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Program

Convex and Non-convex Approaches for Low-Dimensional Models

Tutorial

Many natural and man-made signals can be well modeled as having a few degrees of freedom relative to their "size"/"dimension", due to natural parameterizations or constraints; examples range from the classical band-limited signals that have been studied for many decades, to collections of video and acoustic signals observed from multiple viewpoints and locations in a network-of-sensors and to internet "signals" generated with limited network connectivity. The inherent low-dimensional structure of such signals may be mathematically modeled via combinatorial and/or geometric concepts, such as sparsity, unions-of-subspaces, manifolds, or mixtures of factor analyzers, and are revolutionizing the way we address inverse problems (e.g., signal recovery, parameter estimation, or structure learning) from dimensionality-reduced or incomplete data.

Addressing inverse problems by using a low dimensional model (LDM) to arbitrate the solution among infinitely many possible candidates for the unknown signal (i.e., as a prior, in Bayesian terms) typically leads to optimization problems with exponential complexity. Surprisingly, convex relaxations of specific LDM (priors) produce solutions that are provably close to (or even exactly the same as) an exhaustive search result, at the cost of a slight penalty in the number of required observations. For example, theoretically, using the 1-norm or the nuclear-norm is analogous to seeking the sparsest solution in compressive sensing (CS) or finding the minimum rank solution in matrix completion (MC), respectively, both known to be NP-hard problems. Unfortunately, many other interesting LDMs are intrinsically combinatorial and cannot be "convexified" (or can only be approximated up to constant factors). Such problems require explicitly combinatorial approximation algorithms that can go beyond simple LDM selection heuristics towards provable solution quality as well as runtime/space bounds.

Signal Processing for Power Grid

Tutorial

Student Poster Competition

Syntactic Track-Before-Detect

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Joint-sparse Recovery in Compressed Sensing with Dictionary Mismatch

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RSS-Based Sensor Network Localization in Contaminated Gaussian Measurement Noise

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An Empirical-Bayes Approach to Recovering Linearly Constrained Non-Negative Sparse Signals

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Relative Velocity Estimation Using Multidimensional Scaling

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False-alarm regulation for target detection in Hyperspectral Imaging

Joana Frontera (Supélec, France); Frederic Pascal (Supélec, France); Jean Philippe Ovarlez (ONERA, France)
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Reduced-Complexity Distributed Beamforming Algorithm for Individual Relay Power Constraints

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Cyclostationary Detection from Sub-Nyquist Samples for Cognitive Radios: Model Reconciliation

Deborah Cohen (Technion - Israel Institute of Technology, Israel); Eric Rebeiz (UCLA, USA); Yonina C. Eldar (Technion-Israel Institute of Technology, Israel); Danijela Cabric (University of California Los Angeles, USA)
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Bayesian Cyclic Bounds for Periodic Parameter Estimation

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Marginal Likelihoods for Distributed Estimation of Graphical Model Parameters

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Resource-Efficient Parametric Recovery of Linear Time-varying Systems

Andrew Harms (Duke University, USA); Waheed U. Bajwa (Rutgers University, USA); Robert Calderbank (Duke University, USA)
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To Convexify or Not? Regression with Clustering Penalties on Graphs

Marwa El Halabi (EPFL, Switzerland); Luca Baldassarre (EPFL & LIONS, Switzerland); Volkan Cevher (Ecole Polytechnique Federale de Lausanne, Switzerland)
pp. 21-24

Small Sample Community Detection in Massive Data Sets

Plenary

We live in an era of large networks generating lots of data whose topologies are important but are only partially known to us. Detection of communities in such networks involves hypothesis testing on nodes and edges. In many networks, edges reflect the existence of significant pairwise correlation or partial correlation between data generated at the nodes. When the thresholded sample correlation is used to construct the network this problem is called correlation mining. For small sample size and large number of nodes there may be many false positives that prevent accurate discovery of topology and community structure. This talk will review the correlation mining problem and present applications in genomics, computational neuroscience, and the analysis of financial time series.

New Sensing and Inference Methods for Large-Scale Data

Special session

On GROUSE and Incremental SVD

Laura Balzano (University of Michigan, USA); Stephen J Wright (University of Wisconsin, USA)
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An Empirical-Bayes Approach to Recovering Linearly Constrained Non-Negative Sparse Signals

Jeremy Vila (The Ohio State University, USA); Philip Schniter (The Ohio State University, USA)
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Locating Salient Items in Large Data Collections With Compressive Linear Measurements

Jarvis D. Haupt (University of Minnesota, USA)
pp. 9-12

Lost Without a Compass: Nonmetric Triangulation and Landmark Multidimensional Scaling

Mark Davenport (Georgia Institute of Technology, USA)
pp. 13-16

Beyond Sparsity: Universally Stable Compressed Sensing when the number of 'free' values is less than the number of observations

Galen Reeves (Duke University, USA)
pp. 17-20

To Convexify or Not? Regression with Clustering Penalties on Graphs

Marwa El Halabi (EPFL, Switzerland); Luca Baldassarre (EPFL & LIONS, Switzerland); Volkan Cevher (Ecole Polytechnique Federale de Lausanne, Switzerland)
pp. 21-24

