Boris Muzellec

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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 particular cases of optimal transport that admit closed form expressions to design scalable tools for machine learning.
Keywords: Machine Learning, Optimal Transport.

Education

2017–2020	**ENSAE**, *PhD in Mathematics*, Paris.
	Leveraging Regularization, Projections and Elliptical Distributions in Optimal Transport. Supervised by Marco Cuturi.
2016–2017	**Université Paris-Saclay**, *MSc Data Science*, Paris.
2013–2016	**École polytechnique**, *Engineering Degree, Data Science Track*, Paris.
	Applied mathematics and computer science.

Work Experience

Nov. 2020 –	**INRIA & ENS Paris – SIERRA Team**, *Postdoctoral Researcher*, Paris.
	Optimal transport and machine learning.
Sept.–Nov. 2019	**Riken AIP/U. of Tokyo**, *Research Intern*, Tokyo, Japan. Supervisor: T. Suzuki. Gradient Langevin dynamics for non-convex optimization in RKHS. Work with K. Sato, M. Massias and T. Suzuki.
Mar.–Jul. 2016	**Data61, CSIRO**, *Research Intern*, Sydney, Australia. Supervisor: R. Nock. Regularized optimal transport for joint distribution inference. Publication in AAAI 2017.

Publications and Preprints

H. Janati, B. Muzellec, G. Peyré, and M. Cuturi. "Entropic Optimal Transport between (Unbalanced) Gaussian Measures has a Closed Form." In: *Advances in Neural Information Processing Systems 33* (oral). 2020.

B. Muzellec, K. Sato, M. Massias and T. Suzuki. "Dimension-Free Convergence Rates for Gradient Langevin Dynamics in RKHS." In: *arXiv:2003.00306*. (2020)

B. Muzellec, J. Josse, C. Boyer and M. Cuturi. "Missing Data Imputation using Optimal Transport." In: *Proceedings of the International Conference on Machine Learning*. 2020.

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

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

B. Muzellec, 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

Dec. 2020 **Séminaire Palaisien**, *Inria Saclay*.
"The Bures-Wasserstein Geometry for Machine Learning" (30 minute talk).

July. 2020 **Simpas Group Meeting**, *CMAP, IP Paris*.
"Imputing Missing Values using Optimal Transport." (20 minute talk).

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 minute 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

2020 *DIM Math Innov* Postdoctoral Fellowship

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, NeurIPS 2020.

Ad-hoc journal reviewer: JMLR, Physica A.

Programming skills

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

Notions C++, R, SQL.

Languages

Native French, fluent English, Spanish basics.