

Research: From Tensors to Topic Mining Vision: Bringing CIDSE to the Next Stage

Presented by Nikos Sidiropoulos, University of Minnesota
ADC Chair Professor – Digital Technology Center & Dept. of ECE

Wednesday, November 23, 2016

10:15 am–noon

Brickyard (BYENG) 210, Tempe campus

Tensors have been a mainstay of Sidiropoulos' research for more than 20 years. In this talk, he will begin with a brief introduction to tensor algebra and why it is important in many science and engineering disciplines – including data mining and machine learning, where tensors have recently gained significant momentum. He will then summarize some of his team's results, ranging from basic theory to practical parallel computation for very large tensors. One of the ways in which tensors have been introduced to data mining is for topic modeling applications, where the objective is to identify the important topics (sets of words)

in a document corpus. Tensor decomposition can guarantee identifiability of the latent topics from third-order word x word x word co-occurrence statistics. The drawback is that topics must be uncorrelated, and third-order statistics require a lot more documents for reliable estimation than second-order ones. Instead, Sidiropoulos will take you back to matrix analysis, and show how one can guarantee identifiability of the latent topics from word-document frequency or word x word co-occurrence statistics, without requiring characteristic "anchor" words, even if the topics are highly correlated (e.g., "politics" and "markets").

About the speaker



Nikos 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 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 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 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.