

Amir H. Karimi

ASSISTANT PROFESSOR OF MACHING LEARNING | ML SCIENTIST & ENGINEER

✉ amirhkarimi@gmail.com | 🏠 www.amirhkarimi.com | 🐦 amirhkarimi_

Employment

University of Waterloo & Vector Institute

ASSISTANT PROFESSOR OF MACHINE LEARNING

Waterloo & Toronto, CA

Sep 2023 - p.

- Tenure-track Assistant Professor in the Electrical and Computer Engineering Department

Google DeepMind

RESEARCH SCIENTIST INTERN

London, UK

May 2022 - Oct 2022

- Improved search via type- & IO-based neurally-guided program synthesis. Mentors: Lars Buesing, David Amos, Jessica Hamrick

Google Brain

RESEARCH SCIENTIST INTERN

Waterloo, CA

Dec 2021 - Apr 2022

- Investigated the causal effect of training hyperparameters on ML explanation. Mentors: Been Kim, Simon Kornblith
- Successfully published at ICML 2023, under the title "On the Relationship Between Explanation and Prediction: A Causal View" [C16]

Meta (Facebook) Inc.

SOFTWARE ENGINEER

New York, USA

Aug 2015 - Sep 2016

- Full-stack software engineer on the Enterprise Eng. team, responsible for front-end dev using React and hphp among others
- Implemented the landing page, a customizable notification framework, and the testing and logging platform for the Org Tool
- Successfully published at EMNLP 2016, under the title "Key-Value Memory Networks for Directly Reading Documents" [C2, P1]

Meta (Facebook) Inc.

SOFTWARE ENGINEER INTERN

Menlo Park, USA

Feb 2014 - Apr 2014

- Delivered a first-of-a-kind reporting tool for Facebook's largest Business Manager ad clients to view and manage historical ad budgets
- Successfully reduced TTI < 7sec for Facebook's largest ad clients (100K+ ad accounts), by optimizing front-end JavaScript rendering

BlackBerry Inc.

SOFTWARE ENGINEER INTERN

Toronto, CA

May 2013 - Dec 2013

- Implemented an automation framework to test 6,000+ ported selenium webdriver and WebKit tests for BB10
- Successfully integrated browser team's test automation results with company central test database

Stanford University

UNDERGRADUATE RESEARCH ASSISTANT - HIGH-FREQUENCY LAB

Stanford, USA

May 2012 - Aug. 2012

- Developed a helical antenna and used machine learning for precise 2D localization enabling hand gesture recognition.

Education

Max Planck Institute for Intelligent Systems & ETH Zurich

PHD IN COMPUTER SCIENCE

Tübingen, DE & Zürich, CH

Oct 2018 - Jul 2023

- **Thesis:** "Advances in Algorithmic Recourse: Ensuring Causal Consistency, Fairness, & Robustness"
- **Supervisors:** Prof. Bernhard Schölkopf & Prof. Isabel Valera
- **Major Awards:** NSERC CGS-D PhD Fellowship, Max Planck ETH PhD Fellowship, Google PhD Fellowship, ETH Zurich Medal

University of Waterloo

MMATH IN COMPUTER SCIENCE

Waterloo, CA

Sep 2016 - Apr 2018

- **Thesis:** "Exploring New Forms of Random Projections for Dimensionality Reduction"
- **Supervisors:** Prof. Alexander Wong & Prof. Ali Ghodsi
- **Major Award:** *Alumni Gold Medal* for highest standing across all master's programs at UWaterloo

University of Toronto

B.A.Sc. IN ENGINEERING SCIENCE – ELECTRICAL AND COMPUTER STREAM

Toronto, CA

Sep 2010 - Jun 2015

- **Thesis:** "Benchmarking a Neuro-biologically Inspired Adaptive Controller"
- **Supervisors:** Prof. Chris Eliasmith & Prof. Richard Zemel
- **Major Award:** *Spirit of Engineering Science Award* for outstanding community contribution

Publication Highlights

SPOTLIGHT (🔍) ORAL (🗣️) ≥ 100 CITATIONS (☆) BEST PAPER (🏆) PATENT (🔬) BOOK CHAPTER (📖) EQUAL CONTRIBUTION (*)


🔍	🗣️	☆	🏆	🔬	📖
3	10	5	1	1	1

H-INDEX	G-INDEX	MAX CITATIONS	TOTAL CITATIONS
14	28	1,150 [C2]	2,694


Patents

P1  2018 *US Patent* -
"Key-Value Memory Networks"
Miller, Fisch, Dodge, **Karimi**, Bordes, Weston

