Jordan FRÉCON

Curriculum Vitae

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JordanFrecon
Birthdate: 26 May 1990

Research Areas of Interests

Analysis	Multi-resolution analysis, scale invariance, multifractal analysis.
Learning	Multi-task, structured sparsity, model selection, hyperparameter learning, dictionary learning, bayesian models.
Optimisation	Bilevel optimization, non-smooth convex optimization, proximal methods, online algorithms, branch and bounds algorithms.
Applications	Textures segmentation, change-points detection.

Education

2017 **Qualification aux fonctions de maître de conférences (section 61)**.
Certification for being University lecturer in informatics, automatics and signal processing.

2013 – 2016 **PhD in Physics**, *Laboratoire de Physique, ENS de Lyon*, Lyon, France.
Defended on October 11th 2016 at ENS de Lyon in front of the following jury:
P. Abry, P.-O. Amblard, J.-F. Aujol, F. Picard, N. Pustelnik, B. Vedel.

2010 – 2013 **Bachelor & Master**, *ENS de Lyon*, Lyon, France.
Specialities: Statistical Physics and Complex Systems.

2008 – 2010 **Classes Préparatoires Scientifiques**, *Lycée Claude Fauriel*, Saint-Etienne, France.
Post-secondary classses in Mathematics and Physics.

July 2008 **Baccalauréat Scientifique**, *Lycée François Mauriac*, Andrezieux Bouthéon, France.

Scientific Experiences

2017 – 2020 **Postdoc**, *Computational Statistics and Machine Learning, IIT*, Genova, Italy.
Supervisor M. Pontil
Title *Non-smooth bilevel optimization for multi-task learning.*
Keywords Multi-task learning, bilevel optimization, hyperparameters selection.

2013 – 2016 **PhD in Physics**, *Laboratoire de Physique, ENS de Lyon*, Lyon, France.
Supervisors P. Abry et N. Pustelnik.
Title *Optimization methods for the analysis of scale-invariant processes.*
Keywords Multifractal analysis, change-points detection, online optimization, models selection.

2013 **Internship** (16 weeks), *Laboratoire de Physique de l'ENS de Lyon*, Lyon, France.
Supervisors P. Abry et N. Pustelnik.
Title *Detection of fetal asphyxia based on local regularity analysis and convex optimization.*
Keywords Signal processing, multifractal analysis, convex optimization.

2012 **Internship** (12 weeks), *Center for Polymer Studies*, Boston, Etats-Unis.
Supervisor H. E. Stanley.
Title *Quantitative analysis of the angular distribution of axons.*
Keywords Image processing, mathematical morphology.

2011 **Internship** (8 weeks), *OPERA Photonics*, Bruxelles, Belgique.
Supervisor S. Massar et S.-P. Gorza.
Title *Temperature dependence of the noise affecting photon pairs generation in wire waveguides.*
Keywords Quantum optics, photons intrication.

Teaching Activities

Training

2013 **Teaching day**, Ecole doctorale de Physique et d'Astrophysique de Lyon

2013 **Workshop**, "What does digital technology change for university lecturers and researchers?"

Experiences

2017 **World science day for peace and development**, Mbabane, Eswatini.
Originator and co-organizer of one day of cultural and scientific exchanges.

2013-2016 **Complementary teaching activity grant** (64 hours/year), Lyon, France.

Fields Signal processing, ondulatory optics, electro-magnetostatic, applied statistics, thermodynamics and solid mechanics, Python, dynamical processes and networks.

Skills Supervision of tutorial classes and experiments, writings of exercices.

2010-2012 **Volonteer in the association "Trait d'union"**, *ENS de Lyon*, Lyon, France.
Supervision of students from disadvantaged high-schools.

References

Head of teaching **Pierre Borgnat** (Research director, CNRS), *ENS de Lyon*, pierre.borgnat@ens-lyon.fr.

Head of teaching **Bruno Baguenard** (Associate professor), *ILM, Lyon 1*, bruno.baguenard@univ-lyon1.fr.

Research Activities

Publications

International journals 4 published articles (3 IEEE TSP, IEEE JBHI)

International conferences 7 published articles (EUSIPCO 2014, IEEE ICIP 2015, IEEE EMBC 2015, IEEE ICASSP 2016-2017, NeurIPS 2018) with 4 acts of communication. 1 submitted article (ICML 2020)

National conferences 2 published articles with act of communication (GRETSI 2015-2017)

Workshops 2 published articles with act of communication (IVMSP 2016, ICML 2018). Act of communication (Advancement of Artificial Intelligence Workshop 2019)

Reviewer

Journals Journal of Machine Learning Research, IEEE Transactions on Signal Processing

Software

Skills Design of 7 softwares in MATLAB and Python.

Organization

Help in the organization and filming of the following events:

2015 **GRETSI conference**, Lyon, France.

2015 **Signal processing and monitoring in labour workshop**, Lyon, France.

References

Postdoc supervisor **Massimiliano Pontil** (Research director), *IIT - UCL*, massimiliano.pontily@iit.it.

Co-author **Saverio Salzo** (Researcher), *IIT*, saverio.salzo@iit.it.

PhD supervisor **Patrice Abry** (Research director, CNRS), *ENS de Lyon*, patrice.abry@ens-lyon.fr.

PhD supervisor **Nelly Pustelnik** (Researcher, CNRS), *ENS de Lyon*, nelly.pustelnik@ens-lyon.fr.

