Moïse Blanchard

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Education

Massachusetts Institute of Technology, Cambridge, MA *2019 – Exp. 2024*
Ph.D. Student in Operations Research
Operations Research Center (ORC), Laboratory for Information & Decision Systems (LIDS). GPA 5.0/5.0
Advisor: Prof. Patrick Jaillet

École Polytechnique, Palaiseau, France *2016 – 2020*
B.Sc. and M.Sc. in Applied Mathematics, **Valedictorian**
Minor: Computer Science, Mathematics, Physics. GPA 4.0/4.0

Lycée Louis-le-Grand, Paris, France *2014 – 2016*
Classes Préparatoires
Mathematics, Physics, and Computer Science. GPA 4.0/4.0

Research Interests

Statistical Decision-Making: online learning, contextual bandits, reinforcement learning

Machine Learning: learning with unstructured data, algorithm design, high-dimensional statistics

Optimization: optimization under resource constraints, discrete optimization

Publications (authorship order by contribution, equal contribution marked with *)

Journal Publications

J1 Moïse Blanchard, Patrick Jaillet. Universal regression with adversarial responses.
Annals of Statistics (AoS), 2023

J2 Moïse Blanchard*, Adam Q. Jaffe*. Fréchet mean set estimation in the Hausdorff metric, via relaxation.
Major Revision, Bernoulli, 2023

J3 Moïse Blanchard, Alexandre Jacquillat, Patrick Jaillet. Probabilistic bounds on the k-Traveling Salesman Problem and the Traveling Repairman Problem.
Mathematics of Operations Research (MOR), 2022
Winner of INFORMS Transportation Science & Logistics (TSL) 2023 Best student paper award

J4 Moïse Blanchard, Jesús A. De Loera, Quentin Louveaux. On the length of monotone paths in polyhedra.
SIAM Journal on Discrete Mathematics, 2021
Winner of the Rivot medal for outstanding research, French Science Academia

Conference Publications

C1 Moïse Blanchard, Junhui Zhang, Patrick Jaillet. Quadratic memory is necessary for optimal query complexity in convex optimization: Center-of-mass is Pareto-optimal.
Conference on Learning Theory (COLT), 2023

C2 Moïse Blanchard, Junhui Zhang, Patrick Jaillet. Memory-constrained algorithms for convex optimization.
Advances in Neural Information Processing Systems (NeurIPS), 2023

C3 Moïse Blanchard. Universal online learning: An optimistically universal learning rule.
Conference on Learning Theory (COLT), 2022
Best Student Paper Runner-up Award, COLT

C4 Moïse Blanchard*, Romain Cosson*. Universal online learning with bounded loss: Reduction to binary classification.
Conference on Learning Theory (COLT), 2022

C5 Moïse Blanchard*, Romain Cosson*, Steve Hanneke. Universal online learning with unbounded losses: Memory is all you need.
International Conference on Algorithmic Learning Theory (ALT), 2022

C6 Moïse Blanchard, Amine Bennouna. Shallow and deep networks are near-optimal approximators of Korobov functions.
International Conference on Learning Representations (ICLR), 2022

Preprints

P1 Moïse Blanchard, Steve Hanneke, Patrick Jaillet. Adversarial Rewards in Universal Learning for Contextual Bandits.
To be submitted to Journal of Machine Learning Research (JMLR), 2023

P2 Moïse Blanchard, Steve Hanneke, Patrick Jaillet. Contextual bandits and optimistically universal learning.
To be submitted to Mathematics of Operations Research, 2023

P3 Moïse Blanchard, Václav Voráček. Tight bounds for local Gliveko-Cantelli.
Submitted to International Conference on Algorithmic Learning Theory (ALT), 2023

Talks

Quadratic memory is necessary for optimal query complexity in convex optimization: Center-of-mass is Pareto-optimal

- Conference on Learning Theory (COLT) *Jul 2023*
- Invited talk at Toyota Technological Institute at Chicago (TTIC) *Apr 2023*
- LIDS & Statistics Student Seminar, MIT *Mar 2023*

Contextual bandits and optimistically universal learning

- INFORMS Annual Meeting *Oct 2023*
- Cornell Young Research Workshop, Cornell ORIE *Oct 2023*
- LIDS & Statistics Student Seminar, MIT *Nov 2022*
- Operations Research Student Seminar, MIT *Oct 2022*

Universal regression with adversarial responses

- INFORMS Annual Meeting *Oct 2022*
- Invited talk at Université Pierre et Marie Curie, Laboratoire Jacques-Louis Lions *Mar 2022*
- LIDS Conference, MIT *Feb 2022*

Realizable online learning with minimal assumptions

- Conference on Learning Theory (COLT): "Universal online learning: an optimistically universal learning rule" *Jul 2022*
- Conference on Learning Theory (COLT): "Universal online learning with bounded loss: Reduction to binary classification" *Jul 2022*
- International Conference on Algorithmic Learning Theory (ALT) : "Universal online learning with unbounded loss: memory is all you need" *Mar 2022*
- Operations Research Student Seminar, MIT *Nov 2021*

