Mahdi Haghifam

Curriculum Vitae

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Education

2017-present   **Ph.D, University of Toronto**, Toronto, Ontario, Canada, (Expected August 2023).

Electrical and Computer Engineering Department.

Research area: "Information-Theoretic Analysis of Generalization in Machine Learning"

Advisor: Prof. Daniel M. Roy

2014-2016   **M.Sc, Sharif University of Technology**, Tehran, Iran.

Electrical Engineering.

Thesis: "Energy-Efficient Cooperative Data Transmission in the Wireless Communication Networks"

Advisor: Prof. Masoumeh Nasiri-Kenari

2010–2014   **B.Sc, Sharif University of Technology**, Tehran, Iran.

Electrical Engineering, Major in Communication Systems.

Publications

*: equal-contribution. $\alpha\beta$: alphabetic authorship

Journal

1. M. Haghifam*, M. N. Krishnan*, A. Khisti, X. Zhu, W. Dan and J. Apostolopoulos, "On Streaming Codes With Unequal Error Protection", IEEE Journal on Selected Areas in Information Theory (Volume: 2, Issue: 4, December 2021).

2. M. Haghifam, V. Y. F. Tan, and A. Khisti, "Sequential Classification with Empirically Observed Statistics", IEEE Transactions on Information Theory (Volume: 67, Issue: 5, May 2021).

3. M. Haghifam, M. Robat Mili, B. Makki, M. Nasiri-Kenari, T. Svensson, "Joint Sum Rate And Error Probability Optimization: Finite Blocklength Analysis", IEEE Wireless Communications Letters (Volume: 6, Issue: 6, Dec. 2017).

Conference

1. A. Ganesh, M. Haghifam, T. Steinke, A. Thakurta, $(\alpha\beta)$ " Faster Differentially Private Convex Optimization via Second-Order Methods" [preprint]

2. A. Ganesh, M. Haghifam, M. Nasr, S. Oh, T. Steinke, O. Thakkar, A. Thakurta, L. Wang, $(\alpha\beta)$ " Why Is Public Pretraining Necessary for Private Model Training?" [preprint]

3. M. Haghifam*, B. Rodríguez-Gálvez*, R. Thobaben, M. Skoglund, D. M. Roy, G. K. Dziugaite, "Limitations of Information-Theoretic Generalization Bounds for Gradient Descent Methods in Stochastic Convex Optimization", International Conference on Algorithmic Learning Theory 34 (ALT), 2023.

4. M. Haghifam, G. K. Dziugaite, S. Moran, D. M. Roy, "Understanding Generalization via Leave-One-Out Conditional Mutual Information", IEEE International Symposium on Information Theory (ISIT), 2022.

5. M. Haghifam, S. Moran, D. M. Roy, G. K. Dziugaite, "Towards a Unified Information–Theoretic Framework for Generalization", Advances in Neural Information Processing Systems 35 (NeurIPS), 2021 (Spotlight, $<3\%$ of submissions).

6. G. Neu, G. K. Dziugaite, M. Haghifam, D. M. Roy , "Information-Theoretic Generalization Bounds for Stochastic Gradient Descent", Annual Conference on Learning Theory 34 (COLT), 2021.

7. M. Haghifam, J. Negrea, A. Khisti, D. M. Roy , G. K. Dziugaite, "Sharpened Generalization Bounds based on Conditional Mutual Information and an Application to Noisy, Iterative Algorithms", Advances in Neural Information Processing Systems 34 (NeurIPS), 2020.

8. J. Negrea*, M. Haghifam*, G. K. Dziugaite, A. Khisti, D. M. Roy, "Information-Theoretic Generalization Bounds for SGLD via Data-Dependent Estimates", Advances in Neural Information Processing Systems 33 (NeurIPS), 2019.

Workshop
1. M. Haghifam, V. Y. F. Tan, and A. Khisti, "Sequential Classification with Empirically Observed Statistics", IEEE Information Theory Workshop 2019, Visby, Gotland, Sweden.

