LVA ICA

LIBEREC 2015

12th International Conference on Latent Variable Analysis and Signal Separation

August 25 - 28, 2015 | Liberec, Czech Republic

PROGRAM

LVA/ICA 2015 is the 12ᵗʰ in a series of international conferences which have attracted hundreds of researchers and practitioners over the years. Since its start in 1999 and under the banner of Independent Component Analysis and Blind Source Separation (ICA), the conference has continuously broadened its horizons. Today it encompasses a host of additional forms and models of general mixtures of latent variables. Theories and tools borrowing from the fields of signal processing, applied statistics, machine learning, linear and multilinear algebra, numerical analysis and optimization, and numerous application fields offer exciting interdisciplinary interactions. The conference is to be held on August 25 – 28, 2015 in Liberec, Czech Republic.

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GENERAL INFORMATION

DATE
August 25 – 28, 2015

CONFERENCE VENUE
Technical University of Liberec
Studentská 1402/2, 461 17 Liberec 1, Czech Republic
Building G
www.tul.cz/en

ORGANIZER
The 12th International Conference on Latent Variable Analysis and Signal Separation – LVA/ICA 2015 – is organized by the **Technical University of Liberec** on the occasion of the 20th anniversary of the Faculty of Mechatronics, Informatics, and Interdisciplinary Studies.

ORGANIZING COMMITTEE

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Zbyněk Koldovský | Technical University of Liberec, Czech Republic
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SiSEC evaluation chair
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AUDIO AWARD
The best student paper from the field of audio signal processing will receive a $500 award sponsored by CONEXANT.

PROCEEDINGS
The proceedings are published in Springer – Verlag's Lecture Notes in Computer Science Series (LNCS).

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SOCIAL PROGRAM

Tuesday, August 25, 2015

Welcome reception at Hotel and Restaurant „Above the Clouds"(Ještěd)

18.30 – departure from the conference venue
22.00 – closing

Ještěd is a symbol of the Liberec Region with an elevation of 1012 meters above sea level. It dominates northern Bohemia. The Ještěd transmission tower earned Karel Hubáček the prestigious Perret Prize. Thanks to its unique architecture the tower has become a national cultural monument and building of the century.
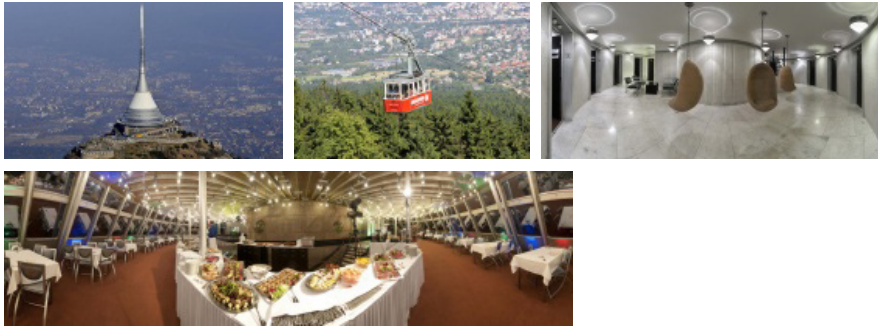
Thursday, August 27, 2015

Social evening at Hotel Panský dům and Pyramida in the picturesque Jizerka valley. Bus transport will be provided.

