Antoine Liutkus

Researcher, Inria

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born 1981, French

Research interests

Machine Learning

Bayesian modeling for machine learning

- *Random processes : Gaussian, α-stable*
- *Nonnegative tensor factorization*
- *Deep learning*
- *Latent variable models*
- *Moment matching, sketching*

Audio filtering and inverse problems

Probabilistic processing of time series

- *Audio source separation*
- *Multichannel models and filtering*
- *Convolutive and probabilistic mixing models*
- *High-dimensional signal separation*
- *Compressed sensing*

Source coding

signal compression

- *Very long-term structured source models*
- *Machine learning for efficient source-coding*
- *Rate-distorsion and high-rate theory*
- *Berger-Flynn-Gray coding : posterior and distributed source coding*
- *Multichannel audio coding*

Positions

2014–today **Permanent researcher**, *Inria, LORIA, Nancy, France.*
Machine learning, Source separation, speech processing

2013 **Postdoc**, *Institut Langevin, ESPCI, Paris, France.*
Compressed sensing, sparsity, optics in turbid media

2010–2012 **Ph.D**, *Telecom Paristech, CNRS LTCI, Paris, France.*

2010–2012 **Lecturer in signal processing**, *Engineering schools ESME Sudria, ISEP, Telecom ParisTech, Paris, France.*
Signal processing, telecommunications, control, 400 hours

2007–2010 **Research engineer**, *Audionamix, Paris, France.*
Blind underdetermined audio source separation, nonnegative matrix/tensor factorization, sinusoidal modeling, pitch-synchronous analysis, patents, prototyping

Education

2013 **Qualification**, *for teaching (section 61 : signal processing)*..

2010–2012 **Ph.D**, *Informed Source Separation*, Supervised by Gaël Richard and Roland Badeau, Telecom Paristech, CNRS LTCI, Institut Mines-Telecom, France.
Multidimensional signal separation of Gaussian processes, nonnegative tensors factorization, underdetermined blind separation, deterministic and probabilistic mixing models, source coding

2004–2005 **Master of sciences**, *Acoustics, Computer Science and Signal Processing applied to Music*, IRCAM, Paris, France.

1999–2004 **Engineering school**, *Telecom ParisTech, Paris, France.*
Computer science, signal processing, mathematics, probability theory

1999 **Baccalauréat (french high-school diploma)**, *with honors.*

Scientific service

Committees
- IEEE Audio and Acoustic Signal Processing Technical Committee 2016-2019
- EUSIPCO 2012 TPC chair
- SiSEC (Separation Evaluation Challenge) general chair

Reviewing
- journals : *IEEE Signal Processing letters, IEEE TASLP, Elsevier Signal Processing, Elsevier Digital Signal Processing*
- conferences : *ICASSP, EUSIPCO, ISMIR, DAFx*

Collaborations

Visiting researcher
- 2015 : Northwestern University, USE (Prof. B. Pardo)
- 2014 : Bosphorus University, Turkey (Prof. A.T. Cemgil)

Collaborator
- QUAERO, MEMORIES, SARAH, DREAM

Projects
- KAMoulox (PI, 300k€)

Miscellaneous

Languages
- French : *native*
- English : *fluent*
- Spanish : *fluent*

Computing
- OS : *linux, Windows*
- Programming languages : *Python, MATLAB*
- LaTeX

Personnal interests: Travels, philosophy, gaming

Patents

[1] S.M. Aziz Sbai, R. Blouet et A. Liutkus. "Automatic audio source separation with joint spectral shape, expansion coefficients and musical state estimation". USPTO 20100174389. 2010.

[2] S.M. Aziz Sbai, R. Blouet et A. Liutkus. "Automatic gathering strategy for unsupervised source separation algorithms". USPTO 20100174389. 2010.

[3] L. Girin et al. "Procédé et dispositif de formation d'un signal mixé numérique audio, procédé et dispositif de séparation de signaux, et signal correspondant". Institut Polytechnique de Grenoble et Institut Télécom, Télécom ParisTech. Oct. 2010.

Journal Papers

[1] A. Liutkus, R. Badeau et G. Richard. "Gaussian Processes for Underdetermined Source Separation". In : *IEEE Transactions on Signal Processing* 59.7 (fév. 2011), p. 3155–3167.

