Individualized Rank Aggregation using Nuclear Norm Regularization

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In recent years rank aggregation has received significant attention. The goal of such a problem is to combine the (partially revealed) preferences over objects of a large population into a single, relatively consistent ordering of those objects. However, in many cases, we might not want a single ranking and instead opt for individual rankings. We study a version of the problem known as collaborative ranking. In this problem we assume that individual users provide us with pairwise preferences (for example purchasing one item over another). From those preferences we wish to obtain rankings on items that the users have not had an opportunity to explore. The results here have a very interesting connection to the standard matrix completion problem. We provide a theoretical justification for a nuclear norm regularized optimization procedure, and provide high-dimensional scaling results that show how the error in estimating user preferences behaves as the number of observations increases. We complement the theoretical analysis with an empirical study demonstrating the validity of the results.

Keywords: High-dimensional estimation, pair-wise comparisons, convex optimization