Antoine Prouvost, Ph.D.

Research Engineer

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WORK EXPERIENCE

2022-Present **Artelys**, Paris – Research Engineer.
- Developper on Knitro non-linear optimization solver (C/C++).
- Developer on Artelys Crystal modelization engine (C++/Python).

2021 Oct-Dec **Independent Contractor**, Montréal.
- CERC Data Science for Decision, École polytechnique de Montréal – Library lead developer.
- Outils en francisation pour le Québec de demain, Université de Montréal – Optimization consultant.

2016 Mar-Aug **VoyagePrive.com**, Aix en Provence – Data Science internship.
Built a generic distributed workflow tool for large data processing using Spark and the Apache ecosystem, and worked on member clustering and predictive marketing modelling.

2015 July-Aug **Crédit-Agricole**, Singapore – Two-month summer internship in Database management.
Projects involved database testing and sampling tools.

EDUCATION

2018-2021 **CERC Data Science for Decision Making**, under supervision of Andrea Lodi,
Mila, Quebec Artificial Intelligence Institute, under co-supervision of Yoshua Bengio,
École polytechnique de Montréal – Ph.D. in machine learning for combinatorial optimization.

2016-2018 **CERC Data Science for Decision Making**, under supervision of Andrea Lodi,
École polytechnique de Montréal – M.Sc. in machine learning and operations research. Ungraduated: accelerated transition to Ph.D.
- Optimization of sensors placement on a railroad network.
- Prediction of adverse events for healthcare patients.

2013-2016 **l'X, École polytechnique**, Paris – France's leading university for high-level scientific studies.
- M.Sc. in Data Science: Machine learning, statistics, operations research, computer vision, computer science and applied mathematics.
- Student body officer (Kès) awarded *Outstanding Investment* by the School Director.
- Second lieutenant supervisor in RSMA army centre, Saint-Pierre, Réunion Island, a military training centre for young adults in social and professional difficulty.

2011-2013 **Lycée Blaise Pascal**, Orsay – Two year intensive program in mathematics and physics in preparation for competitive examinations to the French Grandes écoles for scientific studies.

2010-2011 **Lycée Blaise Pascal**, Orsay – Scientific Baccalauréat: French secondary school diploma, awarded with Very High Honors (mention Très Bien).

MAIN OPEN SOURCE CONTRIBUTIONS

Ecole – creator and lead developper: Designed and developed the software architecture, added C++ to Python bindings (PyBind11), setup documentation, hybrid packaging (shared libraries, CMake, Scikit-Build, setuptools, Conda), continuous testing and deployment (Github Actions, Docker, pre-commit, twine).

Xtensor: Implemented weighted random sampling (with and without replacement), added documentation cross references.

SCIP: deployed and maintain SCIP on Conda-Forge.

ARTICLES

Ecole: A Library for Learning Inside MILP Solvers. Prouvost A., Dumouchelle J., Gasse M., Chételat, D., & Lodi A. (2020). Under review in *INFORMS Journal of Computing*.

Ecole: A Gym-like Library for Machine Learning in Combinatorial Optimization Solver. Prouvost A., Dumouchelle J., Scavuzzo L, Gasse M., Chételat, D., & Lodi A. (2020). *NeurIPS Learning Meets Combinatorial Algorithm Workshop*.

Machine Learning for Combinatorial Optimization: a Methodological Tour d'Horizon. Bengio, Y., Lodi, A. & Prouvost, A. (2020). *European Journal of Operations Research*.

Adverse Event Prediction by Telemonitoring and Deep Learning. Prouvost, A., Lodi, A., Rousseau, L.-M., & Valle, J. (2019). *Health Care Systems Engineering* conference.

PRESENTATIONS

Feb 2021 **Recent Advances in Integrating Machine Learning and Combinatorial Optimization** – Khalil E. B., Lodi A., Dilkina B., Chételat D., Gasse M., Prouvost A., Zarpellon G., Charlin L., Online tutorial in AAAI.

Jan 2021 **Machine Learning for Combinatorial Optimization** – Khalil E. B., Chételat D., Gasse M., Prouvost A., Zarpellon G., Charlin L., Lodi A. Online tutorial in IJCAI 2020.

Dec 2020 **Ecole: A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers** Online poster in NeurIPS LMCA Workshop.

Nov 2020 **Ecole: A Library for Learning Inside MILP Solvers** – INFORMS, Online session presentation.

Oct 2019 **Learning to select cutting planes in MILP** – INFORMS, Seattle session presentation.

July 2019 **Learning a Cutting Plane Selection Policy** – Student poster at the MIP Workshop. Using reinforcement learning and graph neural networks for combinatorial optimization.

May 2019 **Adverse Event Prediction by Telemonitoring and Deep Learning** – Health Care Systems Engineering, Montreal.

May 2019 **Machine Learning for Combinatorial Optimization** – Optimization days, IVADO session, Montréal.

Feb 2019 **Machine Learning for Combinatorial Optimization** – ElementAi, Montréal.

Aug 2018 **Methodology of Machine Learning for Combinatorial Optimization** – Student talk at CERMICS Operations Research and Machine Learning summer school

COMMUNITY EVENTS

2021 **NeurIPS Machine Learning for Combinatorial Optimization Competition** – Co-organiser & Library support.

TEACHING

2018-2020 **Tutorials** – Interactive presentations given to research groups.
Git (Gerad), PyTorch (Gerad, Mila, NextAi), Python packaging (Gerad).

2017 Sep-Dec **École polytechnique de Montréal** – Teaching assistant for the implementation of operations research algorithms course MTH6412B (graduate course).

2014-2015 **Lycée Blaise Pascal**, Orsay – Teaching assistant in preparatory school.
Performed oral examination of students during their weekly test.

PRIZES AND AWARDS

2019-2023 **IVADO excellence Ph.D. scholarship** – Competitive 25'000CAD/year Ph.D. scholarship renewable for four years.

2013-2016 **Excellence scholarship** – €10'000/year scholarship paid by l'X, École polytechnique for four years.

2016 **Outstanding investment** as a student body officer, awarded by the school director of l'X, École polytechnique.

2014-2015 **Finalist in the Scientific Team Project Awards** in l'X, École Polytechnique.

LANGUAGE AND SKILLS

Languages	**French** (mother tongue) – **English** (fluent) – Spanish (limited)
Programming	**Python**, **C/C++**
Machine Learning	**PyTorch, Keras**, **Scikit-learn**, Theano, Tensorflow
Computer Skills	Python C++ extensions and packaging, Cython, Virtual Env, Pytest, Linux, Web, Databases, Git, Make/CMake, Docker.

OUTSIDE INTERESTS

Sport	Cycling, Long distance running, Climbing, Scuba diving
Music	Trumpet (7 years) – Grade 5 of British Royal Academy of Music