curriculum vitæ

Ammar Mian

Associate professor

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Experience

2020-Curr **Associate prof** in Signal Processing — Université Savoie Mont Blanc
Teaching at Polytech Annecy-Chambéry, and research at LISTIC laboratory.

2019-2020 **Post-Doc** in the Acoustic and Signal Processing department — Aalto University
Under supervision of Esa Ollila, I worked on machine learning problems using Riemannian geometry.

2016-2019 **Teaching assistant** — Université Paris-Sud
I worked in the Computer Science department of the IUT d'Orsay. I taught programming, algorithms, and robotics to undergraduate students. I also supervised students in their final year projects.

education

2016-2019 **Ph.d** in signal and image processing — Université Paris-Saclay

- **Title:** Contributions to SAR Image Time Series Analysis
- **Laboratory:** SONDRA, CentraleSupélec
- **Supervisors:** Jean-Philippe Ovarlez, Guillaume Ginolhac, Abdourahmane M. Atto
- **Defended:** 26 Sept. 2019
- **Jury:**
  - Frédéric Pascal, Professeur, CentraleSupélec (Chairman)
  - Jean-Yves Tourneret, Professeur, INP – ENSEEIHT (Reviewer)
  - André Ferrari, Professeur des Universités, Université de Nice Sophia Antipolis (Reviewer)
  - Sabrina Maria Greco, Professeur, Université de Pise (Examinator)
  - Guillaume Ginolhac, Université Savoie Mont-Blanc (Co-Director)
  - Jean-Philippe Ovarlez, Directeur de recherche, ONERA (Co-Director)
  - Abdourahmane M. Atto, Université Savoie Mont-Blanc (Advisor)

2013-2016 **Engineering degree** — Grenoble INP - Phelma
Specialization in Signal, Image, Communication and Multimedia.

Honors

- 1st prize for the best scientific contribution of the doctoral school STIC, Université Paris Saclay, 2019
- Finalist of the Best Student Paper Award at IGARSS 2019 (top 10/300)

Research activities

Research themes and keywords

My research activities are oriented towards statistical signal processing and optimization methods in various applications of machine learning.

- **Estimation/Detection:** parametric estimation, elliptical distributions, generalized likelihood ratio test, statistical hypothesis testing, lower-bounds, robust methods
- **Machine learning:** unsupervised learning, deep learning, kernel methods
- **Riemannian optimization:** information geometry, stochastic gradient, constrained optimization
- **Inverse methods:** sparse coding, filtering
- **Remote sensing:** change detection, classification, segmentation

International collaborations

- Esa Ollila, Invited researcher in LISTIC, Annecy for three months.
  Co-authored a journal paper.

Conferences activities

Tutorials:

- "Riemannian and information geometry in signal processing and machine learning", with A. Breloy and F. Bouchard, full day (6h) tutorial at EUSIPCO 2022

Organisation:

- Social-media chair at EUSIPCO 2023.

Session chair:

- EUSIPCO 2022: "Remote Sensing"
- GRETSI 2023: "Traitements multi-capteurs"

Invited Talks

- "Riemannian geometry in machine learning", CRISTAL Lab, Lille in Feb. 2022.

Affiliations

- *Institute of Electrical and Electronics Engineers* (IEEE)
- *Signal Processing Society* (SPS)
- *Geoscience and Remote Sensing Society* (GRSS)

Scientific animation and dissemination

Thematic meetings under GDR-ISIS:

- "Approches faiblement supervisées en Télédétection", 31 Jan 2023. Co-organized with Yajing Yan, Thomas Oberlin and Stéphane May
- "Télédétection et climat", 7 Dec 2023. Co-organized with Yajing Yan, Thomas Oberlin and Nicolas Gasnier
- "SAR & Cryosphere", 19 Sept 2024. Co-organized with Yajing Yan, Emmanuel Trouve, Abdourahmane Atto and Nicolas Gasnier.

Outreach

- Demystifying AI: a seminar on the challenges of AI at the French Institute of Finland (video available at `https://youtu.be/UOpXHBJM2Ck`).

Reviewing activity

- Associate Editor at "Journal of Advanced Signal Processing (JASP)") from January 2024.
- Frequent reviewer for:
  - IEEE TSP, IEEE SPL, IEEE TGRS, IEEE GRSL, Elsevier SP
  - EUSIPCO and ICASSP

Students supervision

Master students:

- Matthieu Gallet, on *Robust GPR inversion methods* in 2020
- Matthieu Verlynde, on *Frugal Multimodal data classification* in 2024
- Emma Molière, on *Pansharpening unrolling algorithms* in 2024, with Argheesh Banot.

PhD students:

- **Olivier Lerda**

- Title: *Robust Detection methods in Sonar*
- 2020 - 2024 (defended 17 December 2024), done in part-time.
- LISTIC, University of Savoie Mont Blanc
- Co-supervised with Guillaume Ginolhac, Jean-Philippe Ovarlez and Didier Charlot.