Co-author **Nicolas Dobigeon** (Professor), *INP-ENSEEIHT*, nicolas.dobigeon@enseeiht.fr.

Additional Skills

Computing LaTeX, MATLAB, C++, Python, Pytorch, Gnuplot, Maple.

Languages French (native language), English (fluent), Italian (intermediate), Spanish (intermediate).

List of Publications

International journals

1. J. Spilka, J. Frecon, R. Leonarduzzi, N. Pustelnik, P. Abry, and M. Doret. Sparse support vector machine for intrapartum fetal heart rate classification. *IEEE Journal of Biomedical and Health Informatics*, 21(3):664-671, 2017.
2. J. Frecon, N. Pustelnik, N. Dobigeon, H. Wendt, and P. Abry. Bayesian selection for the ℓ_2 -Potts model regularization parameter: 1-D piecewise constant signal denoising. *IEEE Trans. Signal Process.*, 65(19):5215-5224, 2017.
3. J. Frecon, G. Didier, N. Pustelnik, and P. Abry. Non-linear wavelet regression and branch & bound optimization for the full identification of bivariate operator fractional Brownian motion. *IEEE Trans. Signal Process.*, 64(15):4040-4049, 2016.
4. J. Frecon, N. Pustelnik, P. Abry, and L. Condat. On-the-fly approximation of multivariate total variation minimization. *IEEE Trans. Signal Process.*, 64(9):2355–2364, 2016.

International conferences

1. J. Frecon, R. Grazzi, S. Salzo, and M. Pontil. Smooth optimization of orthogonal wavelet basis. (work in progress).
2. J. Frecon, S. Salzo, and M. Pontil. Unveiling groups of related tasks in multi-task learning. Submitted to *Proc. Int. Conf. Machine Learning* (ICML), Vienna, Austria, Jul. 12–18, 2020.
3. J. Frecon, S. Salzo, and M. Pontil. Bilevel learning of the group Lasso structure. In *Proc. Ann. Conf. Neur. Inform. Proc. Syst.* (NeurIPS), pages 8301–8311, Montreal, Canada, Dec. 02–08, 2018.
4. J. Frecon, N. Pustelnik, N. Dobigeon, H. Wendt, and P. Abry. Bayesian-driven criterion to automatically select the regularization parameter in the ℓ_1-Potts model. In *Proc. Int. Conf. Acoust., Speech Signal Process.* (ICASSP), pages 3839–3843, New Orleans, USA, Mar. 05–09, 2017.
5. J. Frecon, R. Fontugne, G. Didier, N. Pustelnik, K. Fukuda, and P. Abry. Non-linear regression for bivariate self-similarity identification - application to anomaly detection in Internet traffic based on a joint scaling analysis of packet and byte counts. In *Proc. Int. Conf. Acoust., Speech Signal Process.* (ICASSP), pages 4184–4188, Shanghai, China, Mar. 20–25, 2016.
6. J. Spilka, J. Frecon, R. Leonarduzzi, N. Pustelnik, P. Abry, and M. Doret. Intrapartum fetal feart rate classification from trajectory in sparse SVM feature space. In *IEEE Conf. Eng. Med. Biol. Soc.* (EMBC), pages 2335–2338, Milan, Italy, Aug. 25-29, 2015.
7. R. Leonarduzzi, J. Spilka, J. Frecon, H. Wendt, N. Pustelnik, S. Jaffard, P. Abry, and M. Doret. P-leader multifractal analysis and sparse SVM for intrapartum fetal acidosis detection. In *IEEE Conf. Eng. Med. Biol. Soc.* (EMBC), pages 1971–1974, Milan, Italy, Aug. 25-29, 2015.
8. J. Frecon, N. Pustelnik, H. Wendt, and P. Abry. Multivariate optimization for multifractal-based texture segmentation. In *Proc. Int. Conf. Image Process.* (ICIP), pages 4957–4961, Quebec City, Canada, Sept. 27–30, 2015.
9. J. Frecon, N. Pustelnik, N. Dobigeon, H. Wendt, and P. Abry. Hybrid Bayesian variational scheme to handle parameter selection in total variation signal denoising. In *Proc. Eur. Sig. Proc. Conference* (EUSIPCO), pages 1716–1720, Lisbon, Portugal, Sept. 1–5, 2014.

National conferences and workshops

1. J. Frecon, S. Salzo, and M. Pontil. Inferring the group Lasso structure via bilevel optimization. In *ICML Workshop: Modern Trends in Nonconvex Optimization for Machine Learning*, Stockholm, Sweden, Jul. 14, 2018.
2. J. Frecon, N. Pustelnik, N. Dobigeon, H. Wendt, and P. Abry. Sélection du paramètre de régularisation dans le problème ℓ_2-Potts. In *Proc. GRETSI*, Juan-les-Pins, France, Sept. 05–08, 2017.
3. J. Frecon, N. Pustelnik, H. Wendt, L. Condat, and P. Abry. Multifractal-based texture segmentation using variational procedure. In *IEEE IVMSP Workshop: Perception and Visual Signal Analysis*, Bordeaux, France, Jul. 11–12, 2016.
4. J. Frecon, N. Pustelnik, H. Wendt, and P. Abry. Variation totale multivariée pour la détection de changement du spectre multifractal. In *Proc. GRETSI*, Lyon, France, Sept. 08–11, 2015.