Track-Before-Detect (TBD) and Multi-Frame Detection (MFD)

Special session

A multitarget range-azimuth tracker for maritime applications

Francesco Bandiera (University of Salento, Italy); Marco Del Coco (University of Salento, Italy); Giuseppe Ricci (University of Salento, Italy)
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ML-PMHT Threshold Determination for False Track Probability Using Extreme-Value Analysis

Steven Schoenecker (Naval Undersea Warfare Center Division Newport, USA); Yaakov Bar-Shalom (University of Connecticut, USA); Peter Willett (University of Connecticut, USA)
pp. 29-32

General multi-object filtering and association measure

Jeremie Houssineau (Heriot-Watt University, United Kingdom); Pierre DeL Moral (INRIA, France); Daniel Clark (Heriot Watt, United Kingdom)
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Tracking Position and Orientation of a Mobile Rigid Body

Sundeep Prabhakar Chopuri (Delft University of Technology, The Netherlands); Andrea Simonetto (Delft University of Technology, The Netherlands); Geert Leus (Delft University of Technology, The Netherlands); Alle Jan van der Veen (Delft University, The Netherlands)
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Syntactic Track-Before-Detect

Mustafa Fanaswala (University of British Columbia, Canada); Vikram Krishnamurthy (University of British Columbia, Canada)
pp. 41-44

A track-before-detect algorithm with successive track cancellation

Emanuele Grossi (University of Cassino, Italy); Marco Lops (University of Cassino & CNIT - Consorzio Universitario Nazionale per le Telecomunicazioni, Italy); Luca Venturino (Universita' degli Studi di Cassino e del Lazio Meridionale, Italy)
pp. 45-48

Alternating Direction Optimization for Imaging and Machine Learning Problems

Plenary

This talk will review our recent work on the application of the alternating direction method of multipliers (ADMM) to several imaging inverse problems. We will show how ADMM provides an efficient and modular optimization tool, which allows addressing a wide variety of problems (namely, image restoration and reconstruction, under Gaussian, Poissonian, or multiplicative noise) using several different types of regularizers (such as total variation, frame-based analysis, frame-based synthesis, or hybrid/balanced analysis-synthesis regularization), and formulations (constrained or unconstrained optimization). We will describe very recent work on the use of ADMM for blind deconvolution and in dealing efficiently with non-periodic boundary conditions. Finally (time permitting), we will also show how ADMM can be used to efficiently perform maximum a posteriori inference in probabilistic graphical models.

Computational Advances in Array Processing I: Parameter Estimation and Decomposition Techniques

Special session

Low-Complexity Robust Data-Dependent Dimensionality Reduction Based on Joint Iterative Optimization of Parameters

Peng Li (University of York, United Kingdom); Rodrigo C. de Lamare (University of York, United Kingdom)
pp. 49-52

Iterative root-MUSIC algorithm for DOA estimation

Mahdi Shaghghi (University of Alberta, Canada); Sergiy A. Vorobyov (Aalto University & University of Alberta on leave, Finland)
pp. 53-56

Source Number Detection with Nested Arrays and ULAs Using Jackknifing

Keyong Han (Washington University in St. Louis, USA); Arye Nehorai (Washington University in St. Louis, USA)
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A Novel Method of DOA Tracking by Penalized Least Squares

Ashkan Panahi (Chalmers University of Technology, Sweden); Mats Viberg (Chalmers University of Technology, Sweden)
pp. 61-64

Kronecker Sum Decompositions of Space-Time Data

Kristjan Greenewald (University of Michigan, USA); Theodoros Tsiligkaridis (University of Michigan - Ann Arbor, USA); Alfred Hero III (University of Michigan, USA)
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Adaptive Waveform Design for Target Enumeration in Cognitive Radar

Joseph Tabrikian (Ben-Gurion University of the Negev, Israel)
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Distributed Statistical Inference

Special session

Marginal Likelihoods for Distributed Estimation of Graphical Model Parameters

Zhaoshi Meng (University of Michigan, USA); Dennis Wei (IBM T. J. Watson Research Center, USA); Ami Wiesel (Hebrew University in Jerusalem, Israel); Alfred Hero III (University of Michigan, USA)
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A Decentralized Approach to Generalized Power System State Estimation

Vassilis Kekatos (University of Minnesota & University of Patras, USA); Evangelos Vlachos (University of Patras, Greece); Dimitris Ampeliotis (University of Patras & Research Academic Computer Technology Institute, Greece); Georgios B. Giannakis (University of Minnesota, USA); Kostas Berberidis (University of Patras, Greece)
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Distributed Sensor-Informative Tracking of Targets

Guohua Ren (University of Texas at Arlington, USA); Ioannis Schizas (University of Texas at Arlington, USA)
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Hierarchical Clustering and Consensus in Trust Networks

