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Randomized Sketching for Large-Scale Spectral Recovery: The MAM^* Method and New Directions

The past decade has seen an explosion in the availability of experimental datasets and the rise in personal and professional computing power. For numerical simulations, this enables finer space resolution over longer time horizons, yielding data sets that are costly to store and process. This motivates techniques such as randomized sketching, which offers structure-preserving dimension reduction of data sets and can enable singe-pass or streaming data processing. In this poster, we first review the $MAM*$ framework, a recent development in randomized sketching for low-rank approximation and spectral recovery. This approach combines randomized linear measurements with compressed sensing techniques to recover sparse approximations of the leading eigenvectors of extremely large, approximately low-rank matrices. Building on these developments, we outline ongoing research directions aimed at extending randomized sketching techniques to the recovery of singular vectors and low-rank factors of large matrices and tensors.