Probabilistic bounds on the k-Traveling Salesman and Traveling Repairman Problems

- INFORMS Annual Meeting, Transportation Science & Logistics award session *Oct 2023*

The representation power of neural networks for Korobov functions

- International Conference on Learning Representations (ICLR) *Apr 2021*
- MIT SIAM Conference *Oct 2021*
- Operations Research Student Seminar, MIT *Mar 2021*

Online matchings on unknown bipartite graphs

- INFORMS Annual Meeting *Oct 2020*

Teaching Experience

Optimization Methods (6.215/15.093J), *MIT* *Fall 2021*

- Qualifying course for Ph.D.s in Electrical Engineering and Computer Science (EECS)
- Core course of the Master of Business Analytics (MBAn)
- Led recitations and by-weekly office hours, graded homeworks and final exams
- Designed material for assignments, exams, and recitations, in linear and convex optimization (simplex methods, duality, network optimization), approximation algorithms for discrete optimization, and non-linear optimization

Advanced Analytics Edge (MBAn) (15.072), *MIT* *Fall 2020*

- Core course of the Master of Business Analytics (MBAn)
- Led recitations and weekly office hours, graded homeworks, supervised and evaluated final projects
- Helped design recitation material for data analytics for business in linear, logistic, and nonlinear regression, tree ensembles and boosting methods, linear and stochastic optimization, unsupervised learning, and text anlytics

Instructor for Classes Préparatoires, *Lycée Condorcet and Henry IV, Paris, France* *2017 - 2019*

- Led and evaluated oral exams for undergraduate students in mathematics
- Designed practice material in real and complex analysis, algebra, differential equations, and probability

Grants and Awards

- Winner INFORMS Transportation Science & Logistics (TSL) Best student paper award *2023*
- **Air Force Office of Scientific Research Grant**, with Prof. Patrick Jaillet *2023*
- Prize for solving a COLT 2019 open problem in Memory-constrained Convex Optimization *2023*
- **COLT Best Student Paper Runner-Up Award** *2022*
- Prize for solving COLT 2021 open problems in Universal Learning *2022*
- Best Presentation Award, Laboratory of Information and Decision Systems Conference, MIT *2022*
- DeepMind Student Grant for COLT *2022*
- Bronze medal, Alibaba Global Mathematics Competition *2022*
- Honorable mention, Alibaba Global Mathematics Competition *2021*
- 2nd Prize, The East Coast Data Open by Citadel *2020*
- Laplace medal given to Valedictorian of École Polytechnique, French Science Academia *2019*
- Rivot medal for outstanding research at École Polytechnique, French Science Academia *2019*
- Bronze medal, International Physics Olympiad (IPhO) *2015*
- Bronze medal, International Mathematics Olympiad (IMO) *2014*
- Silver medal, Junior Balkanic Mathematics Olympiad (JBMO) *2014*
- 1st Prize, Concours Général in Mathematics, France *2014*

Work and Research Experience

MIT, ORC & LIDS, Research assistant, Cambridge, MA *Sep 2019 – to date*

- Designed general-use algorithms for learning unrestricted tasks with minimal assumptions, for supervised learning and contextual bandits
- Analyzed the impacts of memory constraints for optimization and provided memory-efficient algorithms

Amazon Inc., Research intern, Cambridge, MA *Apr 2020 – Jul 2020*

- Co-developed a prediction model for the value of new vendors for Amazon's vendor flex program
- Developed a mixed-integer optimization formulation to inform the selection of new vendors

University of California, Davis, Research assistant with Prof. Jesús De Loera, Davis, CA *Apr 2019 – Aug 2019*

- Analyzed conditions for the fast convergence of simplex methods in combinatorial problems by studying the length of monotone paths
- Supervised two undergraduate students to conduct empirical research on fast pivot rules for combinatorial polyhedra

INRIA, Undergraduate researcher with Prof. Laurent Massoulié, Paris, France *Sep 2018 – Mar 2019*

- Provided theoretical analysis for the problem of reconstructing lattice graphs from local neighborhoods, tightening phase transition bounds from previous works
- Developed algorithms for efficient lattice recovery

École Polytechnique, Undergraduate researcher with Prof. Gabriel Peyré, Palaiseau, France *Sep 2017 – Mar 2018*

- Applied optimal transport to natural language recognition and classification

Reviewing Service

Journals: Mathematics of Operations Research, INFORMS Journal on Optimization, Machine Learning, Journal of the ACM

Conferences: NeurIPS (2021-2023), ICML (2023), ICLR (2022), ALT (2023)

REFERENCES

Patrick Jaillet, MIT (**Ph.D. Advisor**)
Professor of Electrical Engineering and Computer Science (EECS); Co-Director of Operations Research Center (ORC)
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Assistant Professor of Operations Research (ORC)
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Assistant Professor of Computer Science
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