

An algorithm for two-cost budgeted matrix completion

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Abstract Matrix completion is a ubiquitous tool in machine learning and data analysis. Most work in this area has focused on the number of observations necessary to obtain an accurate low-rank approximation. In practice, however, the cost of observations is an important limiting factor, and experimentalists may have on hand multiple modes of observation with differing noise-vs-cost trade-offs. This work considers matrix completion subject to such constraints: a budget is imposed and the experimentalist's goal is to allocate this budget between two sampling modalities in order to recover an accurate low-rank approximation. Specifically, we consider that it is possible to obtain low noise, high cost observations of individual entries or high noise, low cost observations of entire columns. We introduce a regression-based completion algorithm for this setting and experimentally verify the performance of our approach on both synthetic and real data sets. When the budget is low, our algorithm outperforms standard completion algorithms. When the budget is high, our algorithm has comparable error to standard nuclear norm completion algorithms and requires much less computational effort.

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