Douba Jafuno

- Title: *Classification of GPR Signals*
- 2021 - ongoing
- LISTIC, University of Savoie Mont Blanc
- Co-supervised with Guillaume Ginolhac and Nickolas Stelzenmuller.

Matthieu Verlynde

- Title: *Frugal learning in Remote Sensing*
- 2024 - ongoing
- LISTIC, University of Savoie Mont Blanc
- Co-supervised with Yajing Yan.

Research projects and grants

AAP Recherche USMB	Co-Principal Investigator	2021-11	3k€
Project **ELABORATE** (opEn pLAtform for roBust geOmetRic clAssificaTion of Eeg) Project about development of algorithms for EEG data classification with robust Riemannian algorithms and their diffusion through an open platform. Project Members: Florent Bouchard, Stéphano Fortunati			

GDR-ISIS Appel à projet exploratoire	Co-Principal Investigator	2021-09	7k€
Project **ELABORATE** (opEn pLAtform for roBust geOmetRic clAssificaTion of Eeg) Project about development of algorithms for EEG data classification with robust Riemannian algorithms and their diffusion through an open platform. Project Members: Florent Bouchard, Stéphano Fortunati			

AAP Recherche et montagne USMB	Principal Investigator	2020-12	11k€
Project **SMGA** (Stratigraphie de Montagne Aéroportée) Project about developing robust algorithms for Ground Penetrating Radar data inversion. Project Members: Guillaume Ginolhac, Abdourahmane Atto, Emmanuel Trouvé			

Publications

Most of the publications are available on my personal website:

https://ammarmian.github.io/

Journal papers

[J1] **A. Mian**, G. Ginolhac, J-P. Ovarlez et A. M. Atto, "New Robust Statistics for Change Detection in Time Series of Multivariate SAR Images," in *IEEE Transactions on Signal Processing*, Volume : 67, Issue : 2, Jan. 15 2019, pp. 520-534.

[J2] **A. Mian**, J-P. Ovarlez, G. Ginolhac et A. M. Atto, "Design of New Wavelet Packets Adapted to High-Resolution SAR Images With an Application to Target Detection," in *IEEE Transactions on Geoscience and Remote Sensing*, Volume : 57, Issue : 6, June 2019, pp. 3919-3932.

[J3] R. B. Abdallah, **A. Mian**, A. Breloy, M. N. El Korso, D. Lautru, "Detection Methods Based on Structured Covariance Matrices for Multivariate SAR Images Processing," in *IEEE Geoscience and Remote Sensing Letters*, Volume : 16, Issue : 7, July 2019, pp. 1160-1164.

[J4] **A. Mian**, A. Collas, A. Breloy, G. Ginolhac, J-P. Ovarlez, "Robust Low-rank Change Detection for Multivariate SAR Image Time Series," in *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, Volume : 13, June 2020, pp. 3545-3556.

[J5] F. Bouchard, **A. Mian**, J. Zhou, S. Said, G. Ginolhac, Y. Berthoumieu, "Riemannian geometry for compound Gaussian distributions: Application to recursive change detection," *Signal Processing*, Volume : 176, 2020.

[J6] M. Gallet, **A. Mian**, G. Ginolhac, N. Stelzenmuller, "New Robust Sparse Convolutional Coding Inversion Algorithm for Ground Penetrating Radar Images." IEEE Transactions on Geoscience and Remote Sensing (2023).

[J7] O. Lerda, **A. Mian**, G. Ginolhac, J-P. Ovarlez, D. Charlot, "Robust Detection for Mills Cross Sonar," in *IEEE Journal of Oceanic Engineering*, vol. 49, no. 3, pp. 1009-1024, July 2024.

[J8] **A. Mian**, G. Ginolhac, F. Bouchard, A. Breloy, "Online change detection in SAR time-series with Kronecker product structured scaled Gaussian models" in *Elsevier Signal Processing* Volume 24, 2024.

[J9] D. Jafuno, **A. Mian**, G. Ginolhac, N. Stelzenmuller, "Classification of Buried Objects From Ground Penetrating Radar Images by Using Second-Order Deep Learning Models" in *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* vol. 18, pp. 3185-3197, 2025.

Signal Processing conference

[CSP1] **A. Mian**, J-P. Ovarlez, G. Ginolhac et A. M. Atto, "Multivariate change detection on high resolution monovariate SAR image using linear time-frequency analysis," in *IEEE 25th European Signal Processing Conference (EUSIPCO)*, Kos, Grèce, Aout 2017, 1942-1946.

[CSP2] **A. Mian**, J-P. Ovarlez, G. Ginolhac et A. M. Atto, "A robust change detector for highly heterogeneous multivariate images," in *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Calgary, Alberta, Canada, Avril 2018, pp. 3429-3433.

[CSP3] **A. Mian**, J-P. Ovarlez, G. Ginolhac et A. M. Atto, "Robust detection and estimation of Change-Points in a time series of multivariate images," in *IEEE 26th European Signal Processing Conference (EUSIPCO)*, Rome, Italie, Septembre 2018, pp. 1097-1101.

