of large stepsizes and local updates. In the single-machine setting, large stepsizes can lead to significantly faster convergence behavior than what is suggested by standard small-step analysis. In the distributed setting, local updates can introduce structured drift, but this drift can sometimes accelerate optimization rather than simply harm convergence.

I will then discuss how this perspective extends beyond logistic regression. In particular, local training affects not only optimization speed, but also the features learned by neural networks. Overall, the talk highlights a broader message: algorithmic choices that appear risky from a classical optimization viewpoint can play a constructive role in modern machine learning.

Date:	July 13, 2026 (Monday)
Time:	4:00 pm - 5:00 pm
Venue:	Room 210, Run Run Shaw Building HKU