

# CHARLES GUILLE-ESCURET

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## EDUCATION

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<b>Mila, Quebec AI Institute and Université de Montréal (UdeM)</b> <i>Candidate for Doctor of Philosophy in Computer Science; GPA 4.3/4.0</i>	<i>Montréal, Canada</i> 2019 – Expected March 2025
<b>École Normale Supérieure Paris-Saclay</b> <i>Master of Science in Applied Mathematics - MVA program ; cum laude</i> <i>Bachelor of Computer Science; cum laude</i>	<i>Paris, France</i> 2016 2014

## EXPERIENCE

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<b>ServiceNow, Foundation Model Lab</b> <i>Visiting Researcher</i> <ul style="list-style-type: none"><li>Led the pretraining of a 7b-parameters language model over 1.3T tokens.</li><li>Investigated domain-specific data retrieval and validation pipelines for internal use cases.</li></ul>	<i>Montréal, Canada</i> May - Dec. 2024
<b>Apple MLR</b> <i>Research Intern</i> <ul style="list-style-type: none"><li>Designed a novel method to construct finite-sample valid confidence sets for linear regression in a much more realistic setting than previous works, with a wide range of applications.</li><li>Incorporated conformal predictions to previous method to further improve performances and computation costs.</li></ul>	<i>Paris, France</i> Apr. 2023 - Sept. 2023
<b>ServiceNow, ATG Research Group</b> <i>Visiting Researcher, Low-data learning team (part-time)</i> <ul style="list-style-type: none"><li>Trained self-supervised contrastive models to perform anomaly detection on challenging benchmarks with a novel method.</li><li>Proposed a novel benchmark for broad OOD detection and showed how to alleviate the inconsistencies of recent works by ensembling.</li></ul>	<i>Montréal, Canada</i> Dec. 2021 - May 2022 and Sept 2022 - Feb 2023
<b>Mila Quebec AI Institute and Université de Montréal (UdeM)</b> <i>Doctoral Candidate, advised by Prof. Ioannis Mitliagkas</i> <ul style="list-style-type: none"><li>Research Areas: <i>First-order optimization for deep learning, learning dynamics, LLM pretraining.</i></li><li>Teaching assistant for 3 classes and co-supervised 3 internships.</li><li>Introduced a new theoretical framework for the study of first-order optimization.</li><li>Derived novel upper and lower bounds on the convergence rate of first-order algorithms.</li><li>Contributed to various projects on applications such as insect classification, lightning current prediction, predictive visualization of flood effects, adversarial robustness.</li></ul>	<i>Montréal, Canada</i> 2019 – 2025
<b>University of California Berkeley</b> <i>Visiting Scholar, EECS department, under the supervision of Prof. Alexandre Bayen</i> <ul style="list-style-type: none"><li>Worked with startup <i>SafelyYou</i> to implement then-SOTA computer vision models for automatic fall detection in elderly care facilities.</li><li>Resulted in a 80% decrease in ER visits and 40% decrease in fall frequency.</li></ul>	<i>Berkeley, CA</i> Oct. 2017 - Oct. 2018
<b>Elum Energy</b> <i>Machine Learning Engineer</i> <ul style="list-style-type: none"><li>Built from scratch all predictive models for energy consumption.</li><li>These models were successfully deployed to optimize battery usage.</li><li>Conducted interviews, designed and evaluated tests for ML recruitment.</li></ul>	<i>Paris, France</i> Sept. 2016 – Mar. 2017

## HONORS AND AWARDS

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<b>Top reviewer</b> AISTATS top 10% of reviewers	2023
<b>Best Student Paper Award</b> NeurIPS OPT2020, for "A Study of Condition Numbers for First-Order Optimization"	2020
<b>Data Intelligence Award - Predictive Analytics</b> Data Intelligence Forum Paris, for work at Elum Energy	2016
<b>Scholar Award</b> , NeurIPS 2022	2022
<b>Normalien Fellowship</b> 4 years merit-based fellowship	2013
<b>3rd Prize Nationwide</b> French Earth Sciences Olympiads	2009

