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Optimization Program Inverse Problems Workshop
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Lecture: *Stochastic Newton and Quasi-Newton Methods for Large Linear Least-squares Problems*

Speaker: Mathias Chung

Abstract:

In this work, we describe stochastic Newton and stochastic quasi-Newton approaches to efficiently solve large linear least-squares problems, for applications where the size of the data exceeds the memory capabilities or for problems with time-dependent data acquisition. In our proposed framework, stochasticity is introduced as a means to overcome these computational limitations, and probability distributions that can exploit structure and/or sparsity are considered. Two stochastic approximation methods are developed for approximating solutions. Theoretical results on consistency of estimators for both the stochastic Newton and the stochastic quasi-Newton methods are provided and reveal that stochastic Newton iterates, in contrast to stochastic quasi-Newton iterates, may not converge to the desired least-squares solution. Numerical examples demonstrate the potential benefits of these methods.

This is joined work with Julianne Chung, Tanner Slagel, and Luis Tenorio.