

GABRIEL LABERGE

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📍 Montréal, QC, Canada

🔗 Google Scholar

🔗 Github

🌐 Personal Website

Hardworking and Solution-oriented Machine Learning Researcher with a Mathematics background who has published research papers in International conferences.

QUALIFICATIONS

• **Programming Languages** | Python | C | C++ | Bash |
Libraries | PyTorch | TensorFlow | Keras | Scikit-Learn | Numpy | Pandas | Matplotlib | XGBoost |

EDUCATION & HONOURS

Polytechnique Montréal — Montréal, QC

SEPT 2020-AUG 2024

Doctor of Philosophy (PhD) in Computer Engineering

Investigating explainability techniques to understand the predictions of complex machine learning models.

Cumulative GPA of 4.0

Polytechnique Montréal — Montréal, QC

SEPT 2018-AUG 2020

Masters (M.Sc) in Applied Mathematics

Cumulative GPA of 4.0

Polytechnique Montréal — Montréal, QC

SEPT 2014-APR 2018

Bachelor (B.Eng) in Engineering Physics

Cumulative GPA of 3.73 with Academic Excellence Distinction

PUBLICATIONS

- **Laberge, G.**, Pequignot, Y., Marchand, M., & Khomh, F. (May, 2024). Tackling the XAI Disagreement Problem with Regional Explanations. In **International Conference on Artificial Intelligence and Statistics. AISTATS, Valencia (Spain).**
- **Laberge, G.**, Pequignot, Y., Mathieu, A., Khomh, F., & Marchand, M. (December, 2023). Partial Order in Chaos: Consensus on Feature Attributions in the Rashomon Set. **Journal of Machine Learning Research**, 24(364), 1-50.
- **Laberge, G.**, Aïvodji, U., Hara, S., Marchand, M., & Khomh, F. (May, 2023). Fooling SHAP with Stealthily Biased Sampling. In **International Conference on Learning Representations. ICLR, Kigali (Rwanda).**
- Tambon, F., **Laberge, G.**, An, L., Nikanjam, A., Mindom, P. S. N., Pequignot, Y., ... & Laviolette, F. (April, 2022). How to certify machine learning based safety-critical systems? A systematic literature review. **Automated Software Engineering**, 29(2), 38.
- Openja, M., **Laberge, G.**, & Khomh, F. (October, 2023). Detection and evaluation of bias-inducing features in machine learning. **Empirical Software Engineering**, 29(1), 22.
- Goyette, P. A., Boulais, É., Normandeau, F., **Laberge, G.**, Juncker, D., & Gervais, T. (April, 2019). Microfluidic multipoles theory and applications. **Nature communications**, 10 (1), 1781.
- **Laberge G.**, Shirzad, S., Diehl, P., Kaiser, H., Prudhomme, S., & Lemoine, A. S. (September, 2019). Scheduling optimization of parallel linear algebra algorithms using supervised learning. **IEEE/ACM Workshop on Machine Learning in High Performance Computing Environments (MLHPC)**(pp. 31-43).

PREPRINTS

- Ferry, J., **Laberge, G.**, & Aïvodji, U. (2023). Learning hybrid interpretable models: Theory, taxonomy, and methods. [[arXiv:2303.04437](#)].
- **Laberge, G.** & Pequignot, Y. (2022). Understanding interventional treeshap: How and why it works. arXiv preprint [[arXiv:2209.15123](#)].

PRESENTATIONS

- «[Hybrid Interpretable Models : Exploring Compromise between Transparency & Performance](#)», MobiliT.AI Symposium 4th edition, Lecturer. Toulouse, France, 2023.
- «[Can we Derive Insight from Post-Hoc Explanations of Uncertain Models?](#)», MobiliT.AI Symposium 3rd edition, Lecturer. Québec, QC, 2022.

PROFESSIONAL EXPERIENCE


Teaching Assistant

Polytechnique Montréal - Montréal, QC, Jan 2020 - Apr 2020

MTH1115 : Differential Equations

Research Intern at Louisiana State University

The Stellar Group - Baton Rouge LA, 2018 - 2019

- Leverage Supervised Learning for predicting the optimal chunking parameters of parallel linear algebra algorithms.
- Model Predictions led to a doubling in Flops on four benchmarks.
- Workshop paper published at SuperComputing 2019 - Denver, Colorado. 

Research Intern in Microfluidic Lab

Polytechnique Montréal - Montréal, QC, May 2016 - May 2017

- Analytical solutions to 2D microfluidic problems using conformal mapping theory.
- Theoretical results validation with COMSOL finite element simulations.
- Contribution to a publication in Nature communications journal in 2019.

PERSONAL PROJECTS

The PyFD open-source Python Library

- Implemented a library to decompose black-box Machine Learning models into simpler components.
- Developed an optimized C++ Extension and wrapped it in Python with Ctypes.
- Extensively tested the library with a test-suite implemented with Pytest.
- Wrote an in-depth documentation with Sphinx.

Hackathon: Covid Contact-Tracing

- Collaborated with 3 other programmers under tight 24h deadline.
- Simulated Covid spread using a simplified 2D model coded in Python.
- Implemented contact tracing via a Depth-First-Search graph algorithm.

Hackathon : Tide Simulations

- Collaborated with 3 other programmers under tight 24h deadline.
- Simulated the tides on the surface of the earth by solving the Laplace Tide Equations.
- Awarded the Astro Prize.