Santiago Segarra (University of Pennsylvania, USA); Alejandro Ribeiro (University of Pennsylvania, USA)
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Partial-Diffusion Recursive Least-Squares Estimation Over Adaptive Networks

Reza Arablouei (University of South Australia, Australia); Stefan Werner (Aalto University, Finland); Kutluyil Doğançay (University of South Australia, Australia)
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Performance Comparison of Randomized Gossip, Broadcast Gossip and Collection Tree Protocol for Distributed Averaging

Jun Ye Yu (McGill University, Canada); Michael Rabbat (McGill University, Canada)
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Computational Advances in Array Processing II: Adaptive Beamforming and Radar

Special session

Enhanced Capon Beamformer Using Regularized Covariance Matching

Dave Zachariah (KTH EE, Sweden); Magnus Jansson (KTH Royal Institute of Technology, Sweden); Saikat Chatterjee (KTH - Royal Institute of Technology & Communication Theory Lab, Sweden)
pp. 97-100

Constrained ML Estimation of Structured Covariance Matrices with Applications in Radar STAP

Bosung Kang (The Pennsylvania State University, USA); Vishal Monga (Pennsylvania State University, USA); Muralidhar Rangaswamy (AFRL, USA)
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A Beamforming Approach to Imaging of Stationary Indoor Scenes under Known Building Layout

Fauzia Ahmad (Villanova University, USA); Moeness G. Amin (Villanova University, USA); Traian Dogaru (US Army Research Lab, USA)
pp. 105-108

Broadband Angle of Arrival Estimation Methods in a Polynomial Matrix Decomposition Framework

Stephan Weiss (University of Strathclyde, United Kingdom); Mohamed Alrmah (University of Strathclyde, United Kingdom); Sangarapillai Lambotharan (Loughborough University, United Kingdom); John G McWhirter (Cardiff University, United Kingdom); Mostafa Kaveh (University of Minnesota, USA)
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Manifold Sparse Beamforming

Baran Gozcu (EPFL, Switzerland); Afsaneh Asaei (Idiap Research Institute & EPFL, Switzerland); Volkan Cevher (Ecole Polytechnique Federale de Lausanne, Switzerland)
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Gaussian Graphical Models For Proper Quaternion Distributions

Alba Sloin (HUJI, Israel); Ami Wiesel (Hebrew University in Jerusalem, Israel)
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Distributed and Sensor Networks

Poster

RSS-Based Sensor Network Localization in Contaminated Gaussian Measurement Noise

Feng Yin (Technische Universität Darmstadt, Germany); Ang Li (Technische Universität Darmstadt, Germany); Carsten Fritsche (IFEN GmbH, Germany); Fredrik Gustafsson (Linköpings universitet, Sweden); Abdelhak M Zoubir (Darmstadt University of Technology, Germany)
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Relative Velocity Estimation Using Multidimensional Scaling

Raj Thilak Rajan (ASTRON & TU Delft, The Netherlands); Geert Leus (Delft University of Technology, The Netherlands); Alle Jan van der Veen (Delft University, The Netherlands)
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Statistical Approaches for Personal Feature Extraction from Pressure Array Sensors

Toshiki Iso (NTT DOCOMO, Inc., Japan); Tsutomu Horikoshi (NTT DOCOMO, Japan)
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Learning a common dictionary over a sensor network

Pierre Chainais (INRIA Lille-Nord Europe & Clermont University, France); Cédric Richard (Université de Nice Sophia-Antipolis, France)
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Performance analysis of diffusion LMS in multitask networks

Jie Chen (Université de Nice Sophia-Antipolis, France); Cédric Richard (Université de Nice Sophia-Antipolis, France)
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Random Pairwise Gossip on Hadamard Manifolds

Anass Bellachehab (Telecom Sud Paris, France); Jérémie Jakubowicz (Télécom SudParis, France)
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Opportunistic Routing under Unknown Stochastic Models

Pouya Tehrani (Qualcomm Inc., USA); Qing Zhao (University of California at Davis, USA); Tara Javidi (UCSD, USA)
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Multidimensional and Image Processing

Poster

Ultrasound Testing of Metallic Structures using a Dual Symmetric Path Inspection and a Matched Filter-based Method

Costin Vasile (University Politehnica of Bucharest, Romania); Teodor Petrut (Grenoble INP, France); Cornel Ioana (Institute National Polytechnique de Grenoble, France); Valentin Sgârciu (Politehnica University of Bucharest, Romania); Jerome I. Mars (Grenoble Institute of Technology, France); Ion Candel (Grenoble INP, France)
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Speckle Reducing Diffusion for Ultrasound Image Enhancement using the Structural Similarity Image Measure

Scott Acton (University of Virginia, USA)
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Bayesian Techniques for Edge Detection on Polarimetric SAR Images

Francesco Bandiera (University of Salento, Italy); Antonio Masciullo (University of Salento, Italy); Giuseppe Ricci (University of Salento, Lecce, Italy)
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False-alarm regulation for target detection in Hyperspectral Imaging

