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

CONFERENCE VENUE
Technical University of Liberec
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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.

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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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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 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

   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, Zbyněk 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

    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**

   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

    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

    Yannick Deville, Leonardo Tomazeli Duarte

    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, Romís 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

    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*

*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*

*Ivan Markovsky*

P17. Sparsity and Cosparse 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*

*Tianwen Wei*

15.40 – 16.00  Coffee break
16.00 – 17.20  ORAL SESSION 4  | Chair: Felix Weninger

Audio

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

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*

   *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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