Behrooz Tahmasebi

CONTACT

Room 32-G416, Computer Science and Artificial Intelligence Laboratory (CSAIL),
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EDUCATION

- *PhD student (2019-)*, Massachusetts Institute of Technology (MIT)
  Major: Electrical Engineering and Computer Science (EECS)
  Research Laboratory: Computer Science and Artificial Intelligence Laboratory (CSAIL)
  Minor: Analytic Number Theory from Harvard University
  Supervisor: Prof. Stefanie Jegelka
  GPA: 5.00/5.00

- *Master of Science,* Sharif University of Technology
  Bachelor of Science, Sharif University of Technology
  Major: Electrical Engineering (Information Theory)
  Minor: Mathematics
  Supervisors: Prof. Mohammad Ali Maddah-Ali, Prof. Abolfazl Motahari

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RESEARCH INTERESTS

Learning with graphs, manifolds, and invariances
Deep learning (geometry, optimization)
Large Language Models (LLMs) foundations

PUBLICATIONS

*Note: authors denoted with * contributed equally. All papers are available on my website.*

Manuscripts under Review:

- Ashkan Soleymani*, **Behrooz Tahmasebi***, Stefanie Jegelka, Patrick Jaillet, *A Robust Kernel Statistical Test of Invariance: Detecting Subtle Asymmetries*, preprint (submitted), 2024.

- Ashkan Soleymani*, **Behrooz Tahmasebi***, Stefanie Jegelka, Patrick Jaillet, *Learning with Exact Invariances in Polynomial Time*, preprint (submitted), 2024.

- **Behrooz Tahmasebi**, Stefanie Jegelka, *Generalization Bounds for Canonicalization: A Comparative Study with Group Averaging*, preprint (submitted), 2024.

- **Behrooz Tahmasebi**, Stefanie Jegelka, *Regularity in Canonicalized Models: A Theoretical Perspective*, preprint (submitted), 2024.

Published Papers:

- Parsa Moradi, **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, *Coded Computing: A Learning-Theoretic Framework*, Advances in Neural Information Processing Systems (**NeurIPS**), 2024.

- **Behrooz Tahmasebi**, Ashkan Soleymani, Dara Bahri, Stefanie Jegelka, Patrick Jaillet, *A Universal Class of Sharpness-Aware Minimization Algorithms*, International Conference on Machine Learning (**ICML**), 2024.
  - **Best Paper Award**, workshop on High-dimensional Learning Dynamics (HiLD) at ICML 2024.
- **Behrooz Tahmasebi**, Stefanie Jegelka, *Sample Complexity Bounds for Estimating Probability Divergences under Invariances*, International Conference on Machine Learning (**ICML**), 2024.
- **Behrooz Tahmasebi**, Stefanie Jegelka, *The Exact Sample Complexity Gain from Invariances for Kernel Regression*, Advances in Neural Information Processing Systems (**NeurIPS**), 2023.
  - **Spotlight** paper at NeurIPS 2023 (top 3.6% of submissions).
  - This paper is covered by *MIT News*.
- **Behrooz Tahmasebi**, Derek Lim, Stefanie Jegelka, *The Power of Recursion in Graph Neural Networks for Counting Substructures*, International Conference on Artificial Intelligence and Statistics (**AISTATS**), 2023.
  - **Oral presentation** at AISTATS 2023 (top 1.9% of submissions).
- **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, Abolfazl Motahari, *The Capacity of Associated Subsequence Retrieval*, **IEEE Trans. Inf. Theory**, 2021.
- **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, *Private Function Computation*, IEEE International Symposium on Information Theory (ISIT), 2020.
- **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, *Private Sequential Function Computation*, IEEE International Symposium on Information Theory (ISIT), 2019.
- **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, Abolfazl Motahari, *Information Theory of Mixed Population Genome-Wide Association Studies*, IEEE Information Theory Workshop (ITW), 2018.
- **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, Abolfazl Motahari, *Genome-Wide Association Studies: Information Theoretic Limits of Reliable Learning*, IEEE International Symposium on Information Theory (ISIT), 2018.
- **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, Abolfazl Motahari, *On the Identifiability of Parameters in the Population Stratification Problem: A Worst-Case Analysis*, IEEE International Symposium on Information Theory (ISIT), 2018.
- **Behrooz Tahmasebi**, Mohammad Ali Maddah-Ali, Saeedeh Parsaeefard, Babak Hossein Khalaj, *Optimum Transmission Delay for Function Computation in NFV-Based Networks: The Role of Network Coding and Redundant Computing*, IEEE Journal on Selected Areas in Communications (JSAC), 2018.

