



# THE UNIVERSITY OF CHICAGO

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

## SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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### Algorithms for Large Scale Matrix Optimization

**FRIDAY, May 16, 2014, at 4:30 PM**

Eckhart 133, 5734 S. University Avenue

### ABSTRACT

Convex matrix optimization problems (MOPs) arise in a wide variety of applications. The last two decades have seen dramatic advances in the theory and practice of matrix optimization, stimulated in part by the realization that it is an extremely powerful modeling tool. In particular, semidefinite programming (SDP) and its generalizations have been widely used as a powerful modeling tool in signal processing, relaxations of combinatorial and polynomial optimization problems, covariance matrix estimation, and sensor network localization. The first part of the talk will describe several applications, such as matrix completion and covariance selection, that have attracted recent interest in large scale SDP and its generalizations such as nuclear norm minimization and convex quadratic SDP. The second part focuses on designing algorithms based on proximal point and augmented Lagrangian framework for solving MOPs. In particular, we present recent advances in the design and implementation of an augmented Lagrangian based method (called SDPNAL+) for solving large scale doubly nonnegative SDPs. Numerical experiments on a variety of large scale SDPs show that SDPNAL+ can be very efficient, and it outperforms two other recent codes, SDPAD and 2EBD-HPE, which are solvers based respectively on alternating direction and hybrid proximal extragradient methods for solving some classes of large scale SDPs.

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