

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

## Publications and Preprints

- Hicham Janati, BM, Gabriel Peyré, and Marco Cuturi. "Entropic Optimal Transport between (Unbalanced) Gaussian Measures has a Closed Form." In: *arXiv:2006.02572* (2020).
- BM, Kanji Sato, Mathurin Massias and Taji Suzuki. "Dimension-Free Convergence Rates for Gradient Langevin Dynamics in RKHS." In: *arXiv:2003.00306*. (2020)
- BM, Julie Josse, Claire Boyer and Marco Cuturi. "Missing Data Imputation using Optimal Transport." In: *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 **École polytechnique**, *Student Tutor*, Paris.  
Aug. 2017
  - INF311: Introduction to Computer Science.
  - INF557: Introduction to Concurrent and Communicating Systems.

## Talks

- July. 2020 **Simpas Group Meeting**, *CMAP 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.