Jérémy Cohen

Research topics: constrained matrix/tensor low-rank approximations, convex and non-convex numerical optimization, source separation, machine learning, hyperspectral imaging, music information retrieval.

Research statement: I am interested in source separation formulated as inverse problem, which I solve using low-rank approximations models (matrix or tensor factorization). In particular my work is focused on model and algorithm design for regularized low-rank approximations. These regularizations range from nonnegativity and sparsity to trained priors using deep unrolling. Application fields are diverse, I am however specialized in hyperspectral imaging (remote and microscopic) and music information retrieval.

Publication list: available and updated regularly on my webpage [link].

Research Positions

Permanent research position in Machine Learning (CR CNRS section 07 ech. 06) *2018-today*

- 2022-present: CREATIS, team MYRIAD, Lyon
- 2018-2022: IRISA, team PANAMA, Rennes

Student research positions in Signal Processing *2013-2018*

- 2016-2018: Post-doctoral researcher at UMONS, Mons, Belgium, with Nicolas Gillis
- 2013-2016: PhD student at Gipsa-lab, Grenoble, France, with Pierre Comon

PhD Students and Post-doctoral researchers mentoring

Post-doc and engineers supervision

- Caglayan Tuna, research engineer position working on the Tensoptly project *2020-2022*
  Contributions: 35 pull requests on Tensorly, including [PR#254] [PR#284]
  Funding: Projet Ingénieur IA Inria (Tensoptly)
  Next job: Inria research engineer (CDD) in collaboration with Airbus.

PhD student advisor (no HDR)

Students I have worked with on a daily basis with hands-on supervision.

- Séréna Hariga, joint reconstruction and unmixing of spectral images in medical imaging. *2023-present*
  Supervision: with Nicolas Ducros and Denis Friboulet (CREATIS) (50% supervision).
  Contributions: 1 international conference article 1st author (EUSIPCO 2024).
  Funding: EEA doctoral school (Lyon), additional budget from ANRs JCJC LoRAiA and PRC ULHYB.
- Rémi Cornillet, low-rank approximations and optimal transport. *2020-2023*
  Supervision: with Nicolas Courty (IRISA) (50% supervision)
  Contributions: 1 national conference article 1st author (GRETSI 2022).
  Funding: ANR JCJC LoRAiA.
  Note: not defended after mutual agreement.
  Next job: engineer at CEA Grenoble.
- Axel Marmoret, unsupervised machine learning paradigms for representation of music similarity *2019-2022*
  Supervision: with Frédéric Bimbot (IRISA) (50% supervision)
  Contributions: 1 int. journal (TISMIR), 3 int. conf. (incl. 1 ISMIR) 1st author, 1 int. conf. 2d author. Several softwares.
  Funding: EEATS Doctoral school (Rennes), support from ANR JCJC LoRAiA.
  Next job: assistant professor at IMT Atlantique.

PhD student co-supervision

Students I have co-supervised with more distance (1 meeting/2 months).

- Carla Schenker, flexible coupled matrix-tensor factorizations. *2018-2023*
  Supervision: with Evrim Acar (SimulaMet, Oslo) (20% supervision)
  Contributions: 3 int. journal (incl. 1 SIMODS, 1 IEEE STSP), 3 int. conf. (incl. 1 ICASSP).
  Funding: Simula funding.
  Next job: Post-doctoral researcher at SimulaMet.
- Marie Roald, time-evolving source separation with PARAFAC2. *2018-2023*
  Supervision: with Evrim Acar (SimulaMet, Oslo) (20% supervision)
  Contributions: 4 int. journal (incl. 1 SIMODS), 2 int. conf. (incl. 1 ICASSP). Important contributions to Tensorly.
  Funding: Simula funding.
  Next job: data scientist at the National Library of Norway.

- Nicolas Nadisic, sparse nonnegative inverse problems. *2018-2022*
  Supervision: with Nicolas Gillis (UMONS) (20% supervision)
  Contributions: 1 int. journal (Machine Learning), 3 int. conf. (incl. 1 ICASSP, 1 ECMLPKDD) 1st author. NMF library in Julia.
  Funding: EEATS Doctoral school (Rennes), support from ANR JCJC LoRAiA.
  Next job: Research position at the University of Ghent, Belgium and the GAIM lab.
- Cassio Fraga-Dantas, Kronecker-structured dictionary learning and sketching. *2018*
  Supervision: co-supervised during the last year of his PhD with Rémi Gribonval (IRISA) (20% supervision)
  Contributions: 2 int. journal (incl. 1 IEEE TSP), 4 int. conf. (incl. 1 ICASSP) 1st author.
  Funding: Inria doctoral funding.
  Next job: research scientist at INRAE in Toulouse, at TETIS lab.

