THE UNIVERSITY OF CHICAGO

COMPUTATIONAL AND APPLIED MATHEMATICS COLLOQUIUM

DMITRIY DRUSVYATSKIY
Mathematics Department
University of Washington

Convergence Rates of Stochastic Algorithms in Nonsmooth Nonconvex Optimization

THURSDAY, October 25, 2018, at 4:00 PM
Jones 226, 5747 South Ellis Avenue

ABSTRACT

Stochastic iterative methods lie at the core of large-scale optimization and its modern applications to data science. Though such algorithms are routinely and successfully used in practice on highly irregular problems (e.g. deep neural networks), few performance guarantees are available outside of smooth or convex settings. In this talk, I will describe a framework for designing and analyzing stochastic methods on a large class of nonsmooth and nonconvex problems, with provable efficiency guarantees. The problem class subsumes such important tasks as phase retrieval, robust PCA, and minimization of risk measures, while the methods include stochastic subgradient, Gauss-Newton, and proximal point iterations. The main thread of the proposed framework is appealingly intuitive. I will show that a wide variety of stochastic methods can be interpreted as inexact gradient descent on an implicit smoothing of the problem.

Optimal learning rates and novel sample-complexity bounds follow quickly from this viewpoint.

This is joint work with Damek Davis, Sham Kakade, and Jason D. Lee.

Organizers:
Daniel Sanz-Alonso, Department of Statistics, sanzalonso@uchicago.edu
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