2. M. Haghifam, A. Badr, A. Khisti, X. Zhu, W. Dan and J. Apostolopoulos, "Streaming Codes with Unequal Error Protection against Burst Losses", The 29th Biennial Symposium on Communications (BSC 2018).

3. M. Haghifam, B. Makki, M. Nasiri-Kenari, T. Svensson, "On joint information and energy transfer in relay networks with an imperfect power amplifier", 27th Annual IEEE International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC), Valencia, Spain, 2016.

4. M. Haghifam, M. R. Haghifam, B. Safari Chabook, "State estimation in electric distribution networks in presence of distributed generation using the PMUs", CIRED 2012, Lisbon, Portugal

Honors and Awards

2023	Shahid U.H. Qureshi Memorial Scholarship (4,300 CAD)
2023	Czeslaw and Irene Klawe Scholarship (7,000 CAD)
2023	V. L. Henderson and M. Bassett Research Fellowship (8,200 CAD)
2023	Viola Carless Smith Research Fellowship (9,500 CAD)
2022	North American School of Information Theory Travel Grant
2021	Top 8% of reviewers at NeurIPS 2021
2021	Doctoral Completion Award from University of Toronto (15,000 CAD)
2021	Ewing Rae graduate scholarship from ECE Department of University of Toronto (5,000 CAD)
2020,2021,2002	Research grant from the Vector Institute for Artificial Intelligence (18,000 CAD)
2019,2021	MITACS Accelerate Fellowship (42,000 CAD)
2020	Visiting Graduate Student, Institute for Advanced Study, Princeton, New Jersey
2019,2021	NeurIPS Travel Grant (500 CAD)
2014	Ranked **5th** out of **25,000** in nationwide entrance exams for Master's degree in EE

Research Experience

Aug. 22–Dec. 22	**Research Intern, Google Brain, California, U.S.**
	Mentors: Dr. Thomas Steinke and Dr. Abhradeep Guha Thakurta
Nov. 20–March 21	**Research Intern, Element AI-Service Now, Toronto, Canada.**
	Mentor: Dr. Gintare Karolina Dziugaite
March 20–May 20	**Visiting Researcher, Institute for Advanced Studies, Princeton, U.S.**
March 20–Present	**Graduate Researcher, Vector Institute for AI, Toronto, Canada.**

Feb. 19–May 19	**Research Intern, Element AI, Toronto, Canada.**
	Mentor: Dr. Gintare Karolina Dziugaite
June 15–Sept. 15	**Visiting Researcher, Chalmers University of Technology, Sweden.**
	Mentors: Prof. Tommy Svensson, Dr. Behrooz Makki

Invited Talks

University of Minnesota – Network and Information Sciences Seminar Series (March 23)

Harvard University – Flavio Calmon's Reseach Group (March 23)

Google – Privacy in Machine Learning Seminar (December 22)

Google – Information Theory Seminar (September 22)

Canadian Workshop on Information Theory – Ottawa (June 22)

Microsoft Research – Montreal (January 22)

IIMAS, Mexico – Information Theory, Machine Learning and Statistics Seminar (April 21)

Service

Conference Reviewer	ISIT(2019-2023). NeurIPS (2021-2023). ICLR (2022,2023). ICML (2023). COLT (2022)
Journal Referee	IEEE Transactions on Signal Processing. IEEE Transactions on Information Theory. Journal of Machine Learning Research. Transactions on Machine Learning Research.
Area Chair	Information-Theoretic Methods for Rigorous, Responsible, and Reliable Machine Learning (ITR3), workshop in ICML 2021. Eastern European Machine Learning Summer School 2022.

Selected Graduate Courses

Statistical Learning, Online Learning and Sequential Decision Making, Information Theory, Markov Decision Processes, Real Analysis I, Probability Theory I & II, Algorithms for Private Data Analysis.

Computer Skills

Programming	C,C++, Python (Scipy, Numpy), TensorFlow, JAX
Mathematics	MATLAB (Simulink , CVX), Mathematica, Mathcad, R
Operating Systems	Windows, Unix, Macintosh