Research contracts

Project I am leading

- LoRAiA, JCJC ANR CE23, ∼200k€ *2020-2025*
- Tensoptly, INRIA AI funding, paid for a software engineer for two years, ∼120k€ *2020-2022*
- GABI, joint with Bora Ucar (LIP), FIL funding (local) ∼10k€. *2023-2024*

Project I am a member of

- ULHYB, PRC ANR CE01, led by Nicolas Ducros (CREATIS), ∼400k€ *2022-2027*
- EIC Hyperprobe, European project, local coord Bruno Montcel (CREATIS), ∼8M€ over 8 labs *2024-2028*

Valorisation and dissemination

Open source development

- Tensorly package for backend-independent tensor decompositions in Python, core developer, 1.6k stars on Github. Core devs is a team of 10 ppl. *Since 2018*
- Benchopt package for benchmarking optimization algorithms, occasional contributor *Since 2021*
- Several small personnal packages, such as shootout for experiment reproducibility *Since 2021*

Vulgarization

- Artificial Intelligence and Creativity in Music, conference at Ecole Nationale de Musique, Danse et Art Dramatique of Villeurbanne *2024*
- Allô Docteur.e, a podcast about PhD studies in mathematics and informatics, co-hosted with Stephane Kastenbaum https://allodocteure.transistor.fm/ *Since 2022*
- No Perfect Soup, a dynamic webpage to explain Nonnegative Matrix Factorization https://no-perfect-soup.netlify.app/ *Since 2021*
- Journée Sciences et Musique, Rennes, part of the organization team *2021*

Scientific impact

Collaborations

International:

- Valentin Leplat (Innopolis University, Russia), publishing. *since 2021*
- Evrim Acar (SimulaMet, Olso, Norway), co-supervisions, regular visits, publishing. *since 2018*
- Jean Kossaifi (NVIDIA, USA), collaboration for the development of Tensorly. *since 2018*
- Rasmus Bro (University of Copenhaguen, Danemark), regular visits, publishing. *2016-2018*
- Nicolas Gillis (UMONS, Belgium), regular visits, publishing, co-supervision (former post-doc supervisor) *since 2016*

National:

- Bora Ucar (LIP, ENS Lyon), co-supervision, publishing. *since 2023*
- Mai Quyen Pham (IMT Atlantique, Brest), publishing. *since 2022*
- Christophe Kervazo (LTCI, Paris Saclay), co-supervisions, regular visits, publishing. *since 2022*
- Other local (Lyon) collaborations: Nicolas Ducros, Laurent Mahieu-William, Bruno Montcel, Mickael Sdika (CREATIS), Raphael Dumas (Université Gustave Eiffel). *since 2022*

Research stay

- IRIT (Toulouse), one week in team SC visiting Cedric Fevotte *2024*
- Flatiron Institute (New York), one week in the neuroscience department visiting Alex Williams *2022*

- IRISA (Rennes), two weeks in team PANAMA *2017*
- University of Copenhaguen, one month in Rasmus Bro's team *2017*

Reviews for journals

- SIAM Journal on Mathematics of Data Science, SIAM Journal on Matrix Analysis and Applications, SIAM Journal on Imaging Sciences, SIAM Journal on Scientific Computing
- IEEE Transactions on Signal Processing, IEEE Journal of Selected Topics in Signal Processing, IEEE Signal Processing Letters, IEEE Transactions on Geoscience and Remote Sensing, IEEE Geoscience and Remote Sensing Letters, IEEE Transactions on Image Processing, IEEE Transactions on Cybernetics, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE IEEE Transactions on Neural Networks and Learning Systems
- Others: Numerical Linear Algebra, Annals of Statistics, Analitica Chimica Acta, Data Mining and Knowledge Discovery (Springer), Signal Processing (Elsevier), Neural Processing Letters,

