Tom Szwagier

Dual-degree MSc student at Mines Paris - PSL & ENS Paris-Saclay, keenly interested in machine learning and its applications to ambitious scientific challenges that combine mathematical modelling and medicine.

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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 (in progress)
Principal Component Analysis as an optimization on flag manifolds
Lab: Epione – **Head**: Nicholas Ayache – **Supervisor**: Xavier Pennec
The goal of this internship and the follow-up PhD is to explore, implement and study extensions and applications of geometric dimensionality reduction methods from the new point of view of flag manifolds.

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, Image Processing Research Intern (CENTURI Internship Program) — **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:** Track & Field, Climbing, Surf.
- **Music:** Piano (18 years), Composition of electronic music, Improvisation in Jam sessions.