



# Learning From Hidden Traits: Joint Factor Analysis and Latent Clustering

by

## Professor Nikos Sidiropoulos

Dept. of Electrical & Computer Engineering  
& Digital Technology Center  
University of Minnesota  
USA



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### Abstract

Many real-life datasets exhibit structure in the form of physically meaningful clusters - e.g., news documents can be categorized as sports, politics, entertainment, and so on. Taking these clusters into account together with low-rank structure may yield parsimonious matrix and tensor factorization models and more powerful data analytics. In this talk, we will explore joint low-rank factorization and latent-domain clustering; that is, in clustering the latent reduced-dimension representations of the observed entities. To exemplify this idea, we provide three formulations: joint nonnegative matrix/tensor factorization (NMF/NTF) and K-means clustering; joint volume-minimization matrix factorization and K-means clustering; and joint NMF and subspace clustering. A unified algorithmic framework is proposed, and detailed algorithms are fleshed out for the examples considered. Numerical results obtained from synthetic and real-world document and image datasets show that the proposed approach can significantly improve both factor analysis and clustering accuracy.

### Biography of the Speaker

**Nikos Sidiropoulos** received the Diploma in Electrical Engineering from the Aristotelian University of Thessaloniki, Greece, and M.S. and Ph.D. degrees in Electrical Engineering from the University of Maryland–College Park, in 1988, 1990 and 1992, respectively. He served as assistant professor at the University of Virginia, associate professor at the University of Minnesota, and professor at TU Crete, Greece. Since 2011, he has been at the University of Minnesota, where he 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 (SP) Society Best Paper Award in 2001, 2007, and 2011. He served as IEEE SP Society Distinguished Lecturer (2008-2009), and as Chair of the IEEE Signal Processing for Communications and Networking Technical Committee (2007-2008). He received the 2010 IEEE SP Society Meritorious Service Award, and the 2013 Distinguished Alumni Award from the Dept. of ECE, University of Maryland. He is a Fellow of IEEE (2009) and a Fellow of EURASIP (2014).