# HAMIDREZA KAMKARI

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## CURRENT POSITION & EDUCATION

**Layer 6 — Vector Institute** *2024 - Ongoing*
Scientist & Model Developer
Working **full-time** at Layer 6, 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

**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

- 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*
  In Submission: *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*

## HONOURS & AWARDS

- Secured **$30,000** in funding for graduate research through the Mitaccs Accelerate Scholarship — May 2023
- **3rd place** in regional ACM-ICPC contests & received a Gold medal — 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 National Olympiad in Informatics — September 2017
- **Silver medalist** in the National Olympiad in Informatics — September 2016

## 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** 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
· Advancements in Neural Information Processing Systems Reviewer — NeurIPS 2023

## ADDITIONAL RESEARCH EXPERIENCE

**California Institute of Technology (Caltech)** — **Remote**
*Graduate Researcher* — *October 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** — **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*

## WORK EXPERIENCE

**Layer 6** — **Toronto, Canada**
*Research Intern* — *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** — **Espoo, Finland**
*Undergraduate Research Intern* — *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** — **Tehran, Iran**
*Computer Olympiad Teacher* — *September 2018 - September 2021*

· Worked as Computer Olympiad Teacher in well-known Iranian high schools