Mahdi Haghifam

Curriculum Vitae

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Education

2017-present	**Ph.D, University of Toronto**, Toronto, Ontario, Canada, (Expected April 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 Next Generation of 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

Journal Articles

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 Papers

1. **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", 2022 (under review at ALT2023).
2. **M. Haghifam**, G. K. Dziugaite, S. Moran, D. M. Roy, "Understanding Generalization via Leave-One-Out Conditional Mutual Information", 2022 IEEE International Symposium on Information Theory.
3. **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, # submissions 9k).
4. 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 (20% acceptance rate, # submissions 500).
5. **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 (20% acceptance rate, # submissions 9k).
6. 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 (20% acceptance rate, # submissions 6k).

Workshop Papers

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

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.
2021	Ewing Rae graduate scholarship from ECE Department of University of Toronto.
2020,2021	Research grant from the Vector Institute for Artificial Intelligence.
2019,2021	MITACS Accelerate Fellowship.
2020	Visiting Graduate Student, Institute for Advanced Study, Princeton, New Jersey.
2019,2021	NeurIPS Travel Grant.
2014	Ranked **5th** out of **25,000** participants in nationwide entrance exams for Master's degree in EE, 2014.

Research Experience

Aug. 22–Dec. 22	**Research Intern, Google Brain, California, US.**
	Mentors: Dr. Thomas Steinke and Dr. Abhradeep Guha Thakurta
Nov. 20–March 21	**Research Intern, Element AI-Service Now, Toronto, Canada.**
	Mentors: 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.**
	Mentors: Dr. Gintare Karolina Dziugaite
June 15–Sept. 15	**Visiting Researcher, Department of Signals and Systems, Chalmers University of Technology, Sweden.**
	Mentors: Prof. Tommy Svensson, Dr. Behrooz Makki

Presentations

Understanding Generalization via Leave-One-Out Conditional Mutual Information

International Symposium on Information Theory, Finland (July 22).

Information–Theoretic Analysis of Generalization in Machine Learning

Microsoft Research Montreal (January 22).

Canadian Workshop on Information Theory (June 22).

Google Brain-Information Theory Reading Group (September 22).

Towards a Unified Information–Theoretic Framework for Generalization

Neural Information Processing Conference (December 21).

Generalization Bounds based on Conditional Mutual Information and an Application to Iterative Algorithms

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

Neural Information Processing Conference (December 2020).

Information-Theoretic Generalization Bounds for SGLD via Data-Dependent Estimates

Neural Information Processing Conference, Vancouver, Canada (December 19).

Sequential Classification with Empirically Observed Statistics

IEEE Information Theory Workshop, Visby, Sweden (August 19).

Streaming Codes with Unequal Error Protection against Burst Losses

IEEE Biennial Symposium on Communication, Toronto, Canada (July 18).

Service

Conference Reviewer	ISIT(2019-2022). NeurIPS (2021,2022). 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, Algorithms for Private Data Analysis.