Mahdi Haghifam

Curriculum Vitae

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Education

2017-present **Ph.D, University of Toronto**, Toronto, Ontario, Canada, (Expected Graduation:Dec.2022).
Electrical Engineering.
Research area: "Information-Theoretic Analysis of Generalization in Machine Learning"
Advisor: Prof. Daniel M. Roy

2014-2017 **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 (Full Professor at Electrical Engineering Department of Sharif University of Technology.)

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 (Accepted), 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).

Referred Articles in Machine Learning Conferences

1. **M. Haghifam**, G. K. Dziugaite, S. Moran, D. M. Roy, "Towards a Unified Information–Theoretic Framework for Generalization", Advances in Neural Information Processing Systems 35 (NeurIPS), 2021 (Spotlight, $<3\%$ of submissions, # submissions 9k).
2. 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).
3. **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).
4. 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).

Conference Papers

1. **M. Haghifam**, G. K. Dziugaite, S. Moran, D. M. Roy, "Towards a Unified Information–Theoretic Framework for Generalization", ICML–21 Workshop on Information-Theoretic Methods for Rigorous, Responsible, and Reliable Machine Learning.
2. **M. Haghifam**, V. Y. F. Tan, and A. Khisti, "Sequential Classification with Empirically Observed Statistics", IEEE Information Theory Workshop 2019, Visby, Gotland, Sweden.
3. **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).
4. **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.
5. **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.

2021 MITACS Accelerate Fellowship.

2020 Visiting Graduate Student, Institute for Advanced Study, Princeton, New Jersey.

2019,2021 NeurIPS Travel Grant.

2019 MITACS Accelerate Fellowship.

2014 Ranked **5th** out of **25,000** participants in nationwide entrance exams for Master's degree in Electrical Engineering, 2014.

Employment

June. 22–Sep. 22 *Research Intern*, Google Brain, California, US.
Supervisor: Dr. Thomas Steinke and Dr. Abhradeep Guha Thakurta

Nov. 20–March 21 *Research Intern*, Element AI-Service Now, Toronto, Canada.
Supervisor: 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.
Supervisor: Prof. Daniel M. Roy

Feb. 19–May 19 *Research Intern*, Element AI, Toronto, Canada.
Supervisor: Dr. Gintare Karolina Dziugaite

June 15–Sept. 15 *Visiting Researcher*, Department of Signals and Systems, Chalmers University of Technology, Gothenburg, Sweden.
Supervisors: Prof. Tommy Svensson, Dr. Behrooz Makki

Presentations

Title: Information–Theoretic Analysis of Generalization in Machine Learning

January 22 Microsoft Research Montreal (Virtual).

Title: Towards a Unified Information–Theoretic Framework for Generalization

December 21 Neural Information Processing Conference(Virtual).

Title: Sharpened Generalization Bounds based on Conditional Mutual Information and an Application to Noisy, Iterative Algorithms

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

December 20 Neural Information Processing Conference (Virtual).

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

December 19 Neural Information Processing Conference, Vancouver, Canada.

Title: Sequential Classification with Empirically Observed Statistics

August 19 IEEE Information Theory Workshop, Visby, Sweden.

Title: Streaming Codes with Unequal Error Protection against Burst Losses

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

Service

Conference Reviewer ISIT(2019-2022). NeurIPS (2021). ICLR (2022). COLT (2022)

Journal Referee IEEE Transactions on Signal Processing and Communications. Journal of 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.