HAMIDREZA KAMKARI

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https://hamidrezakmk.github.io/

EDUCATION

Massachusetts Institute of Technology (MIT) *2025 - Ongoing*
Doctor of Philosophy Student
Deep generative modelling of geometrically constrained data, and characterizing the properties of high-dimensional distributions learned by diffusion-based generative models.

University of Toronto *2022 - 2024*
Master of Science — Mitaccs Accelerate Fellowship
Department of Computer Science — Cumulative GPA (4.0/4)
Courses: *(CSC2421)* Graphs, Matrices, and Optimization, *(CSC2541)* Topics in Machine Learning: Introduction to Causality

Sharif University of Technology *2018 - 2022*
Bachelor of Science — Overall GPA 19.22/20
Department of Computer Engineering — Ranked Among the *Top 10*
Courses: *(CE695)* Stochastic Processes, *(CE242)* Signals & Systems, *(CE282)* Linear Algebra, *(CE181)* Probability and Statistics, *(CSC384)* Artificial Intelligence, *(CE354)* Algorithm Design, *(CE415)* Formal Languages, *(MAT034)* Differential Equations

PUBLICATIONS

- CausalPFN: Amortized Causal Effect Estimation via In-Context Learning
  Vahid Balazadeh*, **Hamidreza Kamkari***, Valentin Thomas, Benson Li, Junwei Ma, Jesse C. Cresswell, Rahul G. Krishnan
  NeurIPS 2025 **(Spotlight)**: *arXiv: 2506.07918*
  Accepted for an *oral* presentation at the SIM workshop at ICML 2025
- A Geometric View of Data Complexity: Efficient Local Intrinsic Dimension Estimation with Diffusion Models
  Hamidreza Kamkari, Brendan Ross, Rasa Hosseinzadeh, Jesse Cresswell, Gabriel Loaiza-Ganem
  NeurIPS 2024 **(Spotlight)**: *arXiv: 2406.03537*
  Also accepted to three ICML 2024 workshops with two contributed talks and spotlight presentations
- A Geometric Explanation of the Likelihood OOD Detection Paradox
  Hamidreza Kamkari, Brendan Ross, Jesse Cresswell, Anthony Caterini, Rahul Krishnan, Gabriel Loaiza-Ganem
  ICML 2024 (Poster): *arXiv: 2403.18910*
- A Geometric Framework for Understanding Memorization in Generative Models
  Brendan Ross, **Hamidreza Kamkari**, Zhaoyan Liu, Tongzi Wu, George Stein, Gabriel Loaiza-Ganem, Jesse C. Cresswell
  ICLR 2025 (**Spotlight**): *arXiv: 2411.00113*
  Also accepted to two ICML 2024 workshops
- TabDPT: Scaling Tabular Foundation Models
  Junwei Ma, Valentin Thomas*, Rasa Hosseinzadeh,* **Hamidreza Kamkari**, *Alex Labach, Jesse C. Cresswell, Keyvan Golestan, Guangwei Yu, Maksims Volkovs, Anthony L. Caterini*
  NeurIPS 2025: *arXiv: 2410.18164*
- Order-based Structure Learning with Normalizing Flows
  Hamidreza Kamkari*, Vahid Balazadeh*, Vahid Zehtab, Aidan Li, Rahul Krishnan
  In Submission: *arXiv: 2308.07480*

WORK EXPERIENCE

Layer 6 AI Lab at Toronto Dominion (TD) Bank — **Toronto, Canada**
Research Machine Learning Scientist (Full Time) — *February 2024 - June 2025*

- Led multiple publications in top-tier conferences on topics such as deep generative modeling and geometric deep learning.
- Developed a tabular foundation model for Canada's largest bank utilizing prior fitted networks and a Bayesian approach

Layer 6 AI Lab at Toronto Dominion (TD) Bank — **Toronto, Canada**
Machine Learning Research Intern — *May 2023 - December 2023*

- Developed novel out-of-distribution detection methods using deep generative models, leading a first-author publication at a top-tier machine learning conference.

Aalto University — **Espoo, Finland**
Undergraduate Research Intern — *July 2021 - September 2021*

- Designed a reinforcement learning pipeline to design complex RNA structures, including previously underexplored pseudo-knotted structures

HONOURS & AWARDS

- Secured **30,000 CAD** in funding for graduate research through the Mitaccs Accelerate Scholarship — May 2023
- **Gold Medal** in regional ACM-ICPC contests — December 2018

TEACHING & SUPERVISION

Vector Institute — **Toronto, Canada**
Research Mentoring — *July 2024 - Ongoing*

- Started as a researcher at the Vector Institute under the supervision of Prof. Rahul Krishnan, and currently helping mentor undergraduate students Aidan Li and Benson Li, both of whom are affiliated with his lab

University of Toronto — **Toronto, Canada**
Teaching Assistance — *September 2022 - May 2023*

- **CSC384**: Introduction to Artificial Intelligence — **CSC236**: Introduction to the Theory of Computation

Sharif University of Technology — **Tehran, Iran**
Teaching Assistance — *September 2019 - July 2022*

- **CE40254**: Data Structure and Algorithms *(Head TA)* — **CE40181**: Probability and Statistics — **CE40417**: Artificial Intelligence

PEER-REVIEW & TALKS

- Invited Talk at Visual Computing (VC) Seminar — MIT 2025
- Advancements in Neural Information Processing Systems Reviewer — NeurIPS 2023-2025
- Talk on Generative Modelling through the Lens of Manifold Hypothesis (Remote) — Imperial College London
- Association for the Advancement of Artificial Intelligence Program Committee — AAAI 2025
- International Conference on Learning Representations Reviewer — ICLR 2024/2025
- International Conference in Machine Learning Reviewer — ICML 2024
- Transactions on Machine Learning Research (TMLR) Reviewer — Annual (Ongoing)
- **Contributed Talk** for workshop: Differentiable Almost Everything — ICML 2024
- **Contributed Talk** for workshop: Structured Probabilistic Inference and Generative Modelling — ICML 2024

ADDITIONAL RESEARCH EXPERIENCE

Sharif University of Technology — **Tehran, Iran**
Bachelor Thesis (In Persian) — *January 2022 - September 2022*

- Predicting Drug Combination Dose Responses Using Graph Neural Networks and Attention Mechanisms

Max Planck Institute for Informatics — **Saarbrücken, Germany**
Undergraduate Research Intern — *January 2022 - March 2022*

- Physarum Inspired Dynamics to Solve Semi-Definite Programs
  Yuan Gao, *Hamidreza Kamkari*, Andreas Karrenbauer, Kurt Mehlhorn, Mohammadamin Sharifi
  Pre-print from the internship: *arXiv: 2111.02291*