Joana Frontera (Supélec, France); Frederic Pascal (Supélec, France); Jean Philippe Ovarlez (ONERA, France)
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Exploiting information geometry to improve the convergence of nonparametric active contours

Marcelo Pereyra (University of Bristol, United Kingdom); Hadj Batatia (University of Toulouse - IRIT/ENSEEIH, France); Steve McLaughlin (Heriot Watt University, United Kingdom)
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Signal Processing for Big Data

Special session

Two-stage variable selection for molecular prediction of disease

Hamed Firouzi (University of Michigan, USA); Bala Rajaratnam (Stanford University, USA); Alfred Hero III (University of Michigan, USA)
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Online Local Linear Classification

Joe Wang (Boston University, USA); Kirill Trapeznikov (Boston University, USA); Venkatesh Saligrama (Boston University, USA)
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Universal Multiple Outlier Hypothesis Testing

Yun Li (University of Illinois, Urbana-Champaign & Coordinated Science Laboratory, USA); Sirin Nitinawarat (University of Illinois at Urbana-Champaign, USA); Venugopal Veeravalli (University of Illinois at Urbana-Champaign, USA)
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Recent Results on Sparse Principle Component Analysis

T. Tony Cai (University of Pennsylvania, USA); Zongming Ma (University of Pennsylvania, USA); Yihong Wu (University of Illinois Urbana-Champaign, USA)
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Gene Prioritization via Weighted Kendall Rank Aggregation

Minji Kim (University of Illinois at Urbana-Champaign, USA); Fardad Raisali (University of Illinois at Urbana-Champaign, USA); Farzad Farnoud (Hassanzadeh) (California Institute of Technology, USA); Olgica Milenkovic (UIUC, USA)
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Compressive Sensing for Urban Radar

Plenary

Compressive Sensing for Urban Radars, or Compressive Urban Sensing (CUS) using Radars, is an area of research and development which investigates the radar performance within the context of compressive sensing and with a focus on urban applications. CUS examines the effect of using significantly reduced data measurements in time, space and frequency on 2D and 3D imaging quality, strong EM reflections from exterior and interior walls, target ghosts, and moving target detection and tracking. In this respect, CUS is a hybrid between the two areas of compressive sensing and urban sensing. In essence, it enables reliable imaging of indoor targets using a very small percentage of the entire data volume. In this talk, compressive sensing will be put in context for radar, in general, and in particular for the urban environment. We will explain how CS can achieve various radar sensing goals and objectives, and how it compares with the use of full data volume. Different radar specifications and configurations will be used. In particular, we will address CS for urban radars towards achieving (a) Imaging through walls; (b) Detection of behind the wall targets; (c) Mitigation of wall clutter; and (d) Exploitation of multipath. All of the above issues will be examined using data generated both at the Radar Imaging Lab, Villanova University and by using EM simulations.

Superresolution Sensing and Reconstruction

Special session

Wideband Direction of Arrival Estimation Using Nested Arrays

Keyong Han (Washington University in St. Louis, USA); Arye Nehorai (Washington University in St. Louis, USA)
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Compressive Sampling in Array Processing

Ali Ahmed (Georgia Institute of Technology, USA); Justin K Romberg (Georgia Tech, USA)
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Sparse Iterative Adaptive Approach with Application to Source Localization

William Rowe (University of Florida, USA); Jian Li (University of Florida, USA); Petre Stoica (Uppsala University, Sweden)
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Resource-Efficient Parametric Recovery of Linear Time-varying Systems

Andrew Harms (Duke University, USA); Waheed U. Bajwa (Rutgers University, USA); Robert Calderbank (Duke University, USA)
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Sparsity based super-resolution in optical measurements

Yoav Shechtman (Technion, Israel); Alexander Szameit (Technion, Israel); Eliahyu Osherovich (Technion, Israel); Pavel Sidorenko (Technion, Israel); Oren Cohen (Technion, Israel); Yonina C. Eldar (Technion-Israel Institute of Technology, Israel); Mordechai Segev (Technion, Israel)
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Sparse image super-resolution via superset selection and pruning

Nam Nguyen (Massachusetts Institute of Technology, USA); Laurent Demanet (MIT, USA)
pp. 208-211

Tensor-based Methods for Multi-Sensor Signal Processing

Special session

Tensor subspace tracking via Kronecker structured projections (TeTraKron)

Florian Roemer (Ilmenau University of Technology, Germany); Emin-Koray Kasnakli (Ilmenau University of Technology, Germany); Yao Cheng (TU Ilmenau, Germany); Martin Haardt (Ilmenau University of Technology, Germany)
pp. 212-215

Iterative Prewhitening for Multidimensional Harmonic Retrieval: New Variants and Comparative Study

Kefei Liu (City University of Hong Kong, Hong Kong); João Paulo Carvalho Lustosa da Costa (Universidade de Brasília (UnB), Brazil); Hing Cheung So (City University of Hong Kong, Hong Kong); Rafael Timoteo de Sousa Junior (University of Brasília, Brazil)
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Multi-way Functional Principal Components Analysis

