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Sacha Morin

Education

2022–present **PhD, Computer Science**, Université de Montréal - Mila
Machine Learning and Robotics

Advisors: Guy Wolf and Liam Paull

Labs:
- Mila - Quebec Artificial Intelligence Institute
- RAFALES
- Robotics and Embodied AI Lab (REAL)

2021–2022 : **Research MSc, Computer Science**, Université de Montréal - Mila
Machine Learning. Fast tracked to PhD.

Advisor: Guy Wolf

GPA: 4.30/4.30

2017–2021 : **Bachelor of Mathematics and Computer Science**, Université de Montréal

GPA: 4.13/4.30

2014–2017 : **Bachelor of Law (LLB)**, Université de Sherbrooke

GPA: 3.68/4.30

Research Experience

Mila - Quebec AI Institute

2022-present **Phd Student**
- Topological navigation and self-supervised representation learning for embodied agents [C1].
- Mobile robotics and visual navigation [C1], [C2].
- Large Language Models (LLM) and Visual Language Models (VLM) for 3D scene understanding and object affordance prediction [Ongoing Project].

Advisors: Guy Wolf and Liam Paull

2020-2022 **Research Intern/MSc Student**
- Learning structured and interpretable representations by combining autoencoders and manifold learning [J1], [C3].
- Apply clustering and data visualization tools for unsupervised exploration of biological datasets [P1], [J2].

Advisor: Guy Wolf

Université de Montréal

2018-2019 **Research Intern**

- Develop Gambit Forensics, an analytics tool to benchmark various compilers of the Scheme programming language.

Advisor: Marc Feeley

Work Experience

LJT Laywers LLP

2020 **Lawyer (Part Time)**
Mergers and acquisitions of software companies. Contract Law.

June 2019-Jan2020 **Articling Student**
Mergers and acquisitions of software companies. Contract Law. Litigation.

Supervisor: Me Nicolas Lassonde

May 2018-Aug 2018 **Law Student**
Contract Law. Litigation.

Awards

2023 **NSERC PGS D Scholarship**, Natural Sciences and Engineering Council of Canada

2023 **FRQNT Doctoral Scholarship**, Fonds de recherche du Québec - Nature et technologies

2021 **IVADO M.Sc. Scholarship**, Institut de valorisation des données

2021 **FRQNT B1X Scholarship**, Fonds de recherche du Québec - Nature et technologies

2021 **NSERC M.Sc. Scholarship (Declined)**, Natural Sciences and Engineering Council of Canada

2021 **ISM Undergraduate Research Scholarship**, Institut des sciences mathématiques

2020 **IVADO Undergraduate Research Scholarship**, Institut de valorisation des données

2019 **NSERC Undergraduate Award**, Natural Sciences and Engineering Research Council of Canada

2019 **Scholarship for Academic Excellence**, Bourse d'excellence des diplômés et des professeurs

2016 **Winner of the Matthieu-Bernard Competition**, Société québécoise de droit international

2015-2017 **Dean's List**, Faculty of Law, Université de Sherbrooke

Teaching and Academic Involvement

2023 **Co-organizer**, Robot Learning Seminar, Mila - Quebec AI institute

2023 **Co-organizer**, Mila Robotics Summer School, Mila - Quebec AI Institute

- Prepare workshop and challenge using the Unitree Go1 robot and TagSLAM.

2023 **Volunteer**, Conference on Robots and Vision (CRV)

2023 **Reviewer**, IROS 2023

2023 **Teaching Assistant**, STT 3795: Theoretical Foundations of Data Science, Université de Montréal
- Undergraduate class taught by Prof. Guy Wolf.

2022-2023 **Member**, IVADO Student Intersectoral Committee
- Support major IVADO events, such as job fairs and *Digital October*.

2022 **Invited Talk on AI, Data & Algorithms**, Prof. Sylvano Santini's SEM9500 Seminar, Université du Québec à Montréal

2014-2015 **Pro Bono Canada**, Université de Sherbrooke
- Draft training material for directors of non-profits.

Software

2023 **StepMix**, A Python package following the scikit-learn API for model-based clustering and generalized mixture modeling of continuous and categorical data [P2].

Skills

Programming Languages: Python. Some knowledge of C, C++, R, JAVA and Javascript.

Libraries: PyTorch, ROS, Scikit-Learn, Pandas, NumPy.

Publications & Preprints

* indicates joint authorship.

Journal Publications

[J1] A. F. Duque*, **Sacha Morin***, G. Wolf, and K. R. Moon, "Geometry regularized autoencoders", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2022.

[J2] B. Paré, M. Rozendaal, **Sacha Morin**, L. Kaufmann, S. M. Simpson, R. Poujol, F. Mostefai, J.-C. Grenier, H. Xing, M. Sanchez, *et al.*, "Patient health records and whole viral genomes from an early SARS-CoV-2 outbreak in a Quebec hospital reveal features associated with favorable outcomes", *Plos one*, vol. 16, no. 12, e0260714, 2021.

Conference Proceedings

[C1] **Sacha Morin***, M. Saavedra-Ruiz*, and L. Paull, "One-4-All: Neural potential fields for embodied navigation", in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (To appear)*, IEEE, 2023.

[C2] M. Saavedra-Ruiz*, **Sacha Morin***, and L. Paull, "Monocular robot navigation with self-supervised pretrained vision transformers", in *2022 19th Conference on Robots and Vision (CRV)*, IEEE, 2022, pp. 197–204.

[C3] A. F. Duque*, **Sacha Morin***, G. Wolf, and K. Moon, "Extendable and invertible manifold learning with geometry regularized autoencoders", in *2020 IEEE International Conference on Big Data (Big Data)*, IEEE, 2020, pp. 5027–5036.

Preprints

[P1] E. Brunet-Ratnasingham*, **Sacha Morin***, H. Randolph*, M. Labrecque, J. Belair, R. Lima-Barbosa, A. Pagliuzza, L. Marchitto, M. Hultstrom, J. Niessl, *et al.*, "Sustained IFN signaling is associated with delayed development of SARS-CoV-2-specific immunity", *medRxiv*, pp. 2023–06, 2023.

[P2] **Sacha Morin***, R. Legault*, F. Laliberté, Z. Bakk, C.-É. Giguère, R. de la Sablonnière, and É. Lacourse, "Stepmix: A Python package for pseudo-likelihood estimation of generalized mixture models with external variables", *arXiv preprint arXiv:2304.03853*, 2023.

Workshops

[W1] A. F. Duque*, **Sacha Morin***, G. Wolf, and K. Moon, "Extendable and invertible manifold learning with geometry regularized autoencoders", in *NeurIPS 2020 Workshop on Differential Geometry Meets Deep Learning (DiffGeo4DL)*, 2020.

[W2] A. F. Duque*, **Sacha Morin***, G. Wolf, and K. Moon, "Extendable and invertible manifold learning with geometry regularized autoencoders", in *DeepMath 2020 Conference on the Mathematical Theory of Deep Neural Networks*, 2020.

[W3] **Sacha Morin***, A. F. Duque*, G. Wolf, and K. Moon, "Extendable and invertible manifold learning with geometry regularized autoencoders", in *Montreal AI Symposum (MAIS)*, 2020.