

# Mahdi Haghifam

## Curriculum Vitae

✉ mahdi DOT haghifam AT mail.utoronto.ca

### 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, 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, 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.