Gaspard Beugnot

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gaspard-beugnot

PhD candidate in Machine Learning and Optimization

I am open to work starting **February 2024**.

Experience

Since 2020 — *Learning theory and non-convex optimization with kernel methods and deep learning*

École Normale Supérieure d'Ulm & Inria Sierra, Paris, France, PhD candidate.
Understand statistical properties of neural networks and invent faster and more robust optimization methods. With Julien Mairal and Alessandro Rudi. 3 papers (**2 awarded**) published in major ML conferences. Defense in Apr. 2024.

2020 — *Fast approximation of Optimal Transport distances*

5 months — **MIT's Geometric Data Processing group**, Cambridge, US, Master research internship.
Design an estimator of the Wasserstein distance, with constrained computational power budget. Provided theoretical analysis as well as efficient implementation for use in practice. With Prof. Justin Solomon.

2019 — *Unsupervised segmentation of highly multiplexed cancer images*

5 months — **McGill's Shape Analysis Group**, Montreal, Canada, Master research internship.
Combined deep learning with flow-based algorithms to accurately segment mass cytometry's cancer sample, while retaining interpretability of the results. With Prof. Kaleem Siddiqi.

2019 — *Optimization of an algorithm for brain image registration*

6 months — **École Polytechnique Center for applied mathematics (CMAP)**, Palaiseau, France.
Analyzed sturdiness of deep learning algorithms for brain image registration, with Prof. Stéphanie Allassonnière.

2018 — *Intern in a health data processing startup (seed)*

3 months — **Embleema**, New York, USA.
Startup in healthcare aiming at collecting and processing real world evidence medical data. Improved Embleema's handling of electronic medical records and clustered cohorts of patients based on free text notes.

Education

2019–2020 — **École Normale Supérieure**, Saclay, France.
Master Mathématiques, Vision, Apprentissage (MVA). 2nd year student in a Master Degree in Applied Mathematics. Awarded with highest honours. Coursework includes: Graphs in ML, Convex optimization, Computational Statistics.

2016–2020 — **École Polytechnique**, Palaiseau, France.
Ingénieur polytechnicien (X2016). Machine Learning and Computer Vision track.

Publications

NeurIPS23 — *GloptiNets: Scalable Non-Convex Optimization with Certificates* (**spotlight**): Using *kernel Sum-of-Squares* to *certify* the output of a non-convex optimization algorithm.

COLT22 — *On the Benefits of Large Learning Rates for Kernel Methods*: experimental evidence shows that using large learning rates can prove beneficial for the statistical performance of a neural network. We study a general model to explain theoretically this intriguing phenomenon.

NeurIPS21 — *Beyond Tikhonov: faster learning with self-concordant losses, via iterative regularization* (**spotlight**): we uncover the good statistical properties of the proximal point algorithm with new loss function.

UAI21 — *Improving approximate optimal transport (OT) distances using quantization*: design a preprocessing step to speed up the computation of OT distance. We prove the expected gain and measure it in practice.

Skills & interests

Research Interests — LLM for autonomous agents and large scale sentiment analysis. Robustness and explainability in ML for healthcare. Functional programming for scientific computing.

Programming — Proficient in Python (PyTorch, Jax, Numpy) and Julia. Intermediate in C++.

Languages — French (Mother tongue), English (Fluent), Spanish (Intermediate)

Sports — Bouldering, tennis, Spikeball and running.