Genevera I. Allen (Rice University & Baylor College of Medicine, USA)
pp. 220-223

CANDECAMP/PARAFAC (CP) Direction Finding with Multi-Scale Array

Sebastian Miron (CRAN, Université de Lorraine, CNRS, France); Yang Song (Hong Kong Polytechnic University, Hong Kong); David Brie (CRAN, Nancy Université, CNRS, France); Kainam Thomas Wong (Hong Kong Polytechnic University, Hong Kong)
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Coupled Tensor Decompositions for Applications in Array Signal Processing

Mikael Sorensen (Leuven, Belgium); Lieven De Lathauwer (K.U.Leuven, Belgium)
pp. 228-231

Distributed Computation of Tensor Decompositions in Collaborative Networks

André Almeida (Federal University of Ceará & Wireless Telecom Research Group - GTEL, Brazil); Alain Y. Kibangou (GIPSA-Lab, UJF, CNRS, France)
pp. 232-235

Tensor tools for multi-sensor processing. Conceptual and computational advances.

Plenary

For more than 20 years, decompositions of higher-order tensors have played a key role in research on independent component analysis and blind source separation. Nowadays tensors are intensively studied in many disciplines. They open up remarkable new possibilities in signal processing, array processing, data mining, machine learning, system modelling, scientific computing, statistics, wireless communication, audio and image processing, biomedical applications, bio-informatics, etc. On the other hand, tensor methods have firm roots in multilinear algebra, algebraic geometry, numerical mathematics and optimization.

We give a brief introduction to the subject and discuss new trends and perspectives. We pay special attention to new developments relevant for multi-sensor processing, in particular in signal separation. We also pay attention to the current progress in numerical multilinear algebra.

Sparse and Low-dimensional Signal Processing

Shaping the Power Spectra of Bipolar Sequences with Application to Sub-Nyquist Sampling

Andrew Harms (Duke University, USA); Waheed U. Bajwa (Rutgers University, USA); Robert Calderbank (Duke University, USA)
pp. 236-239

Adaptive Search for Sparse Dynamic Targets

Gregory Newstadt (University of Michigan, USA); Dennis Wei (IBM T. J. Watson Research Center, USA); Alfred Hero III (University of Michigan, USA)
pp. 240-243

Sparse X-ray CT Image Reconstruction and Blind Beam Hardening Correction via Mass Attenuation Discretization

Renliang Gu (Iowa State University, USA); Aleksandar Dogandžić (Iowa State University, USA)
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Joint-sparse Recovery in Compressed Sensing with Dictionary Mismatch

Zhao Tan (Washington University in St. Louis, USA); Peng Yang (Washington University in St. Louis, USA); Arye Nehorai (Washington University in St. Louis, USA)
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Boundedness of modified multiplicative updates for nonnegative matrix factorization

Jiro Katayama (Kyushu University, Japan); Norikazu Takahashi (Okayama University, Japan); Junichi Takeuchi (Kyushu University, Japan)
pp. 252-255

Blind Multi-path Elimination by Sparse Inversion in Through-the-Wall-Imaging

Hassan Mansour (Mitsubishi Electric Research Laboratories, USA); Dehong Liu (Mitsubishi Electric Research Laboratories, USA)
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Geophysical Signal Processing

Special session

A new inversion method for NMR signal processing

Evren Yarman (Schlumberger, USA); Lucas Monzon (University of Colorado, Boulder, USA); Matthew Reynolds (University of Colorado, Boulder, USA); Nick Heaton (Schlumberger, USA)
pp. 260-263

Source Separation and Distributed Sensing: the Key for an Efficient Monitoring

Jerome I. Mars (Grenoble Institute of Technology, France); Edouard Buchoud (GIPSA LAB & EDF R&D, France); Valeriu Vrabie (Université de Reims Champagne-Ardenne, France); Amir Khan (NUST, Pakistan); Sylvain Blairon (Electricité de France, France); Guy D'Urso (Electricité de France, France)
pp. 264-267

Broadband Dispersion Extraction of Borehole Acoustic Modes via Sparse Bayesian Learning

Pu Wang (Schlumberger-Doll Research, USA); Sandip Bose (Schlumberger-Doll Research, USA)
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Methods for Large Scale Hydraulic Fracture Monitoring

Gregory Ely (MIT, USA); Shuchin Aeron (Tufts University, USA)
pp. 272-275

Seismic interferometry for sparse data: SVD-enhanced Green's function estimation

Gabriela Melo (Massachusetts Institute of Technology, USA); Alison Malcolm (Massachusetts Institute of Technology, USA); Thomas Gallott (Massachusetts Institute of Technology, USA)
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Wave Equation Receiver Deghosting

Craig Beasley (WesternGeco, USA); Richard Coates (WesternGeco, USA); Cintia Lapilli (WesternGeco, USA)
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Signal Processing in Social Networks

Special session

Multi-layer graph analytics for social networks

Brandon Oselio (University of Michigan, USA); Alex Kulesza (University of Michigan, USA); Alfred Hero III (University of Michigan, USA)
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Discovery of Path-Important Nodes using Structured Semi-Nonnegative Matrix Factorization

