Mohammed Adnan

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adnan1306.github.io/

EDUCATION

Vector Institute/University of Calgary — **Toronto, Canada**
Ph.D. student — *Jan 2023 - present*
Advisors: Dr. Yani Ioannou & Dr. Rahul G. Krishnan.
Research Interests: sparse training, efficient ML and understanding training dynamics.

University of Waterloo — **Waterloo, Canada**
MASc in Machine Learning & Vision, GPA: 4.0/4.0 — *Graduated: August 2021*
Thesis: Set Representation Learning: A Framework for Learning.
Gigapixel Images

Indian Institute of Technology Guwahati — **Guwahati, India**
B.Tech in Electronics & Electrical Engineering — *Graduated: June 2019*
Thesis: Super Resolution of Facial Images.

RESEARCH AWARDS

- **Izaak Walton Killam Fellowship**
  Nominated as a Killam Laureate and awarded 90,000 CAD in research funding.
- **Digital Research Alliance of Canada (DRAC) Funding**
  Awarded CAD 35,000 in research funding to investigate the impact of LLM compression methods on model bias and fairness.
- **Borealis AI Research Fellowship**
  Selected among **top-10** graduate students in CS by Borealis AI, which is an AI arm of the Royal Bank of Canada (RBC).
- **NSERC Doctoral Funding**
  Awarded CAD 120,000 funding for the doctoral studies via a nationwide competition based on the research proposal.
- **Digital Research Alliance of Canada — Resource Allocation Competition (RAC)**
  Co-authored the research proposal for the RAC, which was awarded 25 Reference GPU Units (RGU) of compute, equivalent to 6.25 A100 GPU years (or 28000$ AWS credit).

EXPERIENCE

Borealis AI — **Toronto, Canada**
ML Research Intern — *May 2025 - Present*
- Working on learning user-aligned representation space using LLMs.
- Advisor: Dr. Kevin H. Wilson.

Roche — **Toronto, Canada**
ML Research Intern — *July 2023 - Jan 2024*
- Worked on model pruning and compression (US patent app under-review).
- Advisor: Yao Nie & Qinle Ba.

Borealis AI — **Toronto, Canada**
ML Research Intern — *Sept 2022 - Jan 2023*
- Worked on data augmentation for Temporal Point Processes.
- Advisor: Fred Tung & Gabriel Oliveira.

Vector Institute/University of Guelph — **Toronto, Canada**
Research Associate — *Sept 2021 - Aug 2022*
- Worked on domain-agnostic self-supervised learning and continual learning.
- Advisor: Dr. Graham Taylor.

University of Waterloo — **Waterloo, Canada**
Graduate Research Assistant — *Sept 2019 - August 2021*
- Advisor: Dr. Hamid Tizhoosh.
- Published in ECCV 2020, CVPR(W) 2020, & MICCAI 2021.

Waterloo AI Institute — **Waterloo, Canada**
Shastri Indo-Canadian Research Fellow — *May 2018 – July 2018*
- Awarded fellowship by Govt. of India and Canada to do research at Waterloo AI Institute.

National University of Singapore & Singapore Health — **Singapore**
Visiting Researcher — *May 2017 – July 2017*
- Implemented machine learning algorithms for analyzing high resolution cytometry images.

PUBLICATIONS

1. SparseOpt: Addressing Normalization-induced Gradient Skew in Sparse Training.
   Mohammed Adnan, Rohan Jain, Tom Jacobs, Ekansh Sharma, Rahul G Krishnan, Rebekka Burkholz, Yani Ioannou, **ICML 2026**.
2. Generalizing the Geometry of Model Merging Through Fréchet Averages.
   Marvin F. da Silva, *Mohammed Adnan*, Felix Dangel, Sageev Oore, **under review**.
3. Position: We should Understand Symmetry Breaking in Sparse Training to Unmask the Role of Over-parameterization.
   Mohammed Adnan, Tom Jacobs, Advait Gadhikar, Yani Ioannou, Rebekka Burkholz, **under review**.
4. Sparse Training from Random Initialization: Aligning Lottery Ticket Masks using Weight Symmetry.
   Mohammed Adnan, Rohan Jain, Ekansh Sharma, Rahul Krishnan, Yani Ioannou, **ICML 2025**.
5. Structured Model Pruning for Efficient Inference in Computational Pathology.
   Mohammed Adnan, Qinle Ba, Nazim Shaikh, Shivam Kalra, Satarupa Mukherjee, Auranuch Lorsakul, **MICCAI 2024 Workshop**.
6. Monitoring Shortcut Learning using Mutual Information.
   Mohammed Adnan, Yani A. Ioannou, Kenyon Tsai, Angus Galloway, HR Tizhoosh, Graham Taylor, **ICML 2022 Workshop on Spurious Correlations, Invariance and Stability**
7. Federated Learning and Differential Privacy for Medical Image Analysis.
   Mohammed Adnan, Shivam Kalra, Jesse C. Cresswell, Graham W. Taylor, Hamid Tizhoosh, **Nature Scientific Reports**
8. Domain-Agnostic Clustering with Self-Distillation.
   Mohammed Adnan, Yani A. Ioannou, Kenyon Tsai, Graham Taylor, **NeurIPS 2021 Workshop on Self-Supervised Learning - Theory and Practice**
9. Pay Attention with Focus: A Novel Learning Scheme for Classification of Whole Slide Images.
   Shivam Kalra, *Mohammed Adnan*, Sobhan Hemati, Taher Dehkharghanian, Shahryar Rahnamayan, Hamid Tizhoosh, **MICCAI 2021**
10. Learning Permutation Invariant Representation using Memory Network.
    Shivam Kalra*, *Mohammed Adnan**, Graham Taylor, Hamid Tizhoosh, **ECCV 2020**
11. Representation Learning of Histopathology Images using Graph Neural Networks.
    *Mohammed Adnan**, Shivam Kalra*, Graham Taylor, Hamid Tizhoosh, **CVPR(W) 2020**.
12. A Materiomics Approach to Pulp Regeneration.

* denotes equal contributions

Pei Fang, Aliz Kunstar, Apoorva Shivankar, *Mohammed Adnan*, Hemant Unadkat, **American Association of Endodontists (AAE) Conference, 2018**.

13. A novel topographical driven bioactive membrane for guided tissue regeneration.
Aliz Kunstar, Apoorva Shivankar, *Mohammed Adnan*, Hemant Unadkat, **SingHealth Duke-NUS Scientific Congress 2018**.

AWARDS

1. **Shastri Indo-Canadian Research Fellowship 2018 (MITACS)**
Among 5 students to be awarded Shastri Indo Canadian Research Fellowship 2018.
2. **Vector Institute Scholarship in AI 2019**
Awarded merit-based scholarship by Vector Institute, Canada.
3. **University of Waterloo Graduate Scholarship 2020, 2021**
Awarded scholarship for excellence in academics.
4. **Alberta Graduate Excellence Scholarship 2023**
Awarded scholarship for excellence during Ph.D.

ADDITIONAL

- **Organizer**: Sparsity in LLMs Workshop@ICLR 2025, SSL Reading Group.
- **Reviewer**: ICLR, UAI, NeurIPS, CVPR 2023-2025, ECCV 2024, AISTATS 2025, TMLR.
- **Programming Languages**: Python, C, C++, Verilog, MATLAB.
- **Deep Learning Frameworks**: TensorFlow, PyTorch, JAX.