Book Chapters

B1  2022 *Springer LNAI* -
"Towards Causal Algorithmic Recourse"
Karimi*, von Kügelgen*, Schölkopf, Valera


Journal Proceedings

J2  2022 *ACM Comp. Surveys* I.F. 23.8
"A survey of algorithmic recourse: contrastive explanations & consequential ..."
Karimi, Barthe, Schölkopf, Valera

J1 - 2011 *Optics Express* I.F. 3.2
"Automated detection and density assessment of keratocytes in the human ..."
Karimi, Wong, Bizheva

Conference Proceedings


C18 - 2024 *ICML* A.R. %27.5
"Prospector Heads: Generalized Feature Attribution for Large Models & Data"
Machiraju, Derry, Desai, Guha, **Karimi**, Zou, Altman, Ré, Mallick

C17  2023 *AAAI* A.R. %23.75
"Causal Adversarial Perturbations for Individual Fairness and Robustness in ..."
Ehyaiei, Mohammadi, **Karimi**, Samadi, Farnadi


C16 - 2023 *ICML* A.R. %27.9
"On the Relationship Between Explanation and Prediction: A Causal View"
Karimi, Muandet, Kornblith, Schölkopf, Kim

C15 - 2023 *ICML* A.R. %27.9
"On Data Manifolds Entailed by Structural Causal Models"
Dominguez-Olmedo, **Karimi**, Arvanitidis, Schölkopf


C14 - 2023 *FAccT* A.R. %24.6
"Robustness Implies Fairness in Causal Algorithmic Recourse"
Ehyaiei, **Karimi**, Schölkopf, Maghsudi


C13  2022 *ICML* A.R. %21.9
"On the Robustness of Causal Algorithmic Recourse"
Dominguez-Olmedo, **Karimi**, Schölkopf


C12  2022 *AAAI* A.R. %15.0
"On the Fairness of Causal Algorithmic Recourse"
von Kügelgen, **Karimi**, Bhatt, Valera, Weller, Schölkopf


C11  2021 *ACM-AIES* A.R. %38.0
"Scaling Guarantees for Nearest Counterfactual Explanations"
Mohammadi, **Karimi**, Barthe, Valera

C10  2021 *ACM-FAccT* A.R. %25.0
"Algorithmic Recourse: from Counterfactual Explanations to Interventions"
Karimi, Schölkopf, Valera

C9  2020 *NeurIPS* A.R. %20.1
"Algorithmic recourse under imperfect causal knowledge: a probabilistic ..."
Karimi*, von Kügelgen*, Schölkopf, Valera


C8  2019 *AISTATS* A.R. %32.4
"Model-Agnostic Counterfactual Explanations for Consequential Decisions"
Karimi, Barthe, Balle, Valera


C7  2018 *IJCNN* A.R. %22.7
"Distance Correlation Autoencoder"
Wang, **Karimi**, Ghodsi


C6  2018 *CVIS* A.R. ≥%40.0
"FEELS: a full-spectrum enhanced emotion learning system for assisting ..."
Karimi*, Boroomand*, Pfisterer, Wong

C5  2017 *CVIS* A.R. ≥%40.0
"Ensembles of Random Projections for Nonlinear Dimensionality Reduction"
Karimi, Shafiee, Ghodsi, Wong

C4 - 2017 *CCN* A.R. ≥%40.0
"Synthesizing Deep Neural Network Architectures using Biological Synaptic ..."
Karimi, Shafiee, Ghodsi, Wong

C3  2017 *ICAR* A.R. ≥%40.0
"Discovery Radiomics via a Mixture Sequencers for Multi-Parametric MRI ..."
Karimi, Chung, Shafiee, Khalvati, Haider, Ghodsi, Wong

C2  2016 *EMNLP* A.R. %24.3
"Key-Value Memory Networks for Directly Reading Documents"
Miller, Fisch, Dodge, **Karimi**, Bordes, Weston

C1  2016 *ICIP* A.R. ≥%40.0
"Spatio-temporal saliency detection using abstracted fully-connected ..."
Karimi, Shafiee, Scharfenberger, BenDaya, Haider, Talukdar, Clausi, Wong

Workshop Proceedings

W2 - 2018 *NeurIPS* -
"Deep Variational Sufficient Dimensionality Reduction"
Banijamali, **Karimi**, Ghodsi