[CSP4] **A. Mian**, L. Bacharach, G. Ginolhac, A. Renaux, M. N. El Korso, J-P. Ovarlez, "Designing SAR Images Change-point Estimation Strategies Using an Mse Lower Bound," in *Proc. of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Brighton, Royaume-Uni, Mai 2019, pp. 5312-5316.

[CSP5] **A. Mian**, A. Breloy, G. Ginolhac, J-P. Ovarlez, "Robust Low-rank Change Detection for SAR Image Time Series," in *Proc. of IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Yokohama, Japon, Juillet 2019, pp. 10079-10082.

[CSP6] **A. Mian** and F. Pascal, "A Comparative Study of Statistical-Based Change Detection Methods for Multidimensional and Multitemporal SAR Images", in In Advances in Condition Monitoring and Structural Health Monitoring, Singapore, 2019.

[CSP7] **A. Mian**, E. Raninen, E. Ollila, "A Comparative Study of Supervised Learning Algorithms for Symmetric Positive Definite Features," in *2020 IEEE 28th European Signal Processing Conference (EUSIPCO).*

[CSP8] E. Ollila, **A. Mian** "Block-wise Minimization-Majorization Algorithm for Huber's Criterion: Sparse learning and Applications," in *2020 IEEE International Workshop on Machine Learning for Signal processing (MLSP)*, Helsinki, Finland.

[CSP9] F. Bouchard, A. Breloy, **A. Mian**, Guillaume Ginolhac, "On-line Kronecker Product Structured Covariance Estimation with Riemannian geometry for t-distributed data," in *2021 IEEE 29th European Signal Processing Conference (EUSIPCO)*, Dublin, Ireland.

[CSP10] M. Gallet, **A. Mian**, G. Ginolhac and N. Stelzenmuller, "Classification of GPR Signals via Covariance Pooling on CNN Features within a Riemannian Framework", in *2022 IEEE Geoscience and Remote Sensing Symposium*, Kuala Lampur, Malaysia.

[CSP11] A. Hipper-Ferrer, **A. Mian**, F. Bouchard and F. Pascal, "Riemannian Classification of EEG Signals with Missing Values", in *2022 30th European Signal Processing Conference (EUSIPCO)*, Belgrade, Serbia.

[CSP12] M. Gallet, **A. Mian**, A. Atto, "Renyi Divergences Learning for Explainable Classification of SAR Image Pairs", in *2024 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Seoul, South-Korea.

[CSP13] D. Jafuno, **A. Mian**, G. Ginolhac, N. Stelzenmuller, "Buried Object Classification from GPR Data by using Second Order Deep Learning Models" in *2024 International Geoscience and Remote Sensing Symposium (IGARSS)*, Athens, Greece.

Machine Learning conferences

[CML1] A. Hipper-Ferrer, F. Bouchard, **A. Mian**, T. Vayer, A. Breloy, "Learning graphical factor models with riemannian optimization," in *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases*, 2023, Turin, Italy. Rank A.

[CML2] F. Bouchard, **A. Mian**, M. Tiomoko, G. Ginolhac, F. Pascal, "Random matrix theory improved Fréchet mean of symmetric positive definite matrices" in *International Conference on Machine Learning*, Vienna, Austria, July 2024. Rank A*.

Book chapters

[B1] **A. Mian**, G. Ginolhac, J.-P. Ovarlez, A. Breloy and F. Pascal, "An Overview of Covariance-based Change Detection Methodologies in Multivariate SAR Image Time Series", in *Change Detection and Image Time Series Analysis 1 - Unsupervised Methods*, Wiley, 2021

French national conference papers

[FC1] **A. Mian**, J. -P. Ovarlez, G. Ginolhac, and A. M. Atto, "Détection de changement sur images SAR monovariées par analyse temps-fréquence linéaire", in Conférence GRETSI 2017, Juan-les-Pins, France

[FC2] **A. Mian**, A. Breloy, G. Ginolhac, and J. -P. Ovarlez, "Détection de Changement Robuste en Rang Faible pour les Séries Temporelles d'Images SAR", in Conférence GRETSI 2019, Lille, France

[FC3] M. Gallet, **G. Ginolhac**, G. Ginolhac, N. Stelzenmuller, "Nouvel algorithme d'inversion robuste pour le RADAR GPR", in Conference GRETSI 2022, Nancy, France

[FC4] A. Hipper-Ferrer, F. Bouchard, **A. Mian**, T. Vayer, A. Breloy, "Optimisation Riemannienne pour l'apprentissage de graphes structurés" in Conférence GRETSI 2023, Grenoble, France

[FC5] O. Lerda, **A. Mian**, G. Ginolhac, J-P. Ovarlez, "Détecteur de Rao robuste pour un sonar à croix de Mills" in Conférence GRETSI 2023, Grenoble, France