Théo Dumont

PhD student at LIGM, Univ. Gustave Eiffel (Marne-la-Vallée, France)
Optimal transport / Riemannian geometry / machine learning

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1. Overview

1.1. Summary. I am a PhD student in mathematics at LIGM (Université Gustave Eiffel), under the supervision of François-Xavier Vialard, Théo Lacombe and Virginie Ehrlacher. I am studying the geometry of several optimizations problems related to optimal transport (OT), such as regularized OT or Gromov–Wasserstein, and I am always happy to discuss!

1.2. Interests and recent work. My interests span the theory of OT and Riemannian geometry, and I am passionate about the interplay between those fields. I recently worked with F.X. Vialard and T. Lacombe on the Gromov–Wasserstein problem [1], with P. Harms on the infinite-dimensional geometry of neural networks, and with K. Modin on gradient flows in the diffeomorphism group.

2. Curriculum

2.1. Education.

2023–	:	**PhD in mathematics, LIGM (Université Gustave Eiffel)**
		Thesis: *Geometry of some optimization problems on spaces of measures*
		Supervisors: François-Xavier Vialard, Théo Lacombe and Virginie Ehrlacher
2021–2022:		**M.Sc., ENS Paris-Saclay**, Master 2 MVA (*Mathematics, Computer Vision and Machine Learning*)
		Thesis: *Existence of Monge maps for the Gromov–Wasserstein problem* (link of the thesis) [1]
		Supervisors: François-Xavier Vialard and Théo Lacombe
2018–2022:		**M.Sc., Mines Paris – PSL University** (*Applied Mathematics and Computer Science*) [2, 3, 4]
2016–2018:		**B.Sc., Lycée Sainte-Geneviève** (*Mathematics, Physics, Fundamental and applied Computer Science*)

2.2. Research experiences.

2023:		**Chalmers University (Göteborg, Sweden)**, internship (infinite-dimensional Riemannian geometry)
(2 months)		*Gradient flows in the diffeomorphism group*
		Supervisor: Klas Modin
2022–2023:		**NTU Singapore**, internship (infinite-dimensional Riemannian geometry)
(6 months)		*Intrinsic geometry of neural networks*
		Supervisor: Philipp Harms
2022:		**Université Gustave Eiffel – LIGM**, internship (optimal transport)
(6 months)		*Existence of Monge maps for Gromov–Wasserstein* [1]
		Supervisors: François-Xavier Vialard and Théo Lacombe
2021:		**Tekal.ai, working with MIT CSAIL**, internship (deep learning)
(6 months)		*Video memorability prediction* [2]
		Supervisor: Camilo Fosco
2020–2021:		**InterDigital, Inc.**, internship (deep learning)
(6 months)		*Temporal segmentation of facial features*
		Supervisors: Claire-Hélène Demarty and Frédéric Lefebvre
2020:		**Turing Centre for Living Systems (INMED)**, internship (computer vision)
(3 months)		*Image processing and dimensionality reduction for neuronal coactivity detection in the brain* [3]
		Supervisors: Rosa Cossart and Julien Denis

2019–2020:   **Mines Paris – Center for Mathematical Morphology**, internship (deep learning)
(6 months)   *Image segmentation by superpixels* [4]
     Supervisor: Bruno Figliuzzi

3. Publication list

See also my Google Scholar page.

3.1. Optimal transport and geometry.

[1]   T. Dumont, T. Lacombe, and F. X. Vialard. "On the existence of Monge maps for the Gromov–Wasserstein problem". In: *Foundations of Computational Mathematics* (2024), pp. 1–48.   📄 PDF   ⌾ CODE   🖻 SLIDES.

3.2. Applied ML and image analysis.

[2]   T. Dumont, J. S. Hevia, and C. L. Fosco. "Modular Memorability: Tiered Representations for Video Memorability Prediction". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2023, pp. 10751–10760.   📄 PDF   ⌾ CODE.

[3]   R. F. Dard, E. Leprince, J. Denis, S. R. Balappa, D. Suchkov, R. Boyce, C. Lopez, M. Giorgi-Kurz, T. Szwagier, T. Dumont, et al. "The rapid developmental rise of somatic inhibition disengages hippocampal dynamics from self-motion". In: *Elife* 11 (2022), e78116.   📄 PDF   ⌾ CODE.

[4]   D. Paulovics, B. Figliuzzi, T. Dumont, and F. Blanc. "A supervised algorithm entirely trained on a synthetic dataset to segment granular suspension images". Preprint. 2023.   📄 PDF   ⌾ CODE.

4. Computer and Language skills

		English:	Fluent	(C1, Toefl 113/120)
Proficient:	Python, PyTorch, git, Unix, LaTeX, bash, sql, Adobe Suite	French:	Native speaker	
Intermediate:	Java, OCaml, html, css, Coq	Italian:	Intermediate	(B1)
		Japanese:	Basic	(A2)