Washington University in St.Louis

Engineering

Preston M. Green Department of Electrical & Systems Engineering

Seminar Announcement

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Thursday, February 25, 2016
Green Hall, Room 0120
10:10 AM

Efficient Data-Driven Learning of Sparse Signal Models

Abstract: The data-driven adaptation of sparse signal models has become extremely popular in signal processing, imaging and other areas. In this talk, we present several methods for efficiently learning sparse signal models from data. We focus mainly on the efficient sparsifying transform model. Various interesting structures for sparsifying transforms such as double sparsity, union-of-transforms, and rotation invariance are considered, which enable their efficient learning and usage. We consider both batch and online transform learning. Online learning is particularly useful in applications involving large-scale or streaming data. The proposed data-driven methods are all highly efficient, scalable, and effective. We demonstrate the promising performance of our adaptive signal models in several applications including image and video denoising, and blind compressed sensing-based imaging. We also establish several convergence guarantees for the proposed model learning and image reconstruction methods that were lacking in many prior works. The efficiency and effectiveness of the methods may benefit a wide range of additional applications in imaging, computer vision, neuroscience, and other areas requiring data-driven parsimonious models.

Bio: Saiprasad Ravishankar received the B.Tech. degree in Electrical Engineering from the Indian Institute of Technology Madras, in 2008. He received the M.S. and Ph.D. degrees in Electrical and Computer Engineering, in 2010 and 2014 respectively, from the University of Illinois at Urbana-Champaign, where he was an Adjunct Lecturer in the Department of Electrical and Computer Engineering from February to May 2015, and a Postdoctoral Research Associate at the Coordinated Science Laboratory from February to August, 2015. Since August 10, 2015, he has been a Research Fellow at the University of Michigan, where he is working with Prof. Raj Rao Nadakuditi and Prof. Jeffrey A. Fessler. His current research interests include signal and image processing, dictionary learning, sparse modeling, medical imaging, data science, inverse problems, compressed sensing, machine learning, and large-scale data processing.

Host: Dr. Arye Nehorai