[2] A. Liutkus et al. "Informed source separation through spectrogram coding and data embedding". In : *Signal Processing* 92.8 (2012), p. 1937–1949.

[3] A. Ozerov et al. "Coding-based informed source separation : Nonnegative tensor factorization approach". In : *IEEE Transactions on Audio, Speech and Language Processing* 21.8 (août 2013), p. 1699–1712.

[4] A. Liutkus et al. "Imaging With Nature : Compressive Imaging Using a Multiply Scattering Medium". In : *Scientific Reports* 4 (juil. 2014), p. 14.

[5] A. Liutkus et al. "Kernel Additive Models for Source Separation". In : *IEEE Transactions on Signal Processing* (juin 2014), p. 14.

[6] A. Drémeau et al. "Reference-less measurement of the transmission matrix of a highly scattering material using a DMD and phase retrieval techniques". In : *Optics Express* 29.9 (avr. 2015), p. 11898–11911.

[7] N. Liu et al. "Random Calibration for Accelerating MR-ARFI Guided Ultrasonic Focusing in Transcranial Therapy". In : *Physics in Medicine and Biology* 60.3 (jan. 2015), p. 21.

[8] U. Simsekli, A. Liutkus et T. Cemgil. "Alpha-Stable Matrix Factorization". In : *IEEE Signal Processing Letters* (sept. 2015), p. 5.

[9] D. Fitzgerald, A. Liutkus et R. Badeau. "Projection-based demixing of spatial audio". In : *IEEE Transactions on Audio, Speech and Language Processing* (mai 2016).

[10] A. Liutkus et E. Vincent. "Démixer la musique". In : *Interstices* (jan. 2016).

[11] A. Nugraha, A. Liutkus et E. Vincent. "Multichannel audio source separation with deep neural networks". In : *IEEE/ACM Transactions on Audio, Speech, and Language Processing* 24.10 (juin 2016).

Conference Papers

[1] A. Liutkus, R. Badeau et G. Richard. "Informed Source Separation Using Latent Components". In : *Latent Variable Analysis and Signal Separation*. Sous la dir. de Vincent Vigneron et al. T. 6365. Lecture Notes in Computer Science. Saint Malo, France : Springer, 2010, p. 498–505.

[2] A. Liutkus et P. Leveau. “Separation of Music+Effects sound track from several international versions of the same movie”. In : *AES 128th Convention*. London, United Kingdom, mai 2010.

[3] A. Liutkus, R. Badeau et G. Richard. “Multidimensional Signal Separation with Gaussian Processes”. In : *Statistical Signal Processing Workshop*. Nice, France, juin 2011, p. 401–404.

[4] A. Ozerov et al. “Informed source separation : source coding meets source separation”. In : *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA'11)*. Mohonk, NY, United States, oct. 2011.

[5] B. Fuentes et al. “Probabilistic model for main melody extraction using constant-Q transform”. In : *37th International Conference on Acoustics, Speech, and Signal Processing ICASSP'12*. Kyoto, Japan : IEEE, 2012, p. 5357–5360.

[6] A. Liutkus et al. “Adaptive filtering for music/voice separation exploiting the repeating musical structure”. In : *37th International Conference on Acoustics, Speech, and Signal Processing ICASSP'12*. Kyoto, Japan : IEEE, 2012, p. 53–56.

[7] A. Liutkus et al. “Informed Audio Source Separation : A Comparative Study”. In : *20th European Signal Processing Conference (EUSIPCO-2012)*. Bucarest, Romania, août 2012, n/c.

[8] A. Liutkus et al. “Spatial coding-based informed source separation”. In : *20th European Signal Processing Conference (EUSIPCO 2012)*. Bucharest, Romania, août 2012.

[9] S. Marchand et al. “DReaM : A Novel System for Joint Source Separation and Multi-Track Coding”. In : *133rd AES Convention*. San Francisco, United States, oct. 2012.

[10] N. Sturmel et al. “Linear Mixing Models for Active Listening of Music Productions in Realistic Studio Conditions”. In : *132nd AES Convention*. Budapest, Hungary, avr. 2012.

[11] C. Damon et al. “Non-negative matrix factorization for single-channel EEG artifact rejection”. In : *ICASSP*. Vancouver, Canada, 2013.

