

HAMIDREZA KAMKARI

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<https://hamidrezakmk.github.io/>

CURRENT POSITION & EDUCATION

Layer 6 AI — Vector Institute

2024 - Ongoing

Machine Learning Scientist

Working **full-time** at Layer 6 AI, where I successfully led multiple publications in top-tier conferences within a year, while also serving as a researcher at the Vector Institute alongside the primary role at Layer 6 AI

University of Toronto

2022 - 2024

Master of Science

Mitacs 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

- 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**): <https://arxiv.org/abs/2406.03537>
Also accepted to three ICML 2024 workshops with two invited 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): <https://proceedings.mlr.press/v235/kamkari24a.html>
- 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 submission with two ICML workshop acceptances: <https://arxiv.org/abs/2411.00113>
- 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
ICLR 2025 Submission: <https://arxiv.org/pdf/2410.18164v1>
- Order-based Structure Learning with Normalizing Flows
Hamidreza Kamkari*, Vahid Balazadeh*, Vahid Zehtab, Aidan Li, Rahul Krishnan
AAAI 2025 Submission: <https://arxiv.org/abs/2308.07480>

HONOURS & AWARDS

- Secured **\$30,000** in funding for graduate research through the Mitacs Accelerate Scholarship May 2023
- Awarded the Regional **Gold medal** in ACM-ICPC contests, with the team ranking 3rd overall December 2018
- **Bronze medalist** at the Asia Pacific Informatics Olympiad (APIO) contest May 2018
- **Gold medalist** in the INFO-Cup worldwide programming contest March 2018
- **Gold medalist** in the Iranian National Olympiad in Informatics September 2017
- **Silver medalist** in the Iranian National Olympiad in Informatics September 2016

TEACHING & SUPERVISION

Vector Institute
Research Mentoring

Toronto, Canada
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
Teaching Assistance

Toronto, Canada
September 2022 - May 2023

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

Sharif University of Technology
Teaching Assistance

Tehran, Iran
September 2019 - July 2022

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

PEER-REVIEW & TALKS

- Invited **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)**
- Invited **Talk** for workshop: Differentiable Almost Everything **ICML 2024**
- Invited **Talk** for workshop: Structured Probabilistic Inference and Generative Modelling **ICML 2024**
- Advancements in Neural Information Processing Systems Reviewer **NeurIPS 2023**

ADDITIONAL RESEARCH EXPERIENCE

California Institute of Technology (Caltech)
Graduate Researcher

Remote
September 2024 - Ongoing

- Modelling climate data with denoising diffusion operators and applying them for re-analysis
Hamidreza Kamkari, Kamyar Azizzadenesheli, Anima Anandkumar

Sharif University of Technology
Bachelor Thesis (In Persian)

Tehran, Iran
January 2022 - September 2022

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

Max Planck Institute for Informatics
Undergraduate Research Intern

Saarbrücken, Germany
September 2020 - 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: <https://arxiv.org/abs/2111.02291>

WORK EXPERIENCE

Layer 6 AI
Machine Learning Research Intern

Toronto, Canada
May 2023 - December 2023

- Applying the manifold hypothesis in deep generative models to achieve a deeper understanding of phenomena such as out-of-distribution behaviour, memorization, and overall model quality
- Developing a tabular foundation model for Canada's largest bank utilizing prior fitted networks and a Bayesian approach

Aalto University
Undergraduate Research Intern

Espoo, Finland
July 2021 - September 2021

- Integrated a graph neural network-based algorithm into a reinforcement learning pipeline to design complex RNA structures, including previously underexplored pseudo-knotted structures

High Schools Across Iran
Computer Olympiad Teacher

Tehran, Iran
September 2018 - September 2021

- Worked as Computer Olympiad Teacher in well-known Iranian high schools
- Mentored at the International Olympiad in Informatics (IOI) preparation camp for the event held in Baku, Azarbaijan