



THE UNIVERSITY OF CHICAGO

COMPUTATIONAL AND APPLIED MATHEMATICS COLLOQUIUM

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Highly Efficient Algorithms for Solving Lasso-type Problems based on Second-order Sparsity

WEDNESDAY, November 22, 2017, at 12:30 PM

Jones 226, 5747 South Ellis Avenue

ABSTRACT

In this talk, we present a fast and robust algorithmic framework SSNAL for solving large scale lasso-type problems. SSNAL is a semismooth Newton based augmented Lagrangian algorithmic framework. We show that for lasso problems, both the primal and dual iteration sequences generated by SSNAL possess a remarkably fast linear convergence rate, which can even be superlinear asymptotically. We also conduct variational analysis to analyse the second-order sparsity structure of the underlying problems and proposed efficient numerical techniques to exploit the structure in our algorithm. Numerical comparison between our approach and state-of-the-art solvers on real data sets are presented to demonstrate the high efficiency and robustness of our proposed algorithm in solving challenging large scale lasso problems. For example, for a problem with over 4 million features and 16000 samples, SSNAL can solve it in 20 seconds, while the best alternative solver took 2400 seconds. This talk is based on joint work with Sun Defeng and Xudong Li.

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