HAMIDREZA KAMKARI

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EDUCATION

University of Toronto *2022 - 2024*
Master of Science Mitacs Accelerate Fellowship
Department of Computer Science
Courses: *(CSC2541)* Topics in Machine Learning: Introduction to Causality (A+), *(CSC2240)* Graphs, Matrices, and Continuous Optimization (A+), *(CSC2701)* Communication for Computer Scientists (A+), *(CSC2541)* Advanced Topics in ML: Causal-aware Representation Learning (A), *(CSC2130)* Empirical Research Methods in Software Engineering (A+)

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, *(CE417)* Artificial Intelligence, *(CE494)* Bioinformatics, *(CE282)* Linear Algebra, *(CE181)* Probability and Statistics, *(CE354)* Algorithm Design, *(CE415)* Formal Languages, *(MAT034)* Differential Equations

National Olympiad in Informatics *2016 - 2017*
High School — Young Scholars Club (YSC) Gold (2017) and Silver (2016) Medal
Iranian National Olympiad in Informatics Ranked *5th* in the Country
One of few who **bypassed** university entrance exams by earning a gold medal in nationwide competitions
Courses: Competitive Programming, Algorithms, Data Structures, Computational Geometry, Graph Theory, Combinatorics

RESEARCH AND PUBLICATIONS

Layer 6 AI — University of Toronto **Toronto, Canada**
Deep Generative Modelling through the Lens of the Manifold Hypothesis *May 2023 - Ongoing*

- *Led* two publications in top-tier conferences within *less than a year*
- **(Publication)** 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
  Workshop @ ICLR 2024: Generative Models for Decision Making
- **(Publication)** 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 (Under review with scores: 7, 7, 7, 6): https://arxiv.org/abs/2406.03537
  Workshop @ ICML 2024: Structured Probabilistic Inference and Generative Modelling **(Oral)**
  Workshop @ ICML 2024: Differentiable Almost Everything **(Oral)**
  Workshop @ ICML 2024: Geometry-grounded Representation Learning and Generative Modeling
- **(Publication)** *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
  Aiming for ICLR 2025: https://openreview.net/forum?id=aq6btjS3ZG
  Workshop @ ICML 2024: Geometry-grounded Representation Learning and Generative Modeling
  Workshop @ ICML 2024: Next Generation AI Safety

Vector Institute — University of Toronto **Toronto, Canada**
Causality and Tabular Modelling *November 2022 - Ongoing*

· **(Publication)** Order-based Structure Learning with Normalizing Flows
*Hamidreza Kamkari**, Vahid Balazadeh*, Vahid Zehtab, Rahul Krishnan
AAAI 2024 (Under Review): `https://arxiv.org/abs/2308.07480`

Sharif University of Technology **Tehran, Iran**
Predicting Drug Combination Effects by Utilizing Multi-Omics Data *January 2022 - September 2022*

· **(Thesis)** Multiple Drug Dose Response Prediction *(Written in Persian)*
· Used graph neural networks and attention mechanisms to create a general state-of-the-art framework for predicting drug dose response using SMILES representation of drugs
Hamidreza Kamkari, Amin Ghareyazi, Karim Abbasi, Hamid Rabiee

Maxplanck Institute of Informatics (MPI-INF) **Saarbrücken, Germany**
Convex Optimization and Linear Algebra *August 2020 - February 2022*

· **(Publication)** Physarum Inspired Dynamics to Solve Semi-Definite Programs
Yuan Gao, *Hamidreza Kamkari*, Andreas Karrenbauer, Kurt Mehlhorn, Mohammadamin Sharifi
Pre-print: `https://arxiv.org/abs/2111.02291`

WORK EXPERIENCE

Layer 6 AI — Toronto-Dominion (TD) Bank **Toronto, Canada**
Machine Learning Researcher (Full-Time) *May 2023 - Ongoing*

