ANTOINE MOULIN

PhD student in Machine Learning

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RESEARCH INTERESTS

Reinforcement learning (efficient exploration in Markov decision processes with function approximation, adversarial environments, distribution shift), online learning (adaptive algorithms, post-training of language models).

EDUCATION

Ph.D in Machine Learning　　　　　　　　　　　　　　　　　　　　　Dec 2021 – Present
Universitat Pompeu Fabra　　　　　　　　　　　　　　　　　　　　　　Barcelona, Spain

· The overarching topic is to identify and exploit structural properties of Markov decision processes that make large-scale reinforcement learning (RL) statistically and computationally feasible.
· Part of the ELLIS program, advised by Gergely Neu and Arthur Gretton.

Master of Science in Machine Learning　　　　　　　　　　　　　　Sep 2019 – Sep 2020
ENS Paris-Saclay　　　　　　　　　　　　　　　　　　　　　　　　　Paris, France

· Grade: 17.34/20.00. Courses: RL, Computer Vision, Graphical Models, Convex Optimization, Deep Learning, Neurosciences, Kernel Methods, Sequential Learning, Multi-scale models, Biostatistics.

Engineering Degree　　　　　　　　　　　　　　　　　　　　　　　Sep 2017 – Sep 2020
Telecom Paris　　　　　　　　　　　　　　　　　　　　　　　　　　Paris, France

· GPA: 4.00/4.00. Equivalent to a Masters, top 5% cohort. Some courses: Measure & Probability Theory, Functional Analysis, Signal Processing, Statistics, Machine Learning, Optimization, Algorithm Design.

Preparatory Classes　　　　　　　　　　　　　　　　　　　　　　　Sep 2015 – Jul 2017
Lycée Janson-de-Sailly　　　　　　　　　　　　　　　　　　　　　　Paris, France

· GPA: 3.96/4.00. Post-secondary two-year program in Advanced Mathematics and Physics.

EXPERIENCE

Student Researcher　　　　　　　　　　　　　　　　　　　　　　　Jun 2024 – Dec 2024
Google DeepMind　　　　　　　　　　　　　　　　　　　　　　　　London, UK

· Worked on epistemic uncertainty quantification and how to compute finite-time predictive intervals for general function classes using ensembles and approximations thereof. Advisor: Ilja Kuzborskij.
· Worked on task-specific data mixture selection for large language models.

Research Engineer　　　　　　　　　　　　　　　　　　　　　　　　Feb 2021 – Apr 2021
Research Intern　　　　　　　　　　　　　　　　　　　　　　　　　May 2020 – Oct 2020
INRIA　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Lille, France

· Focus on deep RL. Implemented extensions of actor-critic methods (PPO, TRPO) to improve exploration, worked on reproducibility issues in RL. Advisor: Philippe Preux.

Research Intern　　　　　　　　　　　　　　　　　　　　　　　　　Summer 2019
Aalto University　　　　　　　　　　　　　　　　　　　　　　　　　Helsinki, Finland

· Reviewed the literature on canonical correlation analysis (CCA) methods and implemented an efficient extension of a sparse kernel CCA method. Advisor: Juho Rousu.

Analyst Intern	Summer 2018
Crédit Agricole	Caen, France

PUBLICATIONS & PREPRINTS

Optimistically Optimistic Exploration for Provably Efficient Infinite-Horizon Reinforcement and Imitation Learning *[arXiv]*

Antoine Moulin, Gergely Neu, and Luca Viano (α-β order).

(Submitted)

When Lower-Order Terms Dominate: Improved Loss-Range Adaptivity for Expert Algorithms

Antoine Moulin*, Emmanuel Esposito*, and Dirk van der Hoeven.

(Submitted)

Spectral Representation for Causal Estimation with Hidden Confounders *[arXiv]*

Tongzheng Ren, Haotian Sun, **Antoine Moulin**, Arthur Gretton, and Bo Dai

(AISTATS 2025) 28th International Conference on Artificial Intelligence and Statistics.

Optimistic Planning by Regularized Dynamic Programming *[arXiv]*

Antoine Moulin, Gergely Neu

(ICML 2023) 40th International Conference on Machine Learning.

TALKS

Learning in Adversarial Linear MDPs	Mar 2024
University of Tokyo	Tokyo, Japan
Optimistic Planning by Regularized Dynamic Programming	Aug 2023
Princeton University	Princeton, NJ
Optimistic Planning by Regularized Dynamic Programming	Jul 2023
Stanford University	Stanford, CA
Infinite Horizon RL with Linear Function Approximation	Mar 2023
Universitat Pompeu Fabra	Barcelona, Spain
Primal-dual Methods for RL	Sep 2022
Gatsby Unit, University College London	London, UK
Introduction to JAX	Sep 2021
ELLIS Doctoral Symposium	Tubingen, Germany

TEACHING

Machine Learning	Universitat Pompeu Fabra	2022 – 2023
Algorithm Design	Universitat Pompeu Fabra	2022 – 2024
Computer Science	IPESUP, bootcamp for high-school students	2023
Probabilities	Universitat Pompeu Fabra	2022
Mathematics Examiner	Lycée Janson-de-Sailly, preparatory classes	2018 – 2019

ACADEMIC ACTIVITIES

· Organizer of the RL theory virtual seminars.
· Organizer of the ICML workshop *Aligning Reinforcement Learning Experimentalists and Theorists*.
· Organizer of the Reinforcement Learning Summer School 2023 (RLSS 2023).

- · Reviewer at EWRL 2023, ARLET 2024.
- · Chair of the ELLIS RL reading group (2021 – 2022).
- · Volunteer at AISTATS 2021.

SKILLS

Programming	Python (JAX, PyTorch), MATLAB, C++, Java, SQL, HTML.
Languages	French (native), English (fluent), Spanish, Italian (intermediate).

OTHER ACTIVITIES

- · Organizer of the beach volley tournament at DTIC, Universitat Pompeu Fabra (2022 – 2023).
- · Communication manager in a student-led company at Telecom Paris (2018 – 2019). Organized workshops, study cases, visits and a gala for students & partner companies (€27K budget). Managed missions in Machine Learning for several companies.
- · Hobbies include climbing, (beach) volleyball, ski, table tennis.