18.00 – departure from the conference venue
23.00 – closing

Role of Diversity in Source Separation: Theory and Applications

Tülay Adali
University of Maryland, Baltimore County, USA

Abstract: Independent component analysis (ICA) has been the most popular approach for solving the blind source separation problem. Starting from a simple linear mixing model and the assumption of statistical independence, ICA can recover a set of linearly–mixed sources to within a scaling and permutation ambiguity. It has been successfully applied to numerous data analysis problems in areas as diverse as biomedicine, communications, finance, geophysics, and remote sensing.
ICA can be achieved using different types of diversity - statistical property - and, as demonstrated in this talk, can be posed to simultaneously account for multiple types of diversity such as higher - order - statistics, sample dependence, non–circularity, and nonstationarity. A recent generalization of ICA, independent vector analysis (IVA), generalizes ICA to multiple data sets and adds the use of one more type of diversity, statistical dependence across the data sets, for jointly achieving independent decomposition of multiple data sets. With the addition of each new diversity type, identification of a broader class of signals become possible, and in the case of IVA, this includes sources that are independent and identically distributed Gaussians.
This talk reviews the fundamentals and properties of ICA and IVA when multiple types of diversity are taken into account, and then asks the question whether diversity plays an important role in practical applications as well. Examples from various domains are presented to argue that in many scenarios it might be worthwhile to jointly account for multiple statistical properties.

Tülay Adali received the Ph.D. degree in Electrical Engineering from North Carolina State University, Raleigh, NC, USA, in 1992 and joined the faculty at the University of Maryland Baltimore County (UMBC), Baltimore, MD, USA, the same year. She is currently a professor in the Department of Computer Science and Electrical Engineering at UMBC. She has held visiting positions at École Supérieure de Physique et de Chimie Industrielles, Paris, France, Technical University of Denmark, Lyngby, Denmark, Katholieke Universiteit, Leuven, Belgium, and University of Campinas, Brazil.
Prof. Adali assisted in the organization of a number of international conferences and workshops including the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), the IEEE International Workshop on Neural Networks for Signal Processing (NNSP), and the IEEE International Workshop on Machine Learning for Signal Processing (MLSP). She was the General Co–Chair, NNSP (2001–2003); Technical Chair, MLSP (2004–2008); Program Co–Chair, MLSP (2008 and 2009), 2009 International Conference on Independent Component Analysis and Source Separation; Publicity Chair, ICASSP (2000 and 2005); and Publications Co–Chair, ICASSP 2008.

Prof. Adali chaired the IEEE Signal Processing Society (SPS) MLSP Technical Committee (2003–2005, 2011–2013), served on the SPS Conference Board (1998–2006), and the Bio Imaging and Signal Processing Technical Committee (2004–2007). She was an Associate Editor for IEEE Transactions on Signal Processing (2003–2006), IEEE Transactions on Biomedical Engineering (2007–2013), IEEE Journal of Selected Areas in Signal Processing (2010–2013), and Elsevier Signal Processing Journal (2007–2010). She is currently serving on the Editorial Boards of the Proceedings of the IEEE and Journal of Signal Processing Systems for Signal, Image, and Video Technology, and is a member of the IEEE Signal Processing Theory and Methods Technical Committee.

Prof. Adali is a Fellow of the IEEE and the AIMBE, recipient of a 2010 IEEE Signal Processing Society Best Paper Award, 2013 University System of Maryland Regents' Award for Research, and an NSF CAREER Award. She was an IEEE Signal Processing Society Distinguished Lecturer for 2012 and 2013. Her research interests are in the areas of statistical signal processing, machine learning for signal processing, and biomedical data analysis.

Projections, Learning, and Sparsity for Efficient Data Processing

Rémi Gribonval
Inria, Rennes, France

Abstract: Sparse models are at the core of many research domains where the large amount and high–dimensionality of digital data requires concise data descriptions for efficient information processing. Recent breakthroughs have demonstrated the ability of these models to provide concise descriptions of complex data collections, together with algorithms of provable performance and bounded complexity. A flagship application of sparsity is the paradigm of compressed sensing, which exploits sparsity for data acquisition using limited resources (e.g. fewer/less expensive sensors, limited energy consumption, etc.). Besides sparsity, a key pillar of compressed sensing is the use of random low–dimensional projections.

Compressive sensing has been historically developed and successfully applied on sparse finite–dimensional signals, allowing to recover such signals from far fewer measurements than the ambient dimension. With the maturity of the theory has come the will to apply these paradigms to more general classes of signals, such as low–rank matrices, elements living in a general union of sub–spaces. Machine learning and kernel methods even call for the application of these ideas to functions.

