Gaspard Beugnot

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gaspard-beugnot

PhD candidate in Machine Learning and Optimization

I am open to work starting **January 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 data*

5 months **McGill's Shape Analysis Group**, Montreal, Canada, Master research internship.
Used flow-based algorithms and variants on mass cytometry's cancer sample. Designed new metrics based on biological rules to score and further improve segmentation. With Prof. Kaleem Siddiqi.

2019 *Optimization of an algorithm for image registration*

6 months **École Polytechnique Center for applied mathematics (CMAP)**, Palaiseau, France.
Analyzed sturdiness of deep learning algorithms for 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.

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

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

Programming Proficient in Python and Julia. Intermediate in C++. Particularly enthused about functional programming for scientific computing.

Sports Bouldering, tennis, Spikeball and running.