W1 - 2017 *NeurIPS* -
"JADE: Joint Autoencoders for Dis-Entanglement"
Karimi*, Banijamali*, Ghodsi, Wong

Teaching

2024	Instructor	Intro to Machine Learning	~ 150 students	Waterloo, CA
2024	Instructor	Intro to Machine Learning (☆ Teaching Excellence Award ☆)	~ 100 students	Waterloo, CA
2023	Co-instructor	Socially Responsible Machine Learning: A Causal Perspective	~ 50 attendees	Long Beach, CA
2022-p.	Co-instructor	Providing free public education on basic & advanced AI subjects on YouTube, Instagram, Substack, & Medium	~ 25,000 students	online
2021	Co-instructor	Causethical Machine Learning	~ 20 students	Saarbrücken, DE
2021	Assistant	Computational Intelligence Lab	~ 150 students	Zürich, CH
2020	Assistant	Deep Learning	~ 150 students	Zürich, CH
2020	Assistant	Causal Representation Learning	~ 40 students	Zürich, CH
2018	Head TA	Machine Learning	~ 250 students	Waterloo, CA
2017	Assistant	Data Types and Structures	~ 200 students	Waterloo, CA
2017	Assistant	Data Structures and Data Management	~ 200 students	Waterloo, CA
2017	Assistant	Computer Organization and Design	~ 200 students	Waterloo, CA
2015	Instructor	Taught a course on programming basics (via "Scratch"), logic, combinatorics, and computer assembly to students aged 9-12.	~ 4 students	Shiraz, IR
2012	Instructor	Tutored students on linear algebra and calculus	~ 2 students	Toronto, CA

Honors, Funding, & Awards

As a faculty

2024	Co-PI	Waterloo.AI Nexus of Data & AI Seed Funding	(CAD \$20,000)	Waterloo, ON
2024	Sole-PI	NSERC Discovery Grant	(CAD \$200,000)	Waterloo, ON
2024	Sole-PI	NSERC Discovery Grant Supplements	(CAD \$12,500)	Waterloo, ON
2024	Recipient	Igor Ivkovic Teaching Excellence Award	-	Waterloo, ON
2023	Recipient	Institution Startup Fund	(CAD \$170,000)	Waterloo, ON

As a student

2023	Recipient	ETH Zurich Medal for Outstanding Doctoral Performance	(CHF 2,000)	Zürich, CH
2021	Recipient	Google PhD Fellowship in Machine Learning (AI for Social Good)	(USD \$210,000)	Tübingen, DE
2018	Recipient	Max Planck ETH Center for Learning Systems PhD Fellowship	-	Tübingen, DE
2018	Recipient	NSERC Postgraduate Scholarship - Doctorate (PGS-D)	(CAD \$63,000)	Waterloo, CA
2018	Recipient	NSERC Canada Graduate Scholarship - Doctorate (CGS-D)	(CAD \$105,000) - DECLINE	Waterloo, CA
2018	Recipient	President's Graduate Scholarship (PGS)	(CAD \$35,000) - DECLINE	Waterloo, CA
2018	Recipient	David R. Cheriton Graduate Scholarship	(CAD \$20,000) - DECLINE	Waterloo, CA
2018	Recipient	Alumni Gold Medal for highest standing across university	-	Waterloo, CA
2017	Recipient	Ontario Graduate Scholarship (OGS)	(CAD \$15,000)	Waterloo, CA
2017	Recipient	President's Graduate Scholarship (PGS)	(CAD \$10,000)	Waterloo, CA
2017	Recipient	Graduate Research Scholarship	(CAD \$9,000)	Waterloo, CA
2016	Recipient	Graduate Research Scholarship	(CAD \$3,000)	Waterloo, CA
2015	Recipient	Spirit of EngSci Award for outstanding community contribution	-	Toronto, CA
2015	Recipient	Dean's Honour List (7/8 semesters)	-	Toronto, CA
2014	Recipient	The Next 36 Entrepreneurship Institute	-	Toronto, CA
2013	Recipient	Shaw Design Scholarship	(CAD \$5,000)	Toronto, CA
2012	Recipient	Exceptional Opportunities Award in Engineering Science	(CAD \$3,000)	Stanford, USA
2012	Recipient	Peter Sands Scholarship Award in Engineering Science	(CAD \$2,000)	Toronto, CA
2012	Finalist	Deloitte Consulting Competition	-	Toronto, CA
2012	Finalist	National Business & Technology Consulting Competition	-	Toronto, CA
2010	Top %0.1	Iranian National University Entrance Exam ("Konkoor")	-	Shiraz, IR
2009	Finalist	Iranian Mathematics Olympiad	-	Shiraz, IR
2008	3rd place	Provincial Computer Skills Competition	-	Shiraz, IR
2003	Recipient	2 Gold, 8 Silver, & 8 Bronze medals in regional chess competitions-	-	Waterloo, CA

