Boris Muzellec

Postdoctoral Researcher - INRIA & ENS Paris

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BorisMuzellec

Research Interests

My research is focused on applying tools from the optimal transport theory to machine learning, and vice-versa.
Keywords: Machine Learning, Optimal Transport.

Education

2017–2020 **ENSAE, IP Paris**, *PhD in Applied 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.
Working on optimal transport and kernel methods for machine learning with Alessandro Rudi and Francis Bach.

Sept.–Nov. 2019 **Riken AIP/U. of Tokyo**, *Research Intern*, Tokyo, Japan. Supervisor: T. Suzuki.
Gradient Langevin dynamics for non-convex optimization in RKHS. Joint 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.

Teaching and Supervision

Apr.–Sept. 2021 **Internship co-supervision of Théo Uscidda**, *Msc. MVA*.
Topic: "Distributed Missing Data Imputation using Optimal Transport" (Supervised with Claire Boyer and Julie Josse).

0ct. 2017–2019 **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.

Grants and Awards

2021 *Best Thesis Award*, Institut Polytechnique de Paris.

2020 *Postdoctoral Fellowship*, Dim Math Innov.

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

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

Service to the community

Conference reviewer: AISTATS 2019, ICML 2019, NeurIPS 2020, NeurIPS 2021.

Ad-hoc journal reviewer: JMLR, Mathematical Programming, Information and Inference, Physica A.

Publications and Preprints

B. Muzellec, F. Bach, A. Rudi. ". A Note on Optimizing Distributions using Kernel Mean Embeddings." In: *arXiv:2106.09994*. 2021.

A. Vacher, B. Muzellec, A. Rudi, F. Bach and F.-X. Vialard. "A dimension-free computational upper bound for smooth optimal transport estimation." In: *Conference on Learning Theory*. 2021.

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.

Talks

Oct. 2021 **High-dimensional Statistical Modeling Team Seminar**, *RIKEN AIP*.
"Breaking the curse of dimensionality in smooth optimal transport." (1h talk).

May. 2021 **Young Data Science Researcher Seminar**, *ETH Zürich*.
"Breaking the curse of dimensionality in smooth optimal transport." (1h talk).

Jan. 2021 **Statistics, Econometrics and Machine Learning seminar**, *ENSAE*, Paris.
"Imputing missing values using regularized optimal transport." (1h talk).

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).

Programming skills

Advanced Python: NumPy, scikit-learn, PyTorch.

Notions R, SQL, Java, Git.

Languages

Native French, fluent English, Spanish basics.