Boris Muzellec

PhD Candidate - CREST, ENSAE

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Research Interests

My research is focused on applying tools from the optimal transport theory to machine learning. More specifically, I have a particular interest in leveraging the flexibility of the optimal transport toolbox to tackle unsupervised problems.

Keywords: Machine Learning, Optimal Transport, Unsupervised Learning.

Education

2017–present **ENSAE**, *PhD in Mathematics*, Paris. Supervisor: Marco Cuturi.
Working on applications of optimal transport to machine learning. Expected graduation date: Fall 2020.

2016–2017 **Université Paris-Saclay**, *MSc Data Science*, Paris.

2013–2016 **École polytechnique**, *Engineering Degree, Data Science Track*, Paris.
Applied mathematics and computer science.

Research Internships

Sept.–Nov. 2019 **Riken AIP/U. of Tokyo**, Tokyo, Japan. Supervisor: T. Suzuki.
Gradient Langevin dynamics for non-convex optimization in RKHS. Work with K. Sato, M. Massias and T. Suzuki. Publication: submitted to ICML 2020.

Mar.–Jul. 2016 **Data61, CSIRO**, Sydney, Australia. Supervisor: R. Nock.
Regularized optimal transport for joint distribution inference. Publication in AAAI 2017.

Non-Research Work Experience

Apr.–Aug. 2017 **Ministère des Armées**, *Data Scientist Intern*, Paris.

Jun.–Aug. 2015 **AIMIA Inc.**, *Analyst Intern*, London, UK.
Main developer for a 10 week data visualization project for client Sainsbury's.

Sept. 2013 – Apr. 2014 **French Navy, Patrol Ship *La Gracieuse***, *Navigation Officer*, French Guiana.
Participated in anti-drug trafficking and law enforcement operations at sea.

Publications and Preprints

BM, Kanji Sato, Mathurin Massias and Taji Suzuki. "Dimension-Free Convergence Rates for Gradient Langevin Dynamics in RKHS." In: *arXiv:2003.00306* (submitted to ICML 2020).

BM, Julie Josse, Claire Boyer and Marco Cuturi. "Missing Data Imputation using Optimal Transport." In: *arXiv:2002.03860* (submitted to ICML 2020).

BM and Marco Cuturi. "Subspace Detours: Building Transport Plans that are Optimal on Subspace Projections." In: *Advances in Neural Information Processing Systems 32*. 2019.

BM and Marco Cuturi. "Generalizing Point Embeddings Using the Wasserstein Space of Elliptical Distributions." In: *Advances in Neural Information Processing Systems 31*. 2018.

BM, R. Nock, G. Patrini and F. Nielsen. "Tsallis Regularized Optimal Transport and Ecological Inference." In: *Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence*. 2017.

Teaching Experience

Oct. 2017–present **ENSAE**, *Teaching Assistant*, Paris.
- Functional and Convex Analysis.
- Numerical Analysis.
- Introduction to Machine Learning.

Sept. 2016 – Aug. 2017 **École polytechnique**, *Student Tutor*, Paris.
- INF311: Introduction to Computer Science.
- INF557: Introduction to Concurrent and Communicating Systems.

Talks

Feb. 2020 **Sierra Seminar**, *Inria Paris*.
"The Bures-Wasserstein Distance for Machine Learning." (1h talk).

Sept. 2019 **Riken Deep Learning Theory Team Seminar**, *University of Tokyo*.
"Subspace Detours: Building Transport Plans that are Optimal on Subspace Projections." (30 minutes talk).

Sept. 2018 **Junior Conference on Data Science and Engineering (JDSE)**, *Orsay*.
"Generalizing Point Embeddings Using the Wasserstein Space of Elliptical Distributions."(20 minute talk, best presentation award).

Awards

2018 *Best Talk Award*, Junior Conference on Data Science and Engineering 2018.

2016 *Computer Science Dpt. Research Internship Award*, École polytechnique.

Service to the community

Conference reviewer: AISTATS 2019, ICML 2019.

Ad-hoc journal reviewer: JMLR, Physica A.

Programming skills

Advanced Python (numpy, scikit-learn, Pytorch, cupy).

Notions C++ (OpenCV, Open MPI), Java, R.

Languages

Native French, fluent English, Spanish basics.

Interests

Sports Rock climbing, savate (French-style kickboxing), fencing.

Music Trumpet: Played for concerts and ceremonies as part of a local brass band. Played in the university's jazz band.