

Adam Ibrahim

Interests

Mathematics:

Topology, Algebra,
Measure Theory,
Number Theory

Computer Science:

Machine Learning,
Algorithms and
Optimisation, Quantum
Computing,
Cryptography

Physics:

Theoretical Physics,
Computational Physics

Programming Skills

Python, C/C++, C#,
Unity, MATLAB, R,
LaTeX

Languages

Native/bilingual

proficiency:

French, Arabic, English

Limited working

proficiency:

Spanish

Elementary

proficiency:

German (currently
learning)

Extra-curriculars

Gym, Rock climbing,
Motorcycling (track),
Piano, Guitar

Education

- 2018 - **Now** **Doctor of Philosophy (until ~2023)** [Mila, Université de Montréal, Canada](#)
Machine Learning, under the supervision of Pr. Ioannis Mitliagkas. GPA: 4.30/4.30.
- 2015 - 2018 **Master of Science** [University of California, Santa Barbara, USA](#)
Computer Science. Areas of focus: Machine Learning, Human-Computer Interaction, Computer Vision, Cryptography. GPA: 4.0/4.0.
Relevant graduate courses: CS 595I Advanced Machine Learning seminar, CS 290I Deep Learning, CS 292F Foundations of Data Science, MATH 260J Foundations of Machine Learning, ECE 210A Matrix Analysis, CS 240A Parallel Computing.
- 2012 - 2015 **Bachelor of Science** [McGill University, Montreal, Canada](#)
Joint Honours Mathematics and Physics. First-class honours.
Relevant graduate courses: General Relativity, Introduction to String Theory, Group Theory, Topics in Topology, Quantum Field Theory, Very Early Universe.
- 2011 - 2012 **MPSI** [Collège Stanislas, Paris, France](#)
Preparatory school. Main subjects: Mathematics, Physics, Engineering, specialisation Computer Science.
- 2011 **Baccalauréat Scientifique** [Lycée Saint-Charles, Orléans, France](#)
Bilingual French/English Secondary School. Passed all of the Cambridge English proficiency exams, including the Certificate of Proficiency in English.

Research Experience

- 09/18 - **Now** [Mila, Université de Montréal](#)
Research in optimisation, out-of-distribution generalisation and adversarial machine learning. Ongoing work on large language models as part of the INCITE Allocation program by the US Department of Energy. Interests in continual and meta-learning.
- 05/22 - **12/22** [AMD](#)
Mentoring/supervising confidential research project on reinforcement learning and exploration.
- 02/22 - 06/22 [Microsoft](#)
Mentoring/supervising confidential research project on speech recognition.
- 05/21 - 12/21 [Apple, Cupertino](#)
Mentoring/supervising confidential research project on multimodal machine learning in hardware-constrained environments.
- 03/16 - 06/18 [Four Eyes lab, UC Santa Barbara](#)
Research in recommender systems and in particular the perception of recommendations in Augmented Reality. Language learning project in Augmented Reality using machine learning to recognise objects in the environment in order to provide situated and personalised learning. Design of computer vision algorithms based on deep learning to allow users of Augmented Reality devices to select objects in the environment. Designed and conducted user studies to test the potential of Augmented Reality as a vocabulary learning medium.

- 09/14 - 04/15 [David Cooke group, McGill University](#)
THz photons trapped in dynamical optically-pumped cavities in silicon materials. Worked in a group to test numerically the consistency of the results with the theory using an FDTD algorithm.
- 05/14 - 04/15 [Keshav Dasgupta, McGill University](#)
Investigating whether string theoretical monodromy inflation can be uplifted to a de Sitter universe.
- 05/13 - 09/13 [Robert Brandenberger, McGill University](#)
Probing for cosmic string wakes signatures in the CMB using Canny's algorithm and analytical methods. Attended the weekly research meetings of the cosmology group until 2015.

Publications

- 2022 **Towards Out-of-Distribution Adversarial Robustness** [arXiv preprint](#)
Adam Ibrahim, Charles Guille-Escuret, Ioannis Mitliagkas, Irina Rish, David Krueger, Pouya Bashivan.
- 2022 **Learning Robust Kernel Ensembles with Kernel Average Pooling** [arXiv preprint](#)
Pouya Bashivan, Adam Ibrahim, Amirozhan Dehghani, Yifei Ren
- 2022 **Gradient Descent Is Optimal Under Lower Restricted Secant Inequality And Upper Error Bound** [NeurIPS 2022](#)
Charles Guille-Escuret, Adam Ibrahim, Baptiste Goujaud, Ioannis Mitliagkas.
- 2022 **Towards Generalisable Robustness: A Domain Generalisation Approach** [ICML 2022 AdvML](#)
Adam Ibrahim, Charles Guille-Escuret, Ioannis Mitliagkas, Irina Rish, David Krueger, Pouya Bashivan.
- 2021 **Adversarial Feature Desensitization** [NeurIPS 2021](#)
Pouya Bashivan, Reza Bayat, Adam Ibrahim, Kartik Ahuja, Mojtaba Faramarzi, Touraj Laleh, Blake Richards, Irina Rish.
- 2020 **Linear Lower Bounds and Conditioning of Differentiable Games** [ICML 2020](#)
[Also presented at MAIS 2019, DeepMath 2019 and NeurIPS 2019 SGO workshop](#)
Adam Ibrahim, Waïss Azizian, Gauthier Gidel, Ioannis Mitliagkas.
- 2019 **User Perception of Situated Product Recommendations in Augmented Reality** [International Journal of Semantic Computing 13 \(03\)](#)
Brandon Huynh, Adam Ibrahim, Yun Suk Chang, Tobias Höllerer, John O'Donovan.
- 2018 **ARbis Pictus: A Study of Vocabulary Learning with Augmented Reality** [ISMAR 2018](#)
[Also published as a journal paper in IEEE transactions on visualization and computer graphics 24 \(11\)](#)
Adam Ibrahim, Brandon Huynh, Jonathan Downey, Tobias Höllerer, Dorothy Chun, John O'Donovan.
- 2018 **A Study of Situated Product Recommendations in Augmented Reality** [AIVR 2018](#)
Brandon Huynh, Adam Ibrahim, Yun Suk Chang, Tobias Höllerer, John O'Donovan.

