Juan Ramirez

Ph.D. candidate, Mila – Quebec AI Institute & Université de Montréal Montréal, Canada
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Research

Constrained deep learning: scalable Lagrangian methods for training neural networks under explicit requirements such as fairness, sparsity, and safety; Feasible Learning; and Cooper, an open-source PyTorch library for constrained optimization.

Education

Ph.D. in Computer Science, Université de Montréal & Mila – Quebec AI Institute *Sep 2022 – present*
Advisor: Simon Lacoste-Julien. Expected graduation: mid-2027. Montréal, Canada

B.Sc. in Mathematical Engineering, Universidad EAFIT *Jan 2016 – Jun 2021*
President of the Mathematical Engineering student chapter (2018–2019). Medellín, Colombia

Visiting student, UCLouvain (Université catholique de Louvain) *Jan 2019 – Jun 2019*
Louvain-la-Neuve, Belgium

Research Experience

Summer Associate, Machine Learning Research, Morgan Stanley *Jun 2026 – Aug 2026*
Mentor: Ari Karchmer. New York, NY, USA
Research on constrained deep learning, building on the Feasible Learning paradigm.

Research Intern, Mila – Quebec AI Institute *Nov 2021 – Mar 2022*
Advisors: Jose Gallego-Posada and Simon Lacoste-Julien. Montréal, Canada
Developed scalable constrained optimization algorithms to enforce requirements such as sparsity, fairness, and safety on neural networks; this code became the first version of Cooper.

Research Intern, Tuya S.A. *Jan 2020 – Jun 2020*
Advisor: Sergio Arboleda. Medellín, Colombia
Developed credit-risk machine learning models for clients with limited credit history.

Research Intern, McKinsey & Company *Jun 2019 – Oct 2019*
Advisors: Antoine Stevens and Patrick Dehout. Louvain-la-Neuve, Belgium
Developed machine learning models for clients in the agriculture and climate sectors.

Publications

* equal contribution; † equal supervision.

Conference papers

[C1] **Juan Ramirez**, Meraj Hashemizadeh, and Simon Lacoste-Julien. *Position: Adopt Constraints Over Fixed Penalties in Deep Learning*. NeurIPS 2026 (Position Paper Track). [pdf] [code]

[C2] **Juan Ramirez** and Simon Lacoste-Julien. *Dual Optimistic Ascent (PI Control) is the Augmented Lagrangian Method in Disguise*. ICLR 2026. [pdf] [code]

[C3] **Juan Ramirez***, Ignacio Hounie*, Juan Elenter*, Jose Gallego-Posada*, Meraj Hashemizadeh, Alejandro Ribeiro†, and Simon Lacoste-Julien†. *Feasible Learning*. AISTATS 2025. [pdf] [code]

[C4] Motahareh Sohrabi*, **Juan Ramirez***, Tianyue H. Zhang, Simon Lacoste-Julien, and Jose Gallego-Posada. *On PI Controllers for Updating Lagrange Multipliers in Constrained Optimization*. ICML 2024. [pdf] [code]

[C5] Meraj Hashemizadeh*, **Juan Ramirez***, Rohan Sukumaran, Golnoosh Farnadi, Simon Lacoste-Julien, and Jose Gallego-Posada. *Balancing Act: Constraining Disparate Impact in Sparse Models*. ICLR 2024. [pdf] [code]

[C6] Jose Gallego-Posada, **Juan Ramirez**, Akram Erraqabi, Yoshua Bengio, and Simon Lacoste-Julien. *Controlled Sparsity via Constrained Optimization or: How I Learned to Stop Tuning Penalties and Love Constraints*. NeurIPS 2022. [pdf] [code]

Preprints

[P1] Jose Gallego-Posada*, **Juan Ramirez***, Meraj Hashemizadeh*, and Simon Lacoste-Julien. *Cooper: A Library for Constrained Optimization in Deep Learning*. arXiv:2504.01212, 2025. [pdf] [code]

Workshop papers

[W1] **Juan Ramirez**, Rohan Sukumaran, Quentin Bertrand, and Gauthier Gidel. *Omega: Optimistic EMA Gradients*. LatinX in AI (LXAI) Workshop at ICML 2023 (Oral). [pdf] [code]

[W2] **Juan Ramirez** and Jose Gallego-Posada. *L_0onie: Compressing COINs with L_0-constraints*. Sparsity in Neural Networks (SNN) Workshop 2022. [pdf] [code]

[W3] Jose Gallego-Posada, **Juan Ramirez**, and Akram Erraqabi. *Flexible Learning of Sparse Neural Networks via Constrained L_0 Regularization*. LXAI Workshop at NeurIPS 2021 (Best Poster). [pdf]

Honors and Awards

- RBC Borealis Fellowship 2024–2025
- Bourse d'excellence (ADUM), Université de Montréal 2024
- Bourse en intelligence artificielle, Université de Montréal 2024
- Best Poster Award, LatinX in AI Workshop at NeurIPS 2021
- Full scholarship for the B.Sc., Universidad EAFIT 2016

Invited Talks

- *Feasible Learning*. Machine Learning Research Speaker Series, Morgan Stanley, New York May 2026
- *Feasible Learning*. Montréal Machine Learning and Optimization (MTL MLOpt) [video] Nov 2025
- *Mitigating the Disparate Impact of Pruning with Constrained Optimization*. MTL MLOpt [abstract] Dec 2023

Open-Source Software

Cooper: a PyTorch library for constrained optimization in deep learning (GitHub, documentation; `pip install cooper-optim`). Core developer and maintainer; version 1.0 released in April 2025 with a companion paper [P1]; 160+ GitHub stars.

Teaching and Mentoring

Teaching Assistant, Université de Montréal *Fall 2023, Fall 2024*

Probabilistic Graphical Models, taught by Simon Lacoste-Julien.

Teaching Assistant, Université de Montréal *Winter 2024*

Adversarial Machine Learning, taught by Gauthier Gidel.

Teaching Assistant, summer schools *2024*

Lisbon Machine Learning Summer School (LxMLS) and Tropical Probabilistic AI School.

Co-supervisor of undergraduate research projects *2023*

Daniel Otero and Isabel Urrego, B.Sc. students in Mathematical Engineering (Colombia), with Jose Gallego-Posada.

Academic Service

- Associate Program Chair, ICML 2025 (organizing committee).
- Co-organizer, first Workshop on Constrained Optimization for Machine Learning, NeurIPS 2025.
- Reviewer for TMLR, ICLR 2027, ICLR 2026, ICML 2025, AISTATS 2025, NeurIPS 2024, and the LXAI workshops at NeurIPS 2024, ICML 2024, and ICML 2023.
- Reviewer of student applications, Mila (2025) and Khipu (2025).
- Social chair, LXAI Workshop at NeurIPS 2024; visa chair, LXAI Workshop at ICML 2024.

Skills and Languages

Programming: Python (PyTorch, JAX, NumPy), Slurm, Weights & Biases, Git, LaTeX.
Languages: Spanish (native), English (C1), French (B2).