Tom Szwagier

PhD candidate in geometric statistics at Inria (formerly Mines Paris - PSL & ENS Paris-Saclay), keenly interested in differential geometry, statistics and optimization, eager to impact the machine learning community with new ideas.

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🖥 tomszwagier.github.io
in Tom Szwagier

EDUCATION

ENS Paris-Saclay, Master MVA (Mathematics, Vision, Learning) — **Paris, France** — *2021-2022*
Relevant Coursework: Geometry and statistical learning, Geometry of shape spaces, Convex optimization, Computational statistics, Kernel methods, Optimal transport, Advanced medical image analysis, Functional brain imaging, Sub-pixel image processing.

Mines Paris - PSL, Master in Science & Executive Engineering — **Paris, France** — *2018-2022*
Major: Digital Engineering of Complex Systems (Physics & AI)
Relevant Coursework: Machine learning, Computer science, Statistics, Optimization, Probability theory, Differential and Integral calculus, Distribution theory, Stochastic process.

Lycée Saint-Louis, Preparatory Classes for top French engineering schools — **Paris, France** — *2016-2018*
MP*/MPSI (Mathematics & Computer Science). **Ranking:** 120/8916.

Scientific Baccalaureate — **Paris, France** — *2016*
Participation in the Concours Général in Mathematics and Physics.

PROFESSIONAL EXPERIENCE & PROJECTS

Inria, Research Intern in Geometric Statistics — **Sophia Antipolis, France** — *2022 (6 months)*
Rethinking principal component analysis with flag manifolds
Lab: Epione – **Head**: Nicholas Ayache – **Supervisor**: Xavier Pennec
- Geometry & Optimization: development of a Riemannian optimization framework on flag manifolds
- Code: implementation in `geomstats`, an open-source Python package for geometric statistics
- Results: successful generalization of PCA as a flag optimization

Technion - Israel Institute of Technology, Deep Learning Research Intern — **Haifa, Israel** — *2021 (6 months)*
Atrial Fibrillation diagnosis on long-term ECG recordings
Lab: AIMLab – **Head**: Joachim Behar – **Supervisors**: Joachim Behar, Shany Biton
- Deep Learning: implementation of cutting-edge time-series classification models
- Data Augmentation: development of a physiologically-inspired deep conditional autoencoder

Acoustic Wells, Machine Learning R&D Intern — **Boston, MA, USA** — *2020-2021 (6 months)*
Machine Learning-based estimation of methane emissions in oil wells
- Signal Processing: sensor fusion, filtering
- Machine Learning: feature extraction, non-linear regression, prediction interval
- Active Learning: development of an original method, design of a labeling tool

INMED & CENTURI, Image Processing Research Intern — **Marseille, France** — *2020 (3 months)*
Morphological and functional analysis of calcium imaging neuron sequences
Lab: Cossart Lab – **Head**: Rosa Cossart – **Supervisors**: Julien Denis, Robin Dard
- Image Processing: neuronal video denoising, adaptive thresholding, skeletonization
- Signal Processing: neuronal activity analysis using spike detection, signal correlation, skewness
- Unsupervised Learning: neuronal activity dimensionality reduction, clustering and factorization

Institut Pasteur, Image Processing Research Intern — **Paris, France** — *2019-2020 (6 months)*
Segmentation of dendritic spines using mathematical morphology
Lab: Biological Image Analysis – **Head**: Jean-Christophe Olivo-Marin – **Supervisor**: Suvadip Mukherjee
- Mathematical Morphology: skeletonization, pruning, watershed

SKILLS

- **Languages:** French (mother tongue), English (professional proficiency), Spanish (conversational)
- **Computer Science:** Python, Java, Matlab, Git, LaTeX
- **Python Libraries:** Tensorflow, scikit-learn, OpenCV, scikit-image, scipy, numpy, pandas
- **Machine Learning:** Deep Learning Specialization (deeplearning.ai), Machine Learning (Stanford University)

NONPROFIT ACTIVITIES

Mines Paris - PSL, Student Union — **Paris, France** — *2019-2020 (1 year)*
Head of external relations. VP Paris Sciences & Lettres. VP eligible candidates.
Weekly voluntary tutor for underprivileged excellent students.

INTERESTS

- **Sport:** Running, Hiking, Climbing, Surf.
- **Music:** Piano, DJ controller, Analog Synthesizers (KORG volca series).