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French and American citizen
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Ségolène Martin

Education

2020–ongoing **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 focuses 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). In particular, I study 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.

Publications

Journal articles

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.

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", *arXiv preprint arXiv :2212.12256*, 2022.

Conference Proceedings

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.

Talks

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*.

Computer languages and tools

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

Teaching

2020–ongoing 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

Jun - Oct 2023 **Supervision** of Eliott Barbot, intern with Jean-Christophe Pesquet, on few-shot classification of histopathology images.

Feb 2023 Participation to the Biomedical and Astronomical Signal Processing (BASP) **conference**, Villars-sur-Ollon, Switzerland.

Nov 2022 Instructor at a 2-day mathematic workshop for high school students in the aim of promoting scientific careers for women

Jun 2022 **Reviewer** for ICIP conference.

Jan - Dec 2022 **Supervision** of a 1st and 2nd year research project at CentraleSupelec, with Jean-Christophe Pesquet, on unbalanced classification.

Jul - Dec 2022 **Supervision** of Julien Ajdenbaum, intern with Emilie Chouzenoux, in the context of a project on multi-photon microscopy.

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

Jul 2022 **Visit** at XLIM, Limoges in the context of a collaboration with Claire Lefort, physicist at XLIM.

May 2022 Participation to the *Advanced Techniques in Optimization for Machine learning and Imaging (ATOMI)* **workshop**, Rome.

Languages

French, mother tongue.

English, Advanced. TOEFL® iBT : 97/120, Cambridge English Advanced (level C1).