In this talk I will draw a panorama of recent generalizations of sparse recovery guarantees and compressive sensing to the context of machine learning. Assuming some low–dimensional model on the probability distribution of the data, we will see that in certain scenarios it is indeed possible to (randomly) compress a large data–collection into into a reduced representation, of size driven by the complexity of the learning task, while preserving the essential information necessary to process it. Two case studies will be given: compressive clustering, and compressive Gaussian Mixture Model estimation, with an illustration on speaker verification.

Rémi Gribonval holds a Directeur de Recherche position with Inria in Rennes, France, where he is the scientific leader of the PANAMA research group on sparse audio signal processing. His research focuses on the mathematical and algorithmic aspects of signal processing & machine learning, with an emphasis on the interplay between low–dimensional models and inverse problems in high–dimensions. He founded the series of international workshops SPARS on Signal Processing with Adaptive/Sparse Representations. He has been the coordinator of several national, bilateral and European research projects. In 2011, he was awarded the Blaise Pascal Award of the GAMNI–SMAI by the French Academy of Sciences, and a starting investigator grant from the European Research Council. He is an IEEE fellow.

Deep Neural Networks for Supervised Speech Separation

DeLiang Wang | *The Ohio State University, USA*

Abstract: Speech separation, or the cocktail party problem, is a widely acknowledged challenge in speech and signal processing. Motivated by the auditory masking phenomenon, we have suggested the ideal binary mask (IBM) as a main goal for speech separation. This leads to a new formulation of the separation problem as supervised classification where time–frequency (T–F) units are classified into two classes: those dominated by the target speech and the rest. This formulation opens speech separation to modern machine learning techniques, and deep neural networks (DNN) are particularly well–suited for this problem due to their strong representational capacity. DNN–based IBM estimation elevates speech separation performance to a new level, and produces the first demonstration of substantial speech intelligibility improvements for both hearing–impaired and normal–hearing listeners in background noise. DNN–based separation is not limited to binary asking, and we have examined a number of training targets and found that ratio masking can be preferable in terms of speech quality, and T–F masking in general outperforms spectral mapping.

DeLiang Wang received the B.S. degree and the M.S. degree from Peking (Beijing) University and the Ph.D. degree in 1991 from the University of Southern California all in computer science. Since 1991, he has been with the Department of Computer Science & Engineering and the Center for Cognitive and Brain Sciences at The Ohio State University, where he is a Professor. He was a visiting scholar in the Department of Psychology at Harvard University from 1998 to 1999, and at Oticon A/S in Denmark from 2006 to 2007. Wang's research interests include machine perception and neurodynamics. He received the Office of Naval Research Young Investigator Award in 1996, the 2005 Outstanding Paper Award from IEEE Transactions on Neural Networks, and the 2008 Helmholtz Award from the International Neural Network Society. He was named the University Distinguished Scholar by Ohio State University in 2014. He is an IEEE Fellow, and currently serves as Co–Editor–in–Chief of Neural Networks.

CONFERENCE PROGRAM

TUESDAY, AUGUST 25, 2015

17.00 – 18.30	**REGISTRATION**
18.30	Bus departure to welcome reception
19.00 – 22:00	**Welcome reception** at Hotel and Restaurant „Above the Clouds" | Ještěd

WEDNESDAY, AUGUST 26, 2015

9.00 – 9.20   **OPENING**

9.20 – 10.20   **KEYNOTE 1** | Chair: Shoji Makino

1. Deep Neural Networks for Supervised Speech Separation
   DeLiang Wang

10.20 – 10.40   Coffee break

10.40 – 12.20   **ORAL SESSION 1** | Chair: Lieven De Lathauwer

Special Session: Tensor–Based Methods for Blind Signal Separation

2. Stochastic and Deterministic Tensorization for Blind Signal Separation
   Otto Debals, Lieven De Lathauwer

3. Block–Decoupling Multivariate Polynomials Using the Tensor Block–Term Decomposition
   Philippe Dreesen, Thomas Goossens, Mariya Ishteva, Johan Schoukens

