

Mahdiyar Molahasani

Senior ML Research Scientist at Captura

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RESEARCH FOCUS

I study how foundation models behave under real-world constraints (long-tailed data, spurious bias, distribution shift, privacy, limited compute) and design principled methods for generalization and efficient adaptation, from convergence analysis to training-free techniques.

RESEARCH EXPERIENCE

Senior Machine Learning Research Scientist

Jun 2025 – Present

Captura, Vancouver, BC, Canada

- Efficient inference for vision-language models: training-free methods that reuse cached image computation to answer many queries per image, an order of magnitude faster with unchanged decisions.
- Compact, query-agnostic visual memory for VLMs that preserves the model's decisions at a fraction of the storage.
- Adapting lightweight vision-language models using model-generated supervision.
- Mentored three researchers on evaluation design.

Graduate Research Assistant

May 2021 – May 2025

Queen's University, AIIM Lab, Ingenuity Labs Research Institute, Kingston, ON, Canada

- **Imbalance (NeurIPS 2026).** Proved that models trained on long-tailed data converge to a bounded neighborhood of the Head-only solution, with the bound shrinking as the inverse square root of the imbalance factor: a formal link between long-tailed recognition and continual learning.
- Turned the theory into CLTR, which reuses off-the-shelf continual-learning methods to learn Tail classes without forgetting the Head; validated on CIFAR-LT, ImageNet-LT, Caltech256, and CLIP-based benchmarks, up to +2.5% over prior state of the art.
- **Bias (ICCV 2025).** Built PRISM, a data-free method that removes spurious implicit biases from VLM embeddings: an LLM writes scene descriptions, and a projection learned on their text embeddings alone debiases CLIP without images or group labels. Waterbirds worst-group accuracy 36.4%→84.2%, 15+ points above the best prior image-free method and above methods that use images.
- **Privacy (AAAI 2025, NeurIPS M3L 2024).** Led a three-researcher collaboration on federated domain generalization: aligned global and local client gradients so models generalize to unseen domains without pooling data, and developed the supporting theory; 2% average gain.
- **Shift (ICIP 2023).** Applied continual learning to out-of-distribution pedestrian detection, reducing forgetting by up to 7%.
- Mentored 3 junior PhD/Master's students in research and paper writing; co-authored 5 publications.

SELECTED PUBLICATIONS

GENERALIZATION UNDER IMBALANCE

A Theoretical Bridge Between Long-Tailed Recognition and Continual Learning [\[paper\]](#) [\[interactive\]](#)

M. Molahasani, M. Greenspan, A. Etemad

Conference on Neural Information Processing Systems (NeurIPS) 2026

Extends our NeurIPS M3L 2023 workshop paper.

BIAS AND FAIRNESS IN VISION-LANGUAGE MODELS

PRISM: Reducing Spurious Implicit Biases in Vision-Language Models with LLM-Guided Embedding Projection [\[paper\]](#) [\[code\]](#) [\[interactive\]](#)

M. Molahasani*, A. Motamedi*, M. Greenspan, I.-M. Kim, A. Etemad

International Conference on Computer Vision (ICCV) 2025

PRIVACY-PRESERVING GENERALIZATION (FEDERATED LEARNING)

Federated Unsupervised Domain Generalization using Global and Local Alignment of Gradients [\[paper\]](#) [\[interactive\]](#)

F. Pourpanah*, M. Molahasani*, M. Soltany*, M. Greenspan, A. Etemad

AAAI Conference on Artificial Intelligence (AAAI) 2025

A Theoretical Framework for Federated Domain Generalization with Gradient Alignment [\[paper\]](#)

M. Molahasani*, M. Soltany*, F. Pourpanah*, M. Greenspan, A. Etemad

NeurIPS Workshop on Mathematics of Modern Machine Learning (M3L) 2024

* Equal contribution. Full list: mahdiyar.ai/research

EDUCATION

Ph.D. in Electrical and Computer Engineering

May 2021 – May 2025

Queen's University, Kingston, ON, Canada

Thesis: *Advancing Generalization in Deep Representation Learning*

Advisors: [Ali Etemad](#) and [Michael Greenspan](#)

M.Sc. in Electrical and Computer Engineering

May 2019 – May 2021

University of Saskatchewan, Saskatoon, SK, Canada

B.Sc. in Electrical Engineering – Electronics

Sep 2013 – Jun 2018

Iran University of Science and Technology, Tehran, Iran

AWARDS AND SERVICE

Reviewer awards: Top Reviewer, NeurIPS 2026 and NeurIPS 2024; Gold Reviewer, ICML 2026.

Reviewer: 50+ reviews for NeurIPS, ICML, ICLR, AAAI, AISTATS, TMLR, and IEEE Transactions journals.