Shawn Mankad (University of Maryland, USA); George Michailidis (University of Michigan, USA)
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Dynamic Structural Equation Models for Tracking Topologies of Social Networks

Brian Baingana (University of Minnesota, USA); Gonzalo Mateos (University of Minnesota, USA); Georgios B. Giannakis (University of Minnesota, USA)
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Distributed reinforcement learning in multi-agent networks

Soumya Kar (Carnegie Mellon University, USA); Jose Moura (Carnegie Mellon University, USA); H. Vincent Poor (Princeton University, USA)

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Control and Prediction of Beliefs on Social Network

Tian Wang (North Carolina State University, USA); Hamid Krim (North Carolina State University, USA)
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Beamforming and Array Signal Processing

Poster

Robust Source Localization and Tracking using MUSIC-Group Delay Spectrum over Spherical Arrays

Lalan Kumar (Indian Institute of Technology Kanpur & TCS, India); Kushagra Singhal (IIT Kanpur, India); Rajesh M Hegde (Indian Institute of Technology Kanpur, India)
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Bayesian Cyclic Bounds for Periodic Parameter Estimation

Eyal Nitzan (Ben-Gurion University of the Negev, Israel); Tirza Rountenberg (Cornell University, USA); Joseph Tabrikian (Ben-Gurion University of the Negev, Israel)
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Performance of TOA and FOA-based Localization for Cospas-Sarsat Search and Rescue Signals

Victor Bissoli Nicolau (University of Toulouse, France); Martial Coulon (University of Toulouse, France); Yoan Gregoire (CNES, France); Thibaud Calmettes (Thales Alenia Space, France); Jean-Yves Tournet (University of Toulouse & IRIT/ENSEEIH/TéSA, France)
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Performance Analysis of ESPRIT-Type Algorithms for Strictly Non-Circular Sources Using Structured Least Squares

Jens Steinwandt (Ilmenau University of Technology, Germany); Florian Roemer (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)
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Approximate maximum likelihood direction of arrival estimation for two closely spaced sources

François Vincent (ISAE, France); Olivier Besson (ISAE, France); Eric Chaumette (ONERA, France)
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Adaptive Beamforming with Augmentable Arrays in Non-Stationary Environments

Jonathan Odom (Duke University, USA); Jeffrey Krolik (Duke University, USA)
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On an Iterative Method for Direction of Arrival Estimation using Multiple Frequencies

Fredrik Andersson (Lund University, Sweden); Marcus Carlsson (Lund University, Sweden); Jean-Yves Tournet (University of Toulouse & IRIT/ENSEEIH/TéSA, France); Herwig Wendt (IRIT - ENSEEIH, CNRS, France)
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Filter Bank Based Fractional Delay Filter Implementation for Widely Accurate Broadband Steering Vectors

Mohamed Alrmah (University of Strathclyde, United Kingdom); Stephan Weiss (University of Strathclyde, United Kingdom)
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Experimental Results of Compressive Sensing Based Imaging in Ultrasonic Non-Destructive Testing

Aras Azimipناه (University of Ontario Institute of Technology (UOIT), Canada); Shahram ShahbazPanahi (University of Ontario Institute of Technology, Canada)
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Sparsity-Enforcing Sensor Selection for DOA Estimation

Venkat Roy (Delft University of Technology, The Netherlands); Sundeep Prabhakar Chepuri (Delft University of Technology, The Netherlands); Geert Leus (Delft University of Technology, The Netherlands)
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Constrained Imaging for Radio Astronomy

Ahmad Mouri Sardarabadi (Delft University of Technology, The Netherlands); Alle Jan van der Veen (Delft University, The Netherlands)
pp. 344-347

Advances in Sequential Monte Carlo Methods

Special session

A Rao-Blackwellized Random Exchange Diffusion Particle Filter for Distributed Emitter Tracking

Stiven Dias (Instituto Tecnológico de Aeronáutica (ITA) & Embraer Defense & Security (EDS), Brazil); Marcelo Bruno (ITA, Brazil)
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Particle Filtering for High-Dimensional Systems

Petar M. Djurić (Stony Brook University, USA); Monica F. Bugallo (Stony Brook University, USA)
pp. 352-355

On Marginal Particle Filters with Linear Complexity

Fredrik Gustafsson (Linköpings universitet, Sweden)
pp. 356-359

Particle Filtering with Progressive Gaussian Approximations to the Optimal Importance Density

Pete Bunch (University of Cambridge, United Kingdom); Simon Godsill (University of Cambridge, United Kingdom)
pp. 360-363

Particle filtering with transformed weights

Joaquin Míguez (Universidad Carlos III de Madrid, Spain); Eugenia Koblents (Universidad Carlos III de Madrid, Spain)
pp. 364-367

Particle filter implementation of the multi-Bernoulli filter for superpositional sensors

Santosh Nannuru (McGill University, Canada); Mark Coates (McGill University, Canada)
pp. 368-371

Satellite Communications - Signal Processing Challenges

Plenary

Communication systems via satellite provide an unprecedented coverage at low cost. However, satellite networks as a means of content delivery are meeting increased competition from terrestrial communication systems. To stay competitive, innovative, cost efficient and scalable satellite services providing multimedia delivery, mobile communication services, public safety communications, backhaul etc. must be developed. The efficient and reliable delivery of these services poses several technical challenges. We discuss how signal processing techniques can be used to address some of these challenges, including diversity techniques, advanced multi-channel transmission and reception schemes, interference mitigation, and cognitive satellite communications.