## TEACHING EXPERIENCE

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<b>Mila Optimization Crash Course, Lecturer</b> <ul style="list-style-type: none"><li>Gave lectures on Adam and RMSProp.</li></ul>	<i>Spring 2024</i>
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- Mila and UdeM, IFT3395 and IFT6390 Fundamentals of Machine Learning, Teaching Assistant** *Fall 2019*
- Designed and taught Python workshops for Machine Learning.
  - Contributed to writing assignments and exams and their grading.
- HEC Montreal, MATH80629A ML for Large Scale Data Analysis and Decision Making, Teaching Assistant** *Winter 2021*
- Designed and taught Python workshops for Machine Learning, assisted students.
- UdeM, EDUlib, SD1FR MOOC Data Science, Instructor** *Jan. - Aug. 2021*
- Developed Jupyter Notebooks for an online MOOC on data science hosted by EDUlib.
- Mila, internship co-supervisor** *2020*
- Academic co-supervisor for 3 students of Mila's professional masters in AI doing their internship in external companies.

## OTHER ACADEMIC CONTRIBUTIONS

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- **Co-organizer**, 4th Neural Scaling Laws workshop *2022*
- **Co-organizer**, Montreal Machine Learning and Optimization (MTL ML-OPT) seminars. *2023-now*

## PUBLICATIONS \*: co-first authors

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- Maes L.\*, H Zhang T.\*, Jolicoeur-Martineau A., Mitliagkas I., Scieur D., Lacoste-Julien S., **Guille-Escuret C.** (2024). Understanding Adam Requires Better Rotation Dependent Assumptions, ArXiv.
- Guille-Escuret C.**, Ndiaye E. (2024). From Conformal Predictions to Confidence Regions, ArXiv.
- Guille-Escuret C.**, Ndiaye E. (2023). Finite Sample Confidence Regions for General Linear Regression Parameters Using Arbitrary Predictors, ArXiv.
- Guille-Escuret C.\***, Naganuma H.\*, Fatras K., Mitliagkas I. (2023). No Wrong Turns: The Simple Geometry Of Neural Networks Optimization Paths, *ICML 2024*.
- Guille-Escuret C.**, Noel P., Vazquez D., Mitliagkas I., Monteiro J. (2023). Expecting The Unexpected: Towards Broad Out-Of-Distribution Detection, *NeurIPS 2024*.
- Guille-Escuret C.**, Rodriguez P., Vazquez D., Mitliagkas I., Monteiro J. (2022). CADet: Fully Self-Supervised Anomaly Detection With Contrastive Learning, *NeurIPS 2023*.
- Ibrahim A., **Guille-Escuret C.**, Mitliagkas I., Rish I., Krueger D., Bashivan P. (2022). Towards Out-of-Distribution Adversarial Robustness, *ICML 2022 New Frontiers In Adversarial Machine Learning Workshop*.
- Guille-Escuret C.**, Rodriguez P., Vazquez D., Mitliagkas I., Monteiro J. (2022). Contrastive Self-supervision Defines General-Purpose Similarity Functions, *NeurIPS 2022, Self-supervised learning - theory and practice workshop*.
- Guille-Escuret C.**, Ibrahim A., Goujaud B., Mitliagkas I. (2022). Gradient Descent Is Optimal Under Lower Restricted Secant Inequality And Upper Error Bound, *NeurIPS 2022*.
- Guille-Escuret C.\***, Goujaud B.\*, Girotti M., Mitliagkas I. (2021). A Study of Condition Numbers for First-Order Optimization, *AISTATS 2021* and best student paper award at *NeurIPS 2020, Optimization for Machine Learning Workshop*.
- Monferran P.\*, **Guille-Escuret C.\***, Guiffaut C., Reineix A. (2021). Prediction of Lightning Currents on Fastening Assemblies of an Aircraft Fuel Tank with Machine Learning Methods, *IEEE Transactions on electromagnetic compatibility*.
- Boussieux L., Giro-Larraz T., **Guille-Escuret C.**, Cherti M., Kégl B. (2019). InsectUp: Crowdsourcing Insect Observations to Assess Demographic Shifts and Improve Classification, *ICML 2019, Workshop on AI for Social Good* and *ICCV 2019, Workshop on Wildlife Conservation*