Ségolène Martin

✉ *segolene.tiffany.martin[at]gmail.com*
Github: `https://github.com/SegoleneMartin`
Website: `https://segolenemartin.github.io/`
Birthdate: June 1996

Work experience

Feb 2024–ongoing **Math+ post-doctorate researcher at the Technische Universität, Berlin**, in the group of Gabriele Steidl and in collaboration with Hanno Gottschalk.
My work is at the interface between optimization, image processing and generative learning.

Education

Sep 2020–Jan 2024 **Ph.D. studies at Université Paris-Saclay, Inria, CentraleSupélec, Centre de Vision Numérique**, *Majorization-Minimization algorithms for constrained optimization with application to image processing*, co-supervised by Jean-Christophe Pesquet and Ismail Ben Ayed, and in collaboration with Emilie Chouzenoux .
My thesis focused on designing new optimization methods for high-dimensional problems (convex and non-convex, smooth and non-smooth), with applications to inverse problems in image processing (restoration, reconstruction) and machine learning (few-shot learning, clustering, text-vision models). In particular, I studied the theoretical convergence of algorithms and their numerical efficiency.

2019 **French Agrégation of Mathematics**.
National competition to become a teacher.

2018 **Admitted to the competitive examination of the ENS Paris-Saclay (second concours)**.

2016–2020 **ENS Paris-Saclay**, Cachan.
- Second year of Research Master, "Mathématiques, Vision et Apprentissage" (MVA), with highest honors. Specialization in Optimization and Image Processing.
- Second year of Teaching Master to prepare Agrégation. With honors.
- First year of Master of mathematics, "Jacques Hadamard" track, with honors. Fellowship from FMJH.
- Last year of Bachelor of mathematics, with honors.

2014–2016 **PSL University**, Paris.
Two-year selective program "Cycle Pluridisciplinaire d'Etudes Supérieures", major mathematics.

2011–2014 **Lycée Blaise Pascal**, Orsay.
Baccalauréat, with highest honors.

Internships

2020 **Research internship at Université Paris-Saclay, CentraleSupélec, Inria, CVN.** , *New Constrained Majorization-Minimization algorithms for image restoration*, supervised by Jean-Christophe Pesquet and Emilie Chouzenoux, 5 months.
The goal of the M2 internship was to improve the existing 3MG algorithm, which is an algorithm for non-convex differentiable optimization, to take into account multiple diverse constraints.

2018 **Research internship at Université Savoie Mont Blanc, LISTIC**, *Computation of a Cramèr-Rao bound for the evaluation of the performance of radar interferometry for land displacement measurement*, supervised by Yajing Yan et Guillaume Ginolhac, 4 months.
The goal of the internship was to provide a mathematical bound (hybrid Cramèr-Rao bound) on the error committed on the glacier displacement speed estimation, where the estimation had been acquired from radar images (SAR).

2017 **Research internship at ENS Paris-Saclay, CMLA**, *Bundle adjustment with known positions*, supervised by Jean-Michel Morel and Carlo De Franchis, 4 months.
The internship aimed at developing a 3D reconstruction method from satellite images without using known ground control points.

2016 **Research internship at University Paris-Dauphine, CEREMADE**, *Grid construction for almost periodic approximations of images*, supervised by Dario Prandi, 1 month.

Computer languages and tools

Advanced practical skills in **Python** (Numpy, PyTorch, Cuda, cluster-based computing), **Github**, **LaTeX**, **Beamer**.

Teaching

2020–2023 Refresher exercises in optimization for Master MVA, ENS Paris-Saclay.

2023 Practical sessions of the optimisation class for master students, CentraleSupélec.

2020–2022 64 annual hours of teaching for first and second year bachelor students, IUT, Orsay.

2019–2020 Oral examinations in second year preparatory class, Lycée Fénelon, Paris.

2019 Intensive pre-entry courses in mathematics for preparatory classes, GroupeRéussite, Paris.

2017-2020 Private lessons for high school and preparatory class students.

Other academic experiences

Sep–Dec 2022 **Mobility**, 4 months research visit at the ETS Montreal, International Laboratory on Learning Systems (ILLS).

2022–ongoing **Supervision of students**.

- Official supervisor of Michael Adipoetra's Master's thesis (TU Berlin, 06/2024 – 12/2024), titled *Clustering with Generative Models*.
- Co-supervisor of Lina Durrwald's Bachelor's thesis (TU Berlin, 03/2024 – 07/2024), titled *Fast Sparse Optimization Using Consensus-Based ADMM* in collaboration with Fatima Ba (PhD student, TU Berlin).
- Co-supervisor of Eliott Barbot's M2 internship (CentraleSupélec, 06/2023 – 10/2023), on *Few-Shot Classification for Histopathology Slide Segmentation* in collaboration with Christophe Pesquet and Aymen Sadraoui.
- Supervisor of Julien Adjenbaum's M1 internship (Télécom Paris, 07/2022 – 12/2022), titled *3D PSF Estimation in Multiphoton Microscopy* in collaboration with Claire Lefort (Université de Limoges) and Emilie Chouzenoux (Inria Saclay).
- Co-supervised a research project on *Classification with Imbalanced Classes* (01/2022 – 12/2022) with Jean-Christophe Pesquet, involving 4 first- and second-year students at CentraleSupélec.

ongoing **Reviewing**, *IEEE Transactions on Signal Processing, Signal Processing, Signal Processing Letters, ICIP*.