4. A Polynomial Formulation for Joint Decomposition of Symmetric Tensors of Different Orders
   Pierre Comon, Yang Qi, Konstantin Usevich

5. Rank Splitting for CANDECOMP/PARAFAC
   Anh–Huy Phan, Petr Tichavsky, Andrzej Cichocki

6. Some Rank Conditions for the Identifiability of the Sparse Paralind Model
   Sebastian Miron, David Brie

12.20 – 13.40   Lunch break

13.40 – 15.40   **POSTER SESSION 1**

Special Session: Tensor–Based Methods for Blind Signal Separation

P1. Tensors and Latent Variable Models
    Mariya Ishteva

P2.   A Robust Tensor Factorisation Approach for Separation of Convolutive Complex Communication Signals
Samaneh Kouchaki, Saeid Sanei

P3.   Enhanced Tensor Based Semi–blind Estimation Algorithm for Relay–Assisted MIMO Systems
Jianshu Zhang, Ahmad Nimr, Kristina Naskovska, Martin Haardt

Special Session: Deep Neural Networks for Supervised Speech Separation/Enhancement

P4.   Improving Deep Neural Network Based Speech Enhancement in Low SNR Environments
Tian Gao, Jun Du, Yong Xu, Cong Liu, Li–Rong Dai, Chin–Hui Lee

P5.   Noise Perturbation Improves Supervised Speech Separation
Jitong Chen, Yuxuan Wang, DeLiang Wang

P6.   Speech Enhancement with LSTM Recurrent Neural Networks and Its Application to Noise–Robust ASR
Felix Weninger, Hakan Erdogan, Shinji Watanabe, Emmanuel Vincent, Jonathan Le Roux, John Hershey, Björn Schuller

P7.   Adaptive Denoising Autoencoders: A Fine–Tuning Scheme to Learn from Unknown Sources
Minje Kim, Paris Smaragdis

Regular posters

P8.   Blind Separation of Mixtures of Piecewise AR(1) Processes and Model Mismatch
Petr Tichavsky, Ondřej Šembera, Zbynek Koldovsky

P9.   Linear Discriminant Analysis with Persistent Regularization
Hideitsu Hino

P10. Estimating Correlation Coefficient Between Two Complex Signals Without Phase Observation
Shigeki Miyabe, Nobutaka Ono, Shoji Makino

P11. Acceleration of Perfusion MRI Using Locally Low–Rank Plus Sparse Model
Marie Daňková, Pavel Rajmic, Radovan Jiřík

P12. Decomposition–Based Compression of Ultrasound Raw–Data
Yael Yankelevsky, Arie Feuer, Zvi Friedman

15.40 – 16.00   Coffee break

16.00 – 17.40   ORAL SESSION 2 | Chair: Dana Lahat

Special Session: Joint Analysis of Multiple Datasets, Data Fusion, and Related Topics

7.   Joint Independent Subspace Analysis: A Quasi–Newton Algorithm
Dana Lahat, Christian Jutten

8.   Joint Decompositions with Flexible Couplings
Rodrigo Cabral Farias, Jérémy Emile Cohen, Christian Jutten, Pierre Comon

9. Learning Coupled Embedding Using MultiView Diffusion Maps
    Ofir Lindenbau, Arie Yeredor, Moshe Salhov

10. Extraction of Temporal Patterns in Multi–rate and Multi–modal Datasets
    Antoine Liutkus, Umut Simsekli, Taylan Cemgil

11. Audio–Visual Speech–Turn Detection and Tracking
    Israel–Dejene Gebru, Sileye Ba, Georgios Evangelidis, Radu Horaud

