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IEEE Journal of Selected Topics in Signal Processing (J-STSP)
Special Issue on Structured Matrices in Signal and Data Processing

The idea of representing a signal as a vector living in some linear vector space has borne tremendous fruit in signal processing. This viewpoint provides an encompassing framework for classical least-squares and subspace-based signal processing, and a language with which to model a signal's structural properties. In a variety of signal processing and machine learning problems, the central information is more naturally characterized in terms of a matrix. Matrices allow us to express relationships between multiple signals, or describe an operator that maps one signal to another.

Structured matrix models offer a mechanism for describing mathematically what properties we expect a matrix to have. These models are useful for regularizing problems that would otherwise be ill-posed. For example, the important "low rank" model asserts that the matrix columns live in a low-dimensional subspace; this allows high-dimensional matrices to be factored into products of lower-dimensional matrices. This fact has far-reaching implications: low-rank models are ubiquitous in classical subspace-based signal processing, principal components analysis is fundamental for dimensionality reduction, and low-rank matrices can be completely recovered when only a subset of their entries is observed. Other types of structured models lead to unique matrix factorizations in signal and data processing: restricting the matrices to be non-negative is a model used in imaging, source separation problems, and text analysis; restricting one of the factors to be sparse leads to sparse representations for dictionary learning.

This special issue will bring together work from a variety of research areas, all of which involve discovering or exploiting structured matrix factorizations. Topics of interest include—but are not limited to—theory, algorithms, and applications of:

- Low-rank matrix recovery and its applications such as blind deconvolution and phase retrieval
- Structured matrix factorizations in data processing, including matrix-based recommendation systems and collaborative filtering techniques, pattern recognition and machine learning, and big data processing
- Non-negative matrix factorization in signal processing and its applications such as blind source separation
- Computer vision, image/video processing, noise removal, super-resolution, and inpainting
- Matrix structures in radar and sensor array signal processing
- Subspace identification and tracking
- Dictionary learning and sparse coding
- Factorization/implementation of linear operators and signal transformations
- Cross-disciplinary applications in communications, systems and control, aerospace, information theory, applied mathematics, medicine, biology, and network science
- Extensions of the above involving tensor-based signal models

Important dates:

- Manuscript submission due: ~~July 15, 2015~~ July 29, 2015
- First review completed: October 15, 2015
- Revised manuscript due: December 1, 2015
- Second review completed: February 1, 2016
- Final manuscript due: March 1, 2016
- Publication date: June 2016

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