

APPLIED MATHEMATICS COLLOQUIUM

Noisy Matrix Decomposition: Applications and Methods

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Abstract:

Consider a matrix that can be decomposed as the sum of two unknown matrices, one of which is approximately low-rank and the other having a complementary form of low-dimensional structure, such as bandedness, sparsity, or column-sparsity. Given noisy or partial observations, how to recover accurate estimates of the underlying decomposition?

Matrix decompositions of this type arise in different applications, among them robust forms of dimensionality reduction (PCA, canonical correlations etc.), collaborative filtering problems (e.g., Netflix and Amazon), and estimating the structure of Gaussian graphical models. Various researchers have studied conditions under which simple convex programs, involving the nuclear norm as a rank surrogate, can perform exact recovery based on noiseless observations. In practical settings, observations are likely to be noise-corrupted, and matrices only approximately low-rank. We describe a simple convex program for noisy observations, and sketch how optimal recovery guarantees can be derived under milder conditions.

Based on joint work with Alekh Agarwal and Sahand Negahban. Arxiv preprint:
<http://arxiv.org/abs/1102.4807>

Monday May 9th, 2011

4:30 PM

Building 2, Room 105

*Refreshments are available in Building 2, Room 290
(Math Common Room) between 3:30 – 4:30 PM*

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