HONORS AND AWARDS

- Best Paper Award, workshop on High-dimensional Learning Dynamics (HiLD), International Conference on Machine Learning (ICML), 2024.
- Jacobs Presidential Graduate Fellowship Award at MIT, 2019.
- 1st rank among SM students in the Electrical Engineering Department at Sharif University of Technology.
- 7th rank in the Iran University Entrance Exam (with nearly 300K participants).

MEDIA COVERAGE	• How symmetry can come to the aid of machine learning, *MIT News*, February 2024.

RESEARCH AND INDUSTRY EXPERIENCE	• *Research Intern*, Microsoft Research, Redmond, WA, USA, Summer 2024, Large Language Models (LLMs) foundations, *Supervisors:* Dr. Harkirat Behl and Prof. Yin Tat Lee
	• *Visiting Graduate Student*, UCSD, January 2024 - February 2024, Geometric deep learning, *Supervisor:* Prof. Yusu Wang
	• *Research Assistant (RA)*, MIT Machine Learning Group, CSAIL, (2019-), Learning with group invariances, manifolds, and graphs *Supervisor:* Prof. Stefanie Jegelka

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PRESENTATIONS	• *Exploring the Theoretical Advantages of Symmetry in Machine Learning*

  – Guest lecturer at the MIT EECS graduate course on Symmetry and its Application to Machine Learning and Scientific Computing, May 2024.

• *Sample Complexity Gain from Invariances: Kernel Regression, Wasserstein Distance, and Density Estimation*

  – (Invited) Rensselaer Polytechnic Institute (RPI) Machine Learning Seminar, November 2023.
  – (Invited) Math Machine Learning seminar, MPI MIS + UCLA, July 2023.

• *Sample Complexity Bounds for Estimating Probability Divergences under Invariances*
  – LIDS and STATS Tea Talks, MIT, October 2023.

• *The Exact Sample Complexity Gain from Invariances for Kernel Regression*
  – LIDS and STATS Tea Talks, MIT, March 2023.

• *The Power of Recursion in Graph Neural Networks for Counting Substructures*

  – Oral presentation at AISTATS 2023.
  – LIDS Student Conference, MIT, February 2021.

SERVICE	• *Reviewer:*

  – Conferences: NeurIPS, ICML, ICLR, AISTATS, AAAI.
  – Journals: IEEE Trans. Inf. Theory, IEEE Trans. Neural Netw. Learn. Syst.

• Co-Chair of the MIT LIDS Student Conference, 2023

• Head Organizer of the ML Tea Talks at MIT CSAIL, 2023-24

• Student Member of the MIT EECS Graduate Admissions Committee, 2024

• Served as a Session Volunteer at ICML 2022

TEACHING	• *Graduate Teaching Assistant (TA)* at MIT: 6.7960 Deep Learning, Fall 2024. Instructors: Prof. Sara Beery and Prof. Phillip Isola.
	• *Graduate Teaching Assistant (TA)* at MIT: 6.S966 Symmetry and its Application to Machine Learning and Scientific Computing, Spring 2024. Instructor: Prof. Tess Smidt.
	• *Undergraduate Teaching Assistant (TA)* at Sharif University of Technology: Machine Learning, Mathematical Analysis, Network Coding, Numerical Analysis, Engineering Mathematics.

PROGRAMMING   Python (PyTorch), C++, LaTeX, MATLAB

LANGUAGES   Persian (Native), English (Fluent)

REFERENCES

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Massachusetts Institute of Technology (MIT), Cambridge, MA, USA
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Prof. Patrick Jaillet
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