THURSDAY, AUGUST 27, 2015

9.00 – 10.00   KEYNOTE 2 | Chair: Mark Plumbley

12. Projections, Learning, and Sparsity for Efficient Data Processing
    Rémi Gribonval

10.00 – 10.20   Coffee break

10.20 – 12.20   ORAL SESSION 3

Special Session: Advances in Nonlinear Blind Source Separation | Chair: Yannick Deville

13. An Overview of Blind Source Separation Methods for Linear-Quadratic and Post-Nonlinear Mixtures
    Yannick Deville, Leonardo Tomazeli Duarte

14. Nonlinear Sparse Component Analysis with a Reference: Variable Selection in Genomics and Proteomics
    Ivica Kopriva, Sanja Kapitanović, Tamara Čačev

15. Source Separation in Post–Nonlinear Mixtures by Means of Monotonic Networks
    Leonardo Tomazeli Duarte, Filipe de Oliveira Pereira, Romis Attux, Ricardo Suyama, João Marcos Travassos Romano

Special Session: Sparse and Low–Rank Modeling for Acoustic Signal Processing | Chairs: Afsaneh Asaei and Sharon Gannot

16. Study on Manifolds of Acoustic Responses
    Bracha Laufer Goldshtein, Ronen Talmon, Sharon Gannot

17. A Polynomial Dictionary Learning Method for Acoustic Impulse Response Modeling
    Jian Guan, Jing Dong, Xuan Wang, Wenwu Wang

18. A Local Model of Relative Transfer Functions Involving Sparsity
    Zbyněk Koldovský, Jakub Janský, Francesco Nesta

12.20 – 13.40   Lunch break

13.40 – 15.40   POSTER SESSION 2

Special Session: Advances in Nonlinear Blind Source Separation

P13. From Blind Quantum Source Separation to Blind Quantum Process Tomography
Yannick Deville, Alain Deville

P14. Blind Source Separation in Nonlinear Mixtures for Colored Sources Using Signal Derivatives
Bahram Ehsandoust, Massoud Babaie–Zadeh, Christian Jutten

Special Session: Sparse and Low–Rank Modeling for Acoustic Signal Processing

P15. Improving Relative Transfer Function Estimates Using Second–Order Cone Programming
Zbyněk Koldovský, Jiří Málek, Petr Tichavský

P16. System Identification in the Behavioral Setting: A Structured Low–Rank Approximation Approach
Ivan Markovsky

P17. Sparsity and Cosparsity for Audio Declipping: a Flexible Non–Convex Approach
Srdan Kitic, Nancy Bertin, Rémi Gribonval

P18. Joint Audio Inpainting and Source Separation
Cagdas Bilen, Alexey Ozerov, Patrick Perez

P19. Audio Source Separation with Discriminative Scattering Networks
Pablo Sprechmann, Joan Bruna, Yann LeCun

Regular posters

P20. Theoretical Studies and Algorithms Regarding the Solution of Non–Invertible Nonlinear Source Separation
David Baptista, Rafael Assato Ando, Leonardo Tomazeli Duarte, Christian Jutten, Romis Attux

P21. Patchworking Multiple Pairwise Distances for Learning with Distance Matrices
Ken Takano, Hideitsu Hino, Yuki Yoshikawa, Noboru Murata

P22. A Block–Jacobi Algorithm for Non–Symmetric Joint Diagonalization of Matrices
Hao Shen, Martin Kleinsteuber

P23. An Affine Equivariant Robust Second–Order BSS Method
Pauliina Ilmonen, Klaus Nordhausen, Hannu Oja, Fabian Theis

P24. An Overview of the Asymptotic Performance of the Family of the FastICA Algorithms
Tianwen Wei

15.40 – 16.00   Coffee break

16.00 – 17.20   ORAL SESSION 4 | Chair: Felix Weninger

Audio

19. The 2015 Signal Separation Evaluation Campaign (SiSEC2015)
     Nobutaka Ono, Daichi Kitamura, Zafar Rafii, Nobutaka Ito, Antoine Liutkus

