Sébastien Lachapelle

Curriculum Vitae

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Google scholar
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Education

Since 2018 **Ongoing Ph.D. in Computer Science**, *Université de Montréal*, QC, CA
Specialisation: Artificial Intelligence
@Mila - Quebec Artificial Intelligence Institute
Supervised by Simon Lacoste-Julien
Expected completion: August 2023

2014–2017 **B.Sc. in Mathematics and Economics**, *Université de Montréal*, QC, CA
GPA:4.27/4.3

Research Experience

Since 2017 **M.Sc./Ph.D. Student**, *Mila - Quebec Artificial Intelligence Institute*, Montreal
(Fast-tracked from M.Sc., under Emma Frejinger & Yoshua Bengio, to Ph.D. in 2018)
- Identifiability of representations in generative models [3, 2] and multi-task learning [1]
- Causal representation learning [3, 2]
- Learning causal graphs via continuous constrained optimization using ANN [8, 7, 4]
- Worked at the intersection of Operations Research and Machine Learning [6]

2019 **Research Intern**, *Element AI (acquired by ServiceNow)*, Montreal
- Learning flexible causal models with interventions and "neural autoregressive flows" [7]

2016 **Intern**, *DAMÉCO*, Montreal
- Estimation of a demand system for Quebec consumers

Teaching Experience & Academic Implication

2022 **Teaching Assistant**, *University of Montreal*
Probabilisitic Graphical Models - IFT6269
Graduate class taught by Prof. Simon Lacoste-Julien

2021 **Teaching Assistant**, *University of Montreal*
Probabilisitic Graphical Models - IFT6269
Graduate class taught by Prof. Simon Lacoste-Julien

2021 **Teaching Assistant**, *University of Montreal*
Representation Learning - IFT6135 (general deep learning)
Graduate class taught by Prof. Aaron Courville

2021 **Academic supervisor of professional M.Sc. students**, *Mila*
Étienne Boucher - Internship at Hydro-Québec (6 months - weekly meetings)
Guillaume Laporte - Internship at Hydro-Québec (6 months - weekly meetings)

2021-2022 **Grading professional M.Sc. students internship reports**, *Mila*
Reading and evaluating final internship reports of seven Professional M.Sc. students

2021 **Member of the Mila Recruitment Committe**
Evaluating applications of potential candidates to M.Sc. and Ph.D. research programs

2018 **Volunteer at Montreal AI Symposium**, Montreal

Programming Experience

- 5 years experience in Python & PyTorch
- Basic R programming language and basic JAX

Honors & Awards

2022 **Best Paper Award at UAI 2022 Workshop on Causal Representation Learning**
For "Partial Disentanglement via Mechanism Sparsity" [2]

2021 **NeurIPS 2021 Outstanding Reviewer Award**
Given to top 8% of reviewers who were judged to be instrumental to the review process based on Area Chair and author feedback.

2020-2024 **IVADO excellence scholarship for PhD**
Four years scholarship awarded to PhD students based on grades and research proposal

2018-2019 **Bourse d'excellence du CIRRELT – Acceuil au doctorat**
Prize awarded to seven PhD students (before they completed one year and a half) based on their grades, research aptitudes and implication in CIRRELT

2017 **Prix d'excellence des anciens**, *University of Montreal*
Prize awarded to the student finishing his BS in Mathematics and Economics with the highest GPA in his cohort

2016 **Bourse de la doyenne**, *University of Montreal*
Excellence prize awarded to 13 students from the Faculté des arts et des sciences

2016 **Roger-Dehem award in microeconomics**, *University of Montreal*
Excellence prize in microeconomics

2016 **Robert-Lacroix award in macroeconomics**, *University of Montreal*
Excellence prize in macroeconomics

Selected Presentations

2022 **UAI Workshop on Causal Representation Learning – Oral**, Eindhoven, Netherlands
Partial Disentanglement via Mechanism Sparsity

2022 **ServiceNow Research – Oral**, Montreal, CA
Disentanglement via Mechanism Sparsity Regularization: A new Principle for Nonlinear ICA

2020 **NeurIPS – Spotlight presentation**, Virtual
Differentiable Causal Discovery from Interventional Data

2020 **Element AI – Oral**, Montreal, CA
Learning Causal Structures via Gradient-Based Optimization

2019 **Montreal AI Symposium – Oral**, Montreal, CA
Gradient-Based Neural DAG Learning

2018 **Optimization Days – Oral**, Montreal, CA
Predicting solution summaries to integer linear programs under imperfect information with machine learning

2018 **DIMACS – Poster**, Bethlehem, USA
Predicting solution summaries to integer linear programs under imperfect information with machine learning

Publications & preprints

* indicates joint first authors

[1] S. Lachapelle*, T. Deleu*, D. Mahajan, I. Mitliagkas, Y. Bengio, S. Lacoste-Julien, and Q. Bertrand. "Synergies Between Disentanglement and Sparsity: a Multi-Task Learning Perspective". Under review. 2022. URL: https://arxiv.org/abs/2211.14666.

[2] S. Lachapelle and S. Lacoste-Julien. "Partial Disentanglement via Mechanism Sparsity". In: *UAI 2022 Workshop on Causal Representation Learning*. 2022. URL: https://arxiv.org/abs/2207.07732.

[3] S. Lachapelle, P. Rodriguez Lopez, Y. Sharma, K. E. Everett, R. Le Priol, A. Lacoste, and S. Lacoste-Julien. "Disentanglement via Mechanism Sparsity Regularization: A New Principle for Nonlinear ICA". In: *First Conference on Causal Learning and Reasoning*. 2022. URL: https://arxiv.org/abs/2107.10098.

[4] I. Ng, S. Lachapelle, N. R. Ke, S. Lacoste-Julien, and K. Zhang. "On the Convergence of Continuous Constrained Optimization for Structure Learning". In: *Proceedings of The 25th International Conference on Artificial Intelligence and Statistics*. 2022. URL: https://arxiv.org/abs/2011.11150.

[5] P. Brouillard, P. Taslakian, A. Lacoste, S. Lachapelle, and A. Drouin. "Typing assumptions improve identification in causal discovery". In: *First Conference on Causal Learning and Reasoning*. 2022. URL: https://arxiv.org/abs/2107.10703.

[6] E. Larsen, S. Lachapelle, Y. Bengio, E. Frejinger, S. Lacoste-Julien, and A. Lodi. "Predicting Tactical Solutions to Operational Planning Problems Under Imperfect Information". In: *INFORMS Journal on Computing* (2022). URL: https://arxiv.org/abs/1807.11876.

[7] P. Brouillard*, S. Lachapelle*, A. Lacoste, S. Lacoste-Julien, and A. Drouin. "Differentiable Causal Discovery from Interventional Data". In: *Advances in Neural Information Processing Systems*. 2020. URL: https://arxiv.org/abs/2007.01754.

[8] S. Lachapelle, P. Brouillard, T. Deleu, and S. Lacoste-Julien. "Gradient-Based Neural DAG Learning". In: *Proceedings of the 8th International Conference on Learning Representations*. 2020. URL: https://arxiv.org/abs/1906.02226.

[9] Y. Bengio, T. Deleu, N. Rahaman, N. R. Ke, S. Lachapelle, O. Bilaniuk, A. Goyal, and C. Pal. "A Meta-Transfer Objective for Learning to Disentangle Causal Mechanisms". In: *International Conference on Learning Representations*. 2020. URL: https://arxiv.org/abs/1901.10912.