Advising

Postdoc

2024 **Supervisor** Hamdi Altahery -  Waterloo -

PhD


2024 **Supervisor** Zahra Khotanlou -  Waterloo -

2024 **Co-Supervisor** Mina Kebriaee -  Waterloo -


2023 **Mentor** Ahmad Ehyaei  C14  Tübingen -

2022 **Mentor** Miriam Rateike -  Saarland → Google PhD Fellow 2023


Masters


2024 **Co-Supervisor** Maryam Ghorbansabagh -  Waterloo -

2024 **Co-Supervisor** Zachary Wu -  Waterloo -

2023 **Mentor** Maryam Yalsavar -  Waterloo -

2021 **Mentor** Ricardo Dominguez-Olmedo  C13, C15  Tübingen → Intl. Max Planck Research Schools

2020 **Mentor** Kiarash Mohammadi  C11  Ferdowsi → MILA AI Institute

2019 **Mentor** Alexandra Walter -  Tübingen → Helmholtz Data Sci. Sch. of Health

Bachelors

2024 **Supervisor** Mohammadreza Alavi -  Sharif -

2024 **Supervisor** Abubakar Bello -  Waterloo → Microsoft Inc.

Invited Talks

2024	“Building Bridges: Towards Trustworthy Human-AI Decision Making”	@ Toronto Machine Learning Summit	Toronto, CA
2024	“Building Bridges: Towards Trustworthy Human-AI Decision Making”	@ Waterloo Alumni Reunions	Waterloo, CA
2024	“Building Bridges: Towards Trustworthy Human-AI Decision Making”	@ Waterloo.AI Seminars	Waterloo, CA
2024	“Building Bridges: Towards Trustworthy Human-AI Decision Making”	@ Waterloo.AI Nexus of Data & AI Event	Waterloo, CA
2024	“Building Bridges: Towards Trustworthy Human-AI Decision Making”	@ Waterloo VIP Lab	Waterloo, CA
2024	“Building Bridges: Towards Trustworthy Human-AI Decision Making”	@ Waterloo ECE Seminars	Waterloo, CA
2023	“AI and the Transformation of Social Science Research”	@ University of Waterloo	Waterloo, CA
2023	“Towards trustworthy human-machine collaboration”	@ MIT Media Lab	Cambridge, USA
2023	“Towards trustworthy human-machine collaboration”	@ University of Waterloo	Waterloo, CA
2023	“Towards trustworthy human-machine collaboration”	@ University of Alberta	Alberta, CA
2023	“Towards trustworthy human-machine collaboration”	@ Carnegie Mellon Uni.	Doha, QA
2023	“Towards trustworthy human-machine collaboration”	@ New York University	Abu Dhabi, UAE
2022	“Improving search via type- & IO-based neurally-guided program synthesis”	@ Google DeepMind	London, UK
2022	“Toward Invariant Explanations”	@ Google Brain (CAM)	online
2022	“Algorithmic recourse: from theory to practice”	@ Google Brain (LUMA)	online
2022	“Algorithmic recourse: from theory to practice”	@ Google DeepMind	London, UK
2022	“Algorithmic recourse: from theory to practice”	@ MILA	online
2022	“Algorithmic recourse: from theory to practice”	@ IMS Annual Meeting	London, UK
2021	“Algorithmic recourse: from theory to practice”	@ Harvard University	online
2021	“Algorithmic recourse: from theory to practice”	@ NEC Europe Labs	online
2021	“Algorithmic recourse: from theory to practice”	@ Cyber Valley Health	online
2020	“Algorithmic recourse: from theory to practice”	@ ETH IML Seminars	online
2020	“Algorithmic recourse: from theory to practice”	@ UCL Causality Group	online
2021	“Algorithmic Recourse: from Counterfactual Explanations to Interventions”	@ ACM FAccT’21	online
2020	“Algorithmic recourse under imperfect causal knowledge”	@ NeurIPS’20	online
2020	“Model-Agnostic Counterfactual Explanations for Consequential Decisions”	@ AISTATS’20	online
2019	“Model-Agnostic Counterfactual Explanations for Consequential Decisions”	@ MPI-IS Retreat	Blaubeuren, DE
2016	“The decision to join, and the decision to leave Facebook”	@ Vis. & Img. Proc. Lab	Waterloo, CA