20. A Geometrically Constrained Independent Vector Analysis Algorithm for Online Source Extraction
     Affan Khan, Maja Taseska, Emanuel Habets

21. On–line Multichannel Estimation of Source Spectral Dominance
     Francesco Nesta, Trausti Thormundsson, Zbyněk Koldovský

22. Component–Adaptive Priors for NMF
     Julian Becker, Christian Rohlfing

18:00   Bus departure to social evening

19:00 – 23:00   Social evening at Hotel Panský dům and Pyramida in the Jizerka valley

FRIDAY, AUGUST 28, 2015

9.00 – 10.00   KEYNOTE 3 | Chair: Petr Tichavský

23. Role of Diversity in Source Separation: Theory and Applications
     Tülay Adali

10.00 – 10.20   Coffee break

10.20 – 12.20   POSTER SESSION 3

24. Deep Karaoke: Extracting Vocals from Musical Mixtures Using a Convolutional Deep Neural Network
     Andrew Simpson, Gerard Roma, Mark Plumbley

25. Evaluation of the Convolutional NMF for Supervised Polyphonic Music Transcription and Note Isolation
     Stanislaw Gorlow, Jordi Janer

26. Masked Positive Semi–Definite Tensor Interpolation
     Dave Betts

27. On the Suppression of Noise from a Fast Moving Acoustic Source using Multimodality
     Wendyam Serge Boris Ouedraogo, Bertrand Rivet, Christian Jutten

28. Speaker Verification using Adaptive Dictionaries in Non–Negative Spectrogram Deconvolution
     Szymon Drgas, Tuomas Virtanen

29. Towards Individualized Spatial Audio via Latent Variable Modeling
   Eric Schwenker

30. A MAP–based Order Estimation Procedure for Sparse Channel Estimation
   Sajad Daei, Massoud Babaie–Zadeh, Christian Jutten

31. Bayesian Blind Source Separation with Unknown Prior Covariance
   Ondřej Tichý, Vaclav Smidl

32. Convex Recovery of Tensors using Nuclear Norm Penalization
   Stephane Chrétien, Tianwen Wei

33. Split Gradient Method for Informed Non–negative Matrix Factorization
   Robert Chreiky, Gilles Delmaire, Matthieu Puigt, Gilles Roussel, Dominique Courcot, Antoine Abche

12.20 – 13.40   Lunch break

13.40 – 15.00   ORAL SESSION 5 | Chair: Ivica Kopriva

Dictionary and Manifold Learning

34. A Dictionary Learning Method for Sparse Representation Using a Homotopy Approach
   Milad Niknejad, Mostafa Sadeghi, Massoud Babaie–Zadeh, Hossein Rabbani, Christian Jutten

35. Invertible Nonlinear Dimensionality Reduction via Joint Dictionary Learning
   Xian Wei, Martin Kleinsteuber, Hao Shen

36. Robust Structured Low–Rank Approximation on the Grassmannian
   Clemens Hage, Martin Kleinsteuber

15.00 – 16.20   ORAL SESSION 6 | Chair: Anh Huy Phan

Biomedical and Other Applications

37. Blind Separation of Surface Electromyographic Mixtures from Two Finger Extensor Muscles
   Anton Dogadov, Christine Servière, Franck Quaine

38. Multivariate Fusion of EEG and Functional MRI Data using ICA: Algorithm Choice and Performance Analysis
   Yuri Levin–Schwartz, Vince Calhoun, Tulay Adali

39. Blind Calibration of Mobile Sensors Using Informed Nonnegative Matrix Factorization
   Clément Dorffer, Matthieu Puigt, Gilles Delmaire, Gilles Roussel

40. Texture Retrieval Using Scattering Coefficients and Probability Product Kernels
   Alexander Sagel, Dominik Meyer, Hao Shen

16.20 – 16.30   Closing

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