· Generative modelling with a focus on leveraging insights from the manifold hypothesis
· Led two projects and contributed as a second author to a third one on applying the manifold hypothesis to deep generative models, resulting in successful publications in top-tier conferences
· Set a company record for the most publications at a single conference
· Improving tabular foundation models and injecting concepts from causal inference

Vector Institute **Toronto, Canada**
Graduate Researcher & Mentor *July 2024 - Ongoing*

· Mentoring two University of Toronto undergraduates, affiliated with the Vector Institute, on their research projects

Fanap IT Company **Tehran, Iran**
Machine Learning Engineer *January 2022 - August 2022*

· Helped restore poorly taken photos of dental panoramic images
· Implemented a novel U-Net for dynamic range unification in PyTorch
· Created a demo using Docker and FastAPI for proof of concept and sold MVP to a client with three active radiology clinics in Tehran; all in three months

Max Planck Institute for Informatics **Saarbrücken, Germany**
Undergraduate Research Intern *September 2020 - March 2022*

· Explored the mathematical foundations of applying a slime mold inspired dynamics to solve semi-definite programs

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

· Helped complete a pipeline for RNA sequence design, with applications in bio-technology
· Integrated a graph neural network-based algorithm into a reinforcement learning pipeline to design complex RNA structures, including previously underexplored pseudo-knotted structures

National Olympiad in Informatics Committee **Tehran, Iran**
Supervisor & Mentor *September 2020 - December 2021*

· Curated and organized nationwide competitive contests for talented students all across Iran

· Helped maintain the technical infrastructure of the online code judging system

High Schools Across Iran — **Tehran, Iran**
Computer Olympiad Teacher — *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

ACADEMIC SERVICE

Peer Review

· International Conference on Learning Representations Reviewer — ICLR 2024 & 2025
· Association for the Advancement of Artificial Intelligence Program Committee — AAAI 2024
· International Conference in Machine Learning Reviewer — ICML 2024
· Neural Information Processing Systems Reviewer — NeurIPS 2023
· Transactions on Machine Learning Research (TMLR) Reviewer — Annual (Ongoing)

Talks

· Invited talk for workshop: Differentiable Almost Everything — ICML 2024
· Invited talk for workshop: Structured Probabilistic Inference and Generative Modelling — ICML 2024

Teaching Assistance — University of Toronto

· Introduction to Artificial Intelligence (CSC236) Alice Gao — *January 2023 - June 2023*
· Introduction to the theory of Computation (CSC236) François Pitt — *September 2022 - December 2022*

Teaching Assistance — Sharif University of Technology

· Artificial Intelligence (CE40417) Mohammad Hossein Rohban — *September 2021 - January 2022*
· **Head** of Data Structure and Algorithms (CE40254) - Mohammad Ghodsi — *January 2021 - June 2021*
· Artificial Intelligence (CE40417) Mohammad Hossein Rohban — *January 2021 - June 2021*
· Probability and Statistics (CE40181) Ali Sharifi-Zarchi — *September 2020 - January 2021*
· Discrete Structures (CE40115) Mohammad Ali Abam — *January 2020 - June 2020*
· Advanced Algorithm design (CE40354) Ali Sharifi-Zarchi — *January 2020 - June 2020*
· Data structure and Algorithms (CE40254) Mahdi Safarnejad-Boroujeni — *September 2019 - January 2020*

HONOURS AND AWARDS

ACM-ICPC
Regional Gold Medal
Team Ranked 3rd
December 2018

APIO
Asia-Pacific Informatics
Bronze Medal
May 2018

INFO-Cup
Worldwide Programming
Contests Gold Medal
March 2018

Mitacs Fellowship
Received $30,000 Funding
for Graduate Research
May 2023

SKILLS

Programming Skills:

Pytorch, Lightning, JavaScript, Weights & Biases,
Hydra, React, Docker, C++, Java, MATLAB, LaTeX.

Languages:

Persian (Native) - English (Fluent)
TOEFL iBT (116/120) — IELTS (8/9)