2015	“From Shahed to Broadway”	@ Alma mater highsch.	Shiraz, IR
2015	“The Perfect Human” (“Al Ensan Al Kamel” - book excerpt)	@ UofT Qur’an Group	Toronto, CA
2015	“100 percent of the shots you don’t take are a miss!”	@ Galbraith Society	Toronto, CA

Reviewing

2024-p.	Reviewer	Journal of Artificial Intelligence	=: <i>Art. Int.</i>	/
2021-p.	Reviewer	Journal of Machine Learning Research	=: <i>JMLR</i>	/
2021-p.	Prog. Comm.	International Conference on Learning Representations	=: <i>ICLR</i>	//
2021-p.	Prog. Comm.	ACM Fairness, Accountability, and Transparency	=: <i>ACM FAccT</i>	/
2021-p.	Prog. Comm.	International Conference on Machine Learning	=: <i>ICML</i>	/
2021-p.	Prog. Comm.	European Conference on Machine Learning	=: <i>ECML</i>	/
2020-p.	Prog. Comm.	Artificial Intelligence and Statistics	=: <i>AISTATS</i>	//
2019-p.	Prog. Comm.	Neural Information Processing Systems	=: <i>NeurIPS</i>	///

Other Service

2024-p.	Comm. Mbr.	PhD Defence	/	Waterloo, CA
2024-p.	Chair	PhD Comprehensive Exam	/	Waterloo, CA
2024-p.	Comm. Mbr.	PhD Comprehensive Exam	###	Waterloo, CA
2024	Comm. Mbr.	Vector Institute Scholarship in AI Review Committee	-	Toronto, CA
2024	Comm. Mbr.	ICML Workshops Proposal Review Committee	-	online
2023	Co-organizer	ICML Workshop on Counterfactuals in Minds & Machines	~ 50 attendees	Hawaii, USA
2021	Volunteer	Max Planck ETH Center for Learning Systems Retreat	~ 50 attendees	online
2021	Co-organizer	ELLIS Workshop on Causethical ML	~ 50 attendees	online
2021	Co-organizer	ICML Workshop on Algorithmic Recourse	~ 50 attendees	online
2020	Co-organizer	NeurIPS Symposium on Algorithmic Recourse	~ 100 attendees	online
2020	Note-taker	CIFAR Causal Inference Program Meeting	~ 50 attendees	online
2020	Volunteer	European Conference on Machine Learning (ECML)	-	online
2020	Volunteer	Machine Learning Summer School (MLSS)	~ 150 attendees	online
2016	Volunteer	Conference on Vision and Imaging Systems (CVIS)	~ 150 attendees	Waterloo, CA
2016	Volunteer	Conference on Vision and Imaging Systems (CVIS)	~ 150 attendees	Waterloo, CA
2013	Logistics Dir.	Engineering Science Educational Conference (ESEC)	~ 600 attendees	Toronto, CA
2012	Volunteer	Engineering Science Educational Conference (ESEC)	~ 600 attendees	Toronto, CA
2012	Finance Dir.	Cut for Cancer - Shave the Prof. (Students Fighting Cancer)	~ 350 attendees	Toronto, CA

Consultations

2022-p.	iTourer Inc.	Babak Khodaparast (CEO; contact email)	≥ CAD 100,000	Vancouver, CA
2018-2023	Aerialytic Inc.	Bardia Andalib (CEO; contact email)	≥ CAD 200,000	Toronto, CA
2018	Aurteen Inc.	Faraz Oloumi (CEO; contact email)	≥ CAD 50,000	Calgary, CA

References

Professor & Director	Bernhard Schölkopf	MPI for Intelligent Systems	sekretariat-schoelkopf@tue.mpg.de
Professor	Isabel Valera	Department of CS, Saarland University	ivalera@cs.uni-saarland.de
Professor & Director	Gilles Barthe	MPI for Security and Privacy	gilles.barthe@mpi-sp.org
Senior Staff Research Scientist	Been Kim	Google DeepMind	beenkim@google.com
Assistant Professor	Himabindu Lakkaraju	Department of CS, Harvard University	hlakkaraju@seas.harvard.edu