Spectrum Sensing for Cognitive Radio Systems

Special session

Adaptive Block Sampling for Spectrum Sensing

Ali Tajer (Wayne State University, USA); H. Vincent Poor (Princeton University, USA)
pp. 372-375

Distributed Spectrum Sensing in Cognitive Radios via Graphical Models

Alireza Makhzani (University of Toronto, Canada); Shahrokh Valaee (University of Toronto, Canada)
pp. 376-379

Frequency Domain Distributed OFDM Source Detection

Saeed Akhavan Astaneh (Queen's University, Canada); Saeed Gazor (Queens University, Canada)
pp. 380-383

Cyclostationary Detection from Sub-Nyquist Samples for Cognitive Radios: Model Reconciliation

Deborah Cohen (Technion - Israel Institute of Technology, Israel); Eric Rebeiz (UCLA, USA); Yonina C. Eldar (Technion-Israel Institute of Technology, Israel); Danijela Cabric (University of California Los Angeles, USA)
pp. 384-387

Dynamic Learning for Cognitive Radio Sensing

Seung-Jun Kim (University of Minnesota, USA); Georgios B. Giannakis (University of Minnesota, USA)
pp. 388-391

Distributed Spectrum Sensing in the Presence of Selfish Users

Chung-Kai Yu (University of California, Los Angeles, USA); Mihaela van der Schaar (University of California, Los Angeles (UCLA), USA); Ali H. Sayed (University of California, Los Angeles, USA)
pp. 392-395

Radar Array Processing and STAP

Root-MUSIC Based Source Localization Using Transmit Array Interpolation in MIMO Radar With Arbitrary Planar Arrays

Aboulnasr Hassanien (University of Alberta, Canada); Sergiy A. Vorobyov (Aalto University & University of Alberta on leave, Finland); Yeo-Sun Yoon (Samsung Thales Co., Ltd., Korea); Joon-Young Park (Samsung Thales Co., Ltd., Korea)
pp. 396-399

Aperture Varying Autoregressive Covariance Modeling for 2D Oversampled Receive Arrays

Yuri Abramovich (W R Systems, Ltd, USA); Geoffrey San Antonio (US Naval Research Laboratory, USA)
pp. 400-403

DOA Estimation Using a Sparse Uniform Linear Array with Two CW Signals of Co-prime Frequencies

Yimin D. Zhang (Villanova University, USA); Moeness G. Amin (Villanova University, USA); Fauzia Ahmad (Villanova University, USA); Braham Himed (AFRL, USA)
pp. 404-407

Invariant Target Detection of MIMO Radar with Unknown Parameters

Ali Ghobadzadeh (Queens University, Canada); Mohammad Reza Taban (yazd University, Iran); Ali A. Tadaion (Yazd University, Iran); Saeed Gazor (Queens University, Canada)
pp. 408-411

Multidimensional Low-Rank Filter based on the AU-HOSVD for MIMO STAP

Maxime Boizard (SATIE, ENS Cachan, France); Frédéric Brigui (Temasek Laboratories@NTU & Nanyang Technological University, Singapore); Guillaume Ginolhac (Universite de Savoie & LISTIC, France); Frederic Pascal (Supélec, France); Philippe Forster (GEA, Université Paris X, France); Hongbo Sun (Nanyang Technological University, Singapore)
pp. 412-415

Cyber Attacks on a Power Grid and Counter Measures

Plenary

A defining feature of a smart grid is its ability to adapt to changing operating conditions and contingencies by leveraging advanced sensing, communication, and networking capabilities. However, relying networking for grid monitoring and real time operation comes with increasing security risks of cyber-attacks.

In this talk, we consider cyber attacks on a power grid where an adversary manipulates analog and digital data with the goal of misleading the control center with an incorrect network topology and erroneous operating state. We present a number of attack mechanisms and counter measures.

