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

SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

XIAOYE S. LI

Computational Research Division

Lawrence Berkeley National Lab

Accelerating Sparse Factorization Methods with Algorithmic and Hardware Advances

THURSDAY, February 9, 2017 at 4:30 PM

226 Jones Laboratory, 5747 S. Ellis Avenue

Host: Risi Kondor

ABSTRACT

Many extreme-scale simulation codes encompass multiphysics components in multiple spatial and length scales. The resulting discretized sparse linear systems can be highly indefinite, nonsymmetric and extremely ill-conditioned. For such problems, factorization based algorithms are often the most robust algorithmic choices among many alternatives, either being used as direct solvers, or as coarse-grid solvers in multigrid, or as preconditioners for iterative solvers which otherwise rarely converge. We present our recent research on novel factorization algorithms that are efficient for solving such problems. We incorporate data-sparse low-rank structures, such as hierarchical matrix algebra, to achieve lower arithmetic and communication complexity as well as robust preconditioner. We will illustrate both theoretical and practical aspects of the methods, and demonstrate their performance on recent multicore machines, using a variety of real world problems.

Organizers:

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