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Proudly Presents

Completing a joint PMF from projections: a low-rank coupled tensor factorization approach

There has recently been considerable interest in completing a low-rank matrix or tensor given only a small fraction (or few linear combinations) of its entries. Related approaches have found considerable success in the area of recommender systems, under machine learning. From a statistical estimation point of view, the gold standard is to have access to the joint probability distribution of all pertinent random variables, from which any desired optimal estimator can be readily derived. In practice high-dimensional joint distributions are very hard to estimate, and only estimates of low-dimensional projections may be available. We show that it is possible to identify higher-order joint PMFs from lower-order marginalized PMFs using coupled low-rank tensor factorization. Our approach features guaranteed identifiability when the full joint PMF is of low-enough rank, and effective approximation otherwise. We provide an algorithmic approach to compute the sought factors, and illustrate the merits of our approach using rating prediction as an example. This is joint work with my Ph.D. student Nikos Kargas.

Speaker

N. Sidiropoulos (Fellow, IEEE) received his Ph.D. in 1992, from the University of Maryland - College Park, where he was affiliated with the Institute for Systems Research -- one of the original NSF ERCs. He has served on the faculty of the University of Virginia, TU Crete - Greece, and University of Minnesota, where he has been a Professor of ECE since 2011, and currently holds an ADC Chair in digital technology. His research spans topics in signal processing theory and algorithms, optimization, communications, and factor analysis - with a long-term interest in tensor decomposition and its applications. His current focus is primarily on signal and tensor analytics for learning from big data. He received the NSF/CAREER award in 1998, and the IEEE Signal Processing Society (SPS) Best Paper Award in 2001, 2007, and 2011. He served as IEEE SPS Distinguished Lecturer (2008-2009), and as Chair of the IEEE Signal Processing for Communications and Networking Technical Committee (2007-2008). He served as Associate Editor for IEEE Transactions on Signal Processing (2000 - 2006), IEEE Signal Processing Letters (2000 - 2002), Signal Processing (2009 - 2013), on the editorial board of IEEE Signal Processing Magazine (2009-2011), and as Area Editor for IEEE Transactions on Signal Processing (2012-2014). He currently serves as Vice President – Membership of the IEEE SPS. He received the 2010 IEEE Signal Processing Society Meritorious Service Award, the 2013 Distinguished Alumni Award from the Dept. of ECE, University of Maryland, and was elected Fellow of the European Association for Signal Processing (EURASIP) in 2014.



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