Pairwise comparison models for high-dimensional ranking: Some statistical and computational trade-offs

Abstract:

Data in the form of pairwise comparisons between a collection of n items arises in many settings, including voting schemes, tournament play, and online search rankings. We study a flexible non-parametric model for pairwise comparisons, under which the probabilities of outcomes are required only to satisfy a natural form of stochastic transitivity (SST). The SST class includes a large family of classical parametric models as special cases, among them the Bradley-Terry-Luce and Thurstone models, but is substantially richer. We characterize the global minimax risk for estimating the matrix of pairwise comparisons, as well as some locally adaptive variants. We then discuss various computational trade-offs that arise in achieving these optimal rates in an efficient way.

Based on joint work with Nihar Shah, Sivaraman Balakrishnan and Aditya Guntuboyina

BIO:

Martin Wainwright is currently a professor at University of California at Berkeley, with a joint appointment between the Department of Statistics and the Department of Electrical Engineering and Computer Sciences (EECS). He received a Bachelor’s degree in Mathematics from University of Waterloo, Canada, and Ph.D. degree in EECS from Massachusetts Institute of Technology (MIT). His research interests include high-dimensional statistics, information theory, statistical machine learning, and optimization theory. He has been awarded an Alfred P. Sloan Foundation Fellowship (2005), Best Paper Awards from the IEEE Signal Processing Society (2008), and IEEE Communications Society (2010); the Joint Paper Prize (2012) from IEEE Information Theory and Communication Societies; a Medallion Lectureship (2013) from the Institute of Mathematical Statistics; a Section Lecturer at the International Congress of Mathematicians (2014); and the COPSS Presidents’ Award (2014) from the Joint Statistical Societies.

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