Work Experience

- 05/22 - 12/22 AMD
Mentoring/supervising confidential research project on reinforcement learning and exploration.
- 02/22 - 06/22 Microsoft
Mentoring/supervising confidential research project on speech recognition.
- 05/21 - 12/21 Apple, Cupertino
Mentoring/supervising confidential research project on multimodal machine learning in hardware-constrained environments.
- Summer 2016 Anasys Instruments
Design and optimisation of computer vision and signal processing algorithms for the Analysis Studio software (C# / C++). Design of computer vision algorithms for a healthcare related NDA project.

Organisational skills

- 07/2023 ICML 2023
Emergent Behaviours and Phase Transitions in Deep Learning
Workshop held during ICML 2023. Co-organised with Irina Rish, Guillaume Dumas, Mohammad Pezeshki, Pascal J. Tikeng Notsawo, Hattie Zhou, Gabriela Moisescu-Pareja, Ethan Caballero, Yi Ren, Eric Michaud.
- 12/02/2022 NeurIPS 2022
4th Neural Scaling Laws Workshop
Unofficial workshop held during NeurIPS on Friday 2nd, 2022. Co-organised with Irina Rish. You are encouraged to attend or reach out for more information!
Link: <https://sites.google.com/mila.quebec/4thnslw/home>
- 2019-2021 Mila
Deep Learning Theory / Out-of-Distribution Generalisation Reading Group

Talks

- 02/07/23 Microsoft Research
Towards Out-of-Distribution Adversarial Robustness
- 07/05/19 Montreal MLOpt
Linear Lower Bounds and Conditioning of Differentiable Games
- 05/11/17 Microsoft Station Q
Motivating Convolutional Neural Networks

Awards

- Bourse en Intelligence Artificielle (IA) des ESP** Université de Montréal
- Natural Sciences and Engineering Research Council of Canada**
- Trottier-Lavigne Physics Department Award**
- Edward Beatty Scholarship in Mathematics**
- John V Galley Scholarship in Mathematics**
- Dean's Honour List**

Teaching Assistant Experience

Spring 2018	CS 178 Introduction to Cryptography	UC Santa Barbara, USA
Winter 2018	CS 130B Data Structures and Algorithms II	UC Santa Barbara, USA
Fall 2017	CS 174A Fundamentals of Database Systems	UC Santa Barbara, USA
Summer 2017	CS 16 Problem Solving with Computers 1	UC Santa Barbara, USA
Spring 2017	CS 165B Machine Learning	UC Santa Barbara, USA
Winter 2017	CS 181B Introduction to Computer Vision	UC Santa Barbara, USA
Fall 2016	CS 40 Foundations of Computer Science	UC Santa Barbara, USA
Summer 2016	CS 16 Problem Solving with Computers 1	UC Santa Barbara, USA
Spring 2016	CS 24 Problem Solving with Computers 2	UC Santa Barbara, USA
Winter 2016	CS 16 Problem Solving with Computers 1	UC Santa Barbara, USA
Fall 2015	CS 16 Problem Solving with Computers 1	UC Santa Barbara, USA
2014	MATH 381 Complex Variables and Transforms for Engineers	McGill University
2013 & 2014	MATH 249 Honours Complex Variables	McGill University

Conferences Attended

12/22	2022 NeurIPS Neural Information Processing Systems
08/22	2022 CoLLAs Conference on Lifelong Learning Agents
07/22	2022 ICML International Conference on Machine Learning Presentation of <i>Towards Generalisable Robustness: A Domain Generalisation Approach</i> .
20-22 COVID	Attended the virtual NeurIPS, ICML and ICLR conferences.
07/20	2020 ICML International Conference on Machine Learning Presentation of <i>Linear Lower Bounds and Conditioning of Differentiable Games</i> .
10/19	2019 DeepMath Conference on the Mathematical Theory of Deep Neural Networks Poster presentation of <i>Linear Lower Bounds and Conditioning of Differentiable Games</i> .
09/19	2019 MAIS Montreal AI Symposium Poster presentation of <i>Linear Lower Bounds and Conditioning of Differentiable Games</i> .
12/18	2018 NeurIPS Neural Information Processing Systems
10/18	2018 ISMAR International Symposium on Mixed and Augmented Reality Oral presentation of <i>ARbis Pictus: A Study of Vocabulary Learning with Augmented Reality</i> .
12/17	2017 NeurIPS Neural Information Processing Systems
10/17	2017 South California Machine Learning Symposium (USC)
03/17	2017 IEEE VR 3DUI Conference on Virtual Reality and 3D User Interfaces