Signal and Information Processing in Energy Grids

Special session

A Framework for Actuator Placement in Large Scale Power Systems: Minimal Strong Structural Controllability

Sergio Pequito (Carnegie Mellon University - Instituto Superior Tecnico, USA); Nipun Popli (Carnegie Mellon University, USA); Soumya Kar (Carnegie Mellon University, USA); Marija Ilić (Carnegie Mellon University, USA); Antonio Pedro Aguiar (Faculty of Engineering, University of Porto, Portugal)
pp. 416-419

Dynamic Topology Adaptation for Distributed Estimation in Smart Grids

Songcen Xu (University of York, United Kingdom); Rodrigo C. de Lamare (University of York, United Kingdom); H. Vincent Poor (Princeton University, USA)
pp. 420-423

Study of Nonlinear Power Optimization Problems using Algebraic Graph Theory

Somayeh Sojoudi (California Institute of Technology, USA); Javad Lavaei (Columbia University, USA)
pp. 424-427

Advances in Decentralized State Estimation for Power Systems

Xiao Li (University of California, Davis, USA); Anna Scaglione (University of California, Davis, USA)
pp. 428-431

Monitoring Disturbances in Smart Grids Using Distributed Sequential Change Detection

Shang Li (Columbia University, USA); Xiaodong Wang (Columbia University, USA)
pp. 432-435

Online Learning of Load Elasticity for Electric Vehicle Charging

Nasim Yahya soltani (University of Minnesota, USA); Seung-Jun Kim (University of Minnesota, USA); Georgios B. Giannakis (University of Minnesota, USA)
pp. 436-439

Cognitive Radio and Radar Networks

Special session

Compressive Angular and Frequency Periodogram Reconstruction for Multiband Signals

Dyonisius Dony Ariananda (Delft University of Technology, The Netherlands); Daniel Romero (University of Vigo, Spain); Geert Leus (Delft University of Technology, The Netherlands)
pp. 440-443

A Bilateral-Market based Mechanism for Spectrum Allocation in Cognitive Radio Networks

Venkata Sriram Siddhardh Nadendla (Syracuse University, USA); Swastik Brahma (Syracuse University, USA); Pramod Varshney (Syracuse University, USA)
pp. 444-447

Adaptive PRF Selection Technique for Multiple Targets in Track-Before-Detect

Junhyeong Bae (University of Arizona, USA); Nathan A Goodman (University of Oklahoma, USA)
pp. 448-451

Primary Receiver Localization Using Sparsity and Interference Tweets

Emiliano Dall'Anese (University of Minnesota, USA); Antonio G. Marques (Universidad Rey Juan Carlos, Spain); Georgios B. Giannakis (University of Minnesota, USA)
pp. 452-455

Distributed Throughput Maximization for Multi-Channel ALOHA Networks

Kobi Cohen (UC Davis, USA); Amir Leshem (Bar-Ilan University, Israel)
pp. 456-459

Estimation, Learning, and Optimization for the Smart Grids

Hybrid Energy Storage and Generation Planning with Large Renewable Penetration

Peng Yang (Washington University in St. Louis, USA); Arye Nehorai (Washington University in St. Louis, USA)
pp. 460-463

Estimating Frequency of Three-Phase Power Systems via Widely-Linear Modeling and Total Least-Squares

Reza Arablouei (University of South Australia, Australia); Stefan Werner (Aalto University, Finland); Kutluyil Doğançay (University of South Australia, Australia)
pp. 464-467

Distributed Demand Response for Plug-in Electrical Vehicles in the Smart Grid

Zhao Tan (Washington University in St. Louis, USA); Peng Yang (Washington University in St. Louis, USA); Arye Nehorai (Washington University in St. Louis, USA)
pp. 468-471

Stochastic Programming for Energy Planning in Microgrids with Renewables

Gabriela Martinez (Cornell University, USA); Nikolaos Gatsis (The University of Texas at San Antonio, USA); Georgios B. Giannakis (University of Minnesota, USA)
pp. 472-475

Wireless Communications

Optimization of the Rate Adaptation Procedures in xDSL Systems

Wagih Sarhan (Technische Universität Darmstadt, Germany); Anja Klein (TU Darmstadt, Germany)
pp. 476-479

Expected Likelihood Support for Blind SIMO Channel Identification

Yuri Abramovich (W R Systems, Ltd, USA); Ben A. Johnson (Colorado School of Mines & Lockheed Martin, USA)
pp. 480-483

Error Exponents for Bias Detection of a Correlated Process over a MAC Fading Channel

Juan A. Maya (University of Buenos Aires, Argentina); Leonardo Rey Vega (University of Buenos Aires, Facultad de Ingeniería & CONICET, Argentina); Cecilia G. Galarza (University of Buenos Aires, Argentina)
pp. 484-487

Known-Interference Aware Iterative MMSE Filter Design for Non-Regenerative Multi-Way Relaying

Holger Degenhardt (TU Darmstadt, Germany); Anja Klein (TU Darmstadt, Germany)
pp. 488-491

Multicast Relay Beamforming through Dual Approach

Min Dong (University of Ontario Institute of Technology, Canada); Ben Liang (University of Toronto, Canada)
pp. 492-495

Reduced-Complexity Distributed Beamforming Algorithm for Individual Relay Power Constraints

Jens Steinwandt (Ilmenau University of Technology, Germany); Martin Haardt (Ilmenau University of Technology, Germany)
pp. 496-499

Multi-Relay Network Design Using Power-Normalized SNR

Yichen Hao (University of Alberta, Canada); Yindi Jing (University of Alberta, Canada); Shahram ShahbazPanahi (University of Ontario Institute of Technology, Canada)
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