THE UNIVERSITY OF CHICAGO

Departments of Computer Science, Mathematics, Statistics and the Computation Institute

SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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Microsoft Research

Accelerating Stochastic Gradient Descent

THURSDAY, April 6, 2017 at 4:30 PM

226 Jones Laboratory, 5747 S. Ellis Avenue

Host: John Lafferty

ABSTRACT

There is widespread sentiment that it is not possible to effectively utilize fast gradient methods (e.g. Nesterov's acceleration, conjugate gradient, heavy ball) for the purposes of stochastic optimization due to their instability and error accumulation, a notion made precise in dAspremont 2008 and Devolder et al. 2014. This work strongly refutes this folklore by showing that acceleration, in a precise sense, is robust to statistical errors. In particular, this paper introduces an accelerated stochastic gradient method that enjoys minimax optimal statistical estimation at a rate that is provably faster than stochastic gradient descent. This paper's analysis techniques involve the introduction of a technical lens of viewing the proposed accelerated stochastic gradient descent updates as a stochastic process, which is a tool that we believe could be of independent interest in the design and analysis of algorithms for the stochastic approximation problem.

Joint work with Prateek Jain, Sham M. Kakade, Rahul Kidambi and Aaron Sidford

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