Nov 2022 **Dissemination of scientific knowledge**, *Rendez-vous of Young Mathematicians and Computer Scientists (RJMI)*, Instructor in a 2-day mathematics workshop for high school girls, aimed at promoting scientific careers for women, organized by Inria Saclay and the Animath association.

Publications

Publication preceeded with a ⋆ are the ones where I am the main author. *In the mathematics and signal processing community, the order of authors is usually alphabetical for journal articles. Conferences in this field generally follow the order of contribution. In the machine learning community, the order of authors is always determined by the degree of contribution to the publication.*

Submitted papers

⋆ S. Martin, J.-C. Pesquet, G. Steidl, I. Ben Ayed, "A novel variational approach for multiphoton microscopy image restoration : from PSF estimation to 3D deconvolution", *arXiv preprint arXiv :2501.07306*, 2025.

Journal articles

⋆ J. Ajdenbaum, E. Chouzenoux, S. Martin, C. Lefort, J.-C. Pesquet, "Variable Bregman Majorization-Minimization Algorithm and its Application to Dirichlet Maximum Likelihood Estimation", in *Inverse Problems*, 2024.

⋆ E. Chouzenoux, S. Martin, J.-C. Pesquet, "A Local MM Subspace Method for Solving Constrained Variational Problems in Image Recovery", *Journal of Mathematical Imaging and Vision*, 2022.

Conference proceedings

M. Adipoetra, S. Martin, "Deep Generative Clustering with VAEs and Expectation-Maximization", accepted at *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*, 2025.

⋆ S. Martin, A. Gagneux, P. Hagemann, G. Steidl, "PnP-Flow : Plug-and-Play Image Restoration with Flow Matching", accepted at *International Conference on Learning Representations (ICLR)*, 2025.

⋆ S. Martin, Y. Huang, F. Shakeri, J.-C. Pesquet, I. Ben Ayed, "Transductive zero-shot and few-shot CLIP", in *IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)* as a highlight (<10 % of accepted papers), 2024.

⋆ A. Sadraoui, S. Martin, E. Barbot, A. Laurent-Bellue, J.-C. Pesquet, C. Guettier, "A transductive few-shot learning approach for classification of liver cancer histopathology images", in *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2024.

J.-B. Fest, T. Heikkilä, I. Loris, S. Martin, L. Ratti, S. Rebegoldi, G. Sarnighausen, "On a fixed-point continuation method for a convex optimization problem", *Advanced Techniques in Optimization for Machine learning and Imaging (ATOMI)*, 2023.

⋆ S. Martin, M. Boudiaf, E. Chouzenoux, J.-C. Pesquet, I. Ben Ayed, "Towards Practical Few-shot Query Sets : Transductive Minimum Description Length Inference", *Neural Information Processing Systems (NeurIPS)*, 2022.

M. Kahanam, L. Le-Brusquet, S. Martin, J.-C. Pesquet, "A Non-Convex Proximal Approach for Centroid-Based Classification", *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022.

⋆ S. Martin, E. Chouzenoux, J.-C. Pesquet, "A Penalized Subspace Strategy for Solving Large-Scale Constrained Optimization Problems", *IEEE 29th European Signal Processing Conference (EUSIPCO)*, 2021.

Others

Gagneux, A., Martin, S., Emonet, R., Bertrand, Q., Massias, M, "A visual dive into conditional flow matching", *Blogpost Track of the International Conference on Learning Representations (ICLR)*, 2025.

Talks

2024 "Flow-based generative models", invited talk for the *Machine Learning and Signal Processing seminar*, ENS Lyon, CNRS, Université Claude Bernard Lyon 1, Inria, LIP, UMR 5668, Lyon, France.

2023 "Unbalanced few-shot learning", DATAIA workshop on *Mathematical foundations of artifical intelligence*, Sorbonne Center for AI, Paris, France.

2022 "Towards practical few-shot query sets : transductive minimum description length inference", Seminar of the ILLS laboratory, Montreal, Canada.

2022 "Numerical restoration of multiphoton images", Seminar of the XLIM, Limoges, France.

2022 "Penalized methods for solving constrained variational problems in image recovery", Mini-Symposium : Variational Methods for Inverse Problems in Imaging, *10th International Conference Inverse Problems Modeling and Simulation*.

2022 "A Penalized Subspace Strategy for Solving Large-Scale Constrained Optimization Problems", Mini-Symposium : Novel Perspectives in Optimization and Machine Learning for Imaging, *SIAM Conference on Imaging Science*.