[12] C. Damon et al. “Non-negative Tensor Factorization for Single-Channel EEG Artifact Rejection”. In : *MLSP*. Southampton, United Kingdom, sept. 2013.

[13] A. Liutkus, R. Badeau et G. Richard. “Low bitrate informed source separation of realistic mixtures”. In : *ICASSP*. Vancouver, Canada : IEEE, 2013, p. 66–70.

[14] A. Liutkus et al. “An overview of informed audio source separation”. In : *WIAMIS*. Paris, France, 2013, p. 1–4.

[15] S. Zhang, L. Girin et A. Liutkus. “Informed Source Separation from compressed mixtures using spatial wiener filter and quantization noise estimation”. In : *International Conference on Acoustics, Speech, and Signal Processing*. vancouver, Canada, mai 2013, p. 61–65.

[16] Julie B. et A. Liutkus. “OOPS : une approche orientée objet pour l'interrogation et l'analyse linguistique de l'interface prosodie/syntaxe/discours”. In : *4e Congrès Mondial de Linguistique Française*. T. 8. Berlin, Germany, juil. 2014, p. 2565–2581.

[17] D. Fitzgerald et al. “Harmonic/Percussive Separation Using Kernel Additive Modelling”. In : *IET Irish Signals & Systems Conference 2014*. Limerick, Ireland, juin 2014.

[18] S. Kirbiz et al. “Perceptual coding-based informed source separation”. In : *22nd European Signal Processing Conference (EUSIPCO)*. Lisbonne, Portugal, sept. 2014.

[19] A. Liutkus et al. “Compressed sensing under strong noise. Application to imaging through multiply scattering media”. In : *European Signal Processing Conference (EUSIPCO)*. Lisbon, Portugal, sept. 2014.

[20] A. Liutkus et al. “Kernel Spectrogram models for source separation”. In : *HSCMA*. Nancy, France, mai 2014.

[21] A. Liutkus et R. Badeau. “Generalized Wiener filtering with fractional power spectrograms”. In : *40th International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Brisbane, Australia : IEEE, avr. 2015.

[22] A. Liutkus, D. Fitzgerald et R. Badeau. “Cauchy Nonnegative Matrix Factorization”. In : *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*. New Paltz, NY, United States, oct. 2015.

[23] A. Liutkus, D. Fitzgerald et Z. Rafii. “Scalable audio separation with light kernel additive modelling”. In : *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE. Brisbane, Australia, avr. 2015.

[24] A. Liutkus, U. Şimşekli et T. Cemgil. “Extraction of Temporal Patterns in Multirate and Multi-modal Datasets”. In : *International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)*. Liberec, Czech Republic, août 2015.

[25] A. Liutkus et al. “Source Separation for Target Enhancement of Food Intake Acoustics from Noisy Recordings”. In : *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*. New Paltz, NY, United States, oct. 2015.

[26] N. Ono et al. “The 2015 Signal Separation Evaluation Campaign”. In : *International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)*. T. 9237. Latent Variable Analysis and Signal Separation. Liberec, France, août 2015, p. 387–395.

[27] T. Prätzlich et al. “Kernel additive modeling for interference reduction in multichannel music recordings”. In : *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Brisbane, Australia, avr. 2015.

[28] Z. Rafii, A. Liutkus et B. Pardo. “A simple user interface system for recovering patterns repeating in time and frequency in mixtures of sounds”. In : *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Brisbane, France, avr. 2015.

[29] S. Sivasankaran et al. “Robust ASR using neural network based speech enhancement and feature simulation”. In : *2015 IEEE Automatic Speech Recognition and Understanding Workshop (ASRU 2015)*. Arizona, United States, déc. 2015.

[30] D. Fitzgerald, A. Liutkus et R. Badeau. “PROJET - Spatial Audio Separation Using Projections”. In : *41st International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Shanghai, China : IEEE, 2016.

[31] A. Nugraha, A. Liutkus et E. Vincent. “Multichannel music separation with deep neural networks”. In : *European Signal Processing Conference (EUSIPCO)*. Budapest, Hungary, août 2016.

[32] F. Stöter et al. “Common Fate Model for Unison source Separation”. In : *41st International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Proceedings of the 41st International Conference on Acoustics, Speech and Signal Processing (ICASSP). Shanghai, China : IEEE, 2016.