Reviews for conferences

- ICASSP: 2019, 2018
- GRETSI: 2023, 2021, 2019
- EUSIPCO: 2024, 2021, 2019
- LVA/ICA: 2018, 2016
- Others: Asilomar 2021, MLSP 2020, CAP 2020, Whispers 2019, SPARS 2019, CAMSAP 2017

Animation of the scientific community

Workshop organisation

- Peyresq doctoral school on low-rank approximations and optimization, co-organized with Nicolas Gillis, Guillaume Ginolhac and André Ferrari *2024*
- Journée Problèmes Inverses, Optimisation à Lyon St Etienne, co-organized with Julian Tachella, Nelly Pustelnik, Maxime Guillaud, Jordan Frecon, Laurent Seppecher *2024*
- Workshop DiPOpt, organized mainly by Nelly Pustelnik, with Julian Tachella, Marion Foare, Adrien Meynard, Elisa Ricietti *2023*

Special sessions organization

- GRETSI2023: Constrained Low-rank approximations, co-organized with Konstantin Usevich
- ICIAM2023: Nonnegative tensor decompositions, co-organized with Daniel Dunlavy
- Asilomar2021: Advances in coupled matrix and tensor factorizations, with application to remote sensing, co-organized with Evrim Acar

Collective service

National scientific research comity

- Member of CoNRS section 7, grade B, workload is about 40 full days of work. *2024-2025*

Assistant Professor selection jury (COS)

- LISIC-IUT MCF 61, Université du Littoral *2022*

PhD individual advisory comity (French CSI/CST)

- Ali Fakhar, Laboratoire Jean Kuntzmann, supervised by Kevin Polisano, Irène Gannaz and Sophie Achard *2024*
- Raphael Mignot, Intitut Elie Cartan, University of Lorraine, supervised by Konstantin Usevich and Marianne Clausel *2022, 2023*

Implication in CREATIS

- Responsible for the validation of seminars in conjunction with the EEA doctoral school *since 2023*

Teaching

Teachings (Graduate and Undergraduate)

- INSA Lyon: Numerical Analysis and Machine Learning (L3) *2023-2024*
- Ecole Centrale de Lyon: Numerical Analysis (L3) *2022-2024*
- CPE Lyon: Statistical Signal Processing (M1) *2022-2023*
- INSA Rennes and ENSAI: Convex Optimization for Sparse Approximations (M2) *2018-2021*
- ITWIST2020 doctoral school, Nantes: Nonnegative Low-Rank Approximations *2020*
- Polytech Mons: Probability and Statistics (L2) *2018*
- Polytech Mons: Convex Optimization for Tensor Decomposition (L3) *2016*
- University Grenoble Alpes: Undergraduate Mathematics (L1) *2014-2015*

Intern supervision

- Damien Lesens, co-supervised with Bora Uçar (LIP) *2024*
- Séréna Hariga, co-supervised with Nicolas Ducros (CREATIS) *2023*
- Joris Claude, co-supervised with Raphael Dumas (LBMC) *2023*
- Abdelkhalak Chetoui, co-supervised with Christophe Kervazo (Télécom Paris) *2022*
- Mathis Jeannot, co-supervised with Simon Leglaive (Centrale Supelec) *2021*
- Florian Voorwinden, co-supervised with Axel Marmoret (IRISA) *2021*
- Kefan Sun, Victor Bertret, Haoran Wu (individual INSA research projects) *2020-2021*
- Alexis Gagoud *2020*
- Marius Lumbroso, co-supervised with Nancy Bertin (IRISA) *2020*
- Axel Marmoret, co-supervised with Nancy Bertin (IRISA) *2019*
- Thomas Cusson *2019*
- Sebastien Ferreira *2018*

Others

Music

- Platane Quartet: eclectic jazz songs (band leader) https://www.instagram.com/platanequartet/ *2024-present*
- Charlatan Transfer: vocal jazz ensemble (member) https://www.charlatantransfer.fr/ *2013-2016, 2023-present*
- UV Harmonie jazz, ENM Villeurbanne *2024*
- DFE classical piano and music theory, CRR Rueil Malmaison *2006*

jeremy.cohen@cnrs.fr | https://jeremy-e-cohen.jimdofree.com/