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Methods for Computing Correlation and Singular Value Thresholds

Proposal Abstract:

In 2005, we developed one of the most popular Partial Singular Value Decomposition (PSVD) methods for large matrices, referred to as IRLBA. The IRLBA method has been translated into numerous programming languages, where the R code has been downloaded over 3 million times since 2011. In 2015, we leveraged the IRLBA method to develop a correlation threshold algorithm for finding highly correlated pairs of columns of matrices. However, the method was not fully developed until 2023 when we published an efficient method for extending the PSVD. During that process we discovered another application of the IRLBA method to singular value thresholding. The correlation threshold algorithm has numerous applications in genomics, machine learning, and finance, whereas singular value thresholding has applications in matrix completion problems, analysis of directed networks and discrete ill--posed problems. In this proposal, we seek funding to develop public domain codes both for efficiently finding correlation and singular value thresholds in MATLAB, R, and Julia. With this funding we also plan to submit two papers for publication. Funds for this project will be used to develop the computer codes during July and August 2023.

Awarded: $4,000