

BEHRAD MONIRI

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RESEARCH INTERESTS

I am broadly interested in the mathematical foundations of data science. In particular, I am interested in the theory of deep learning, random matrix theory, information theory, and mathematical statistics.

EDUCATION

University of Pennsylvania

Philadelphia, PA

- Doctor of Philosophy, **Electrical and Systems Engineering** 2021 - Present
School of Engineering and Applied Sciences
Advisor: Prof. Hamed Hassani
- Master of Arts, **Statistics and Data Science** 2021 - 2024
The Wharton School of Business

Relevant Coursework: Random Matrix Theory, Probability Theory, Elements of Probability Theory, Advanced Mathematical Statistics, Bayesian Statistics, Uncertainty Quantification, Observational Studies, Advanced Causal Inference, Mathematics of High-Dimensional Data, Large-Scale Optimization, Linear Systems Theory, Deep Generative Models, Debugging Data and Models, Theory of Modern Machine Learning.

Sharif University of Technology

Tehran, Iran

- Bachelor of Science, **Electrical Engineering** 2016 - 2020
GPA: 19.01/20.00, Highest Distinctions

Relevant Coursework: Information Theory, High Dimensional Probability, Theory of Machine Learning, Probability and Statistics, Algorithms, Causal Inference, Numerical Optimization, Computational Neuroscience.

PUBLICATIONS

(*: equal contributions)

- [1] *A Theory of Non-Linear Feature Learning with One Gradient Step in Two-Layer Neural Networks*
Behrad Moniri*, Donghwan Lee*, Hamed Hassani, and Edgar Dobriban.
Under Review, 2023.
Presented at the NeurIPS 2023 Workshop on Mathematics of Modern Machine Learning (M3L).
- [2] *Demystifying Disagreement-on-the-Line in High Dimensions*
Donghwan Lee*, **Behrad Moniri***, Xinneng Huang, Edgar Dobriban, and Hamed Hassani.
International Conference on Machine Learning (ICML 2023).
- [3] *Information-Theoretic Analysis of Minimax Excess Risk*
Hassan Hafez-Kolahi*, **Behrad Moniri***, and Shohreh Kasaei.
IEEE Transactions on Information Theory, 2023.
- [4] *Rate-Distortion Analysis of Minimum Excess Risk in Bayesian Learning*
Hassan Hafez-Kolahi, **Behrad Moniri**, Shohreh Kasaei, and Mahdieh Soleymani.
International Conference on Machine Learning (ICML 2021). [**Oral Presentation**]

HONORS AND AWARDS

- **Outstanding Teaching Award**, School of Engineering, *University of Pennsylvania*, 2024.
- **Travel Award**, Workshop on the Interplay of Information Theory, Probability and Statistical Learning, *Yale Institute for Foundations of Data Science*, 2024.

- **Travel Award**, North American School of Information Theory, *IEEE Info. Theory Society* 2022.
- **The Dean's Fellowship**, ESE Department, *University of Pennsylvania*, 2021.
- **Prof. Iraj Zandi's Fellowship**, ESE Department, *University of Pennsylvania*, 2021.
- **Academic Achievement Award**, EE Department, *Sharif University of Technology*, 2020.
- **Academic Achievement Award**, EE Department, *Sharif University of Technology*, 2019.
- **Fellowship**, *Iran National Elites Foundation*, 2016.
- **Ranked in the top 0.1% among 250,000 students** taking part in Iran's National University Entrance Exam (Konkour) in Mathematics/Physics Branch, 2016.

TA EXPERIENCES

University of Pennsylvania, Philadelphia, PA.

Head Teaching Assistant, *Statistics for Data Science* (Fall 2022, Fall 2023). 250 Participants.

Sharif University of Technology, Tehran, Iran.

- **Graduate Courses:** *Theory of Machine Learning* (Fall 2020), *Probability in High Dimensions* (Spring 2021) *High Dimensional Statistics* (Spring 2020) *Causal Inference* (Fall 2019).
- **Undergraduate Courses:** *Probability and Statistics* (Fall 2019, Spring 2020), *Signals and Systems* (Spring 2019, Fall 2019), *Engineering Mathematics* (Fall 2018).

INDUSTRIAL EXPERIENCES

- **Summer Intern @ Data Science Group**, Digikala, Digikala.ir June 2019 - Sep. 2019
Supervisor: Dr. Omid Mirsadeghi

SELECTED TALKS AND PRESENTATIONS

- Centre International de Mathématiques et Informatique de Toulouse (CIMI), “Beyond classical regimes in statistical inference and machine learning” workshop, invited by Prof. Henrike Goulart, Nov 2024. (did not attend due to visa issues)
- Yale Institute for Foundations of Data Science, Workshop Honoring Andrew Barron: Forty Years at the Interplay of Information Theory, Probability and Statistical Learning, April 2024.
- INFORMS Optimization Society (IOS) Conference, Session on “Nonconvex Optimization Approaches in Machine Learning”, invited by Prof. Salar Fattahi, March 2024.
- NSF Institute for Emerging CORE Methods in Data Science (EnCORE), Student Talks, Dec 2023.
- Penn ESE PhD Colloquium, Oct. 2023.
- Poster presentation at the International Conference on Machine Learning (ICML), July 2023.
- Columbia Statistical Machine Learning Symposium, April 2023.
- FM+ML Seminars at Penn, invited by Prof. Eric Wong, April 2023.
- Guest Lecture, Random Matrix Theory Course, taught by Prof. Jiaoyang Huang, April 2023.
- Penn ESE PhD Colloquium, Feb. 2023.
- Penn Advance Mathematical Statistics Coures, taught by Prof. T. T. Cai, Dec. 2022.
- Penn Modern Statistical Inference Seminar, taught by Prof. Edgar Dobriban, April 2022.

SERVICE

- **Board Member**, ESE Ph.D. Association, University of Pennsylvania, 2023-present.
- **Reviewer**, International Conference on Machine Learning (ICML), Conference on Neural Information Processing Systems (NeurIPS), International Conference on Learning Representations (ICLR), International Symposium on Information Theory (ISIT), SIAM Journal on Mathematics of Data Science.
- **Organizer**, Reading Group: Tools for the Analysis of High Dimensional Models
University of Pennsylvania, 2023.
- **Organizing Committee**, IEEE North American School of Information Theory, 2023.
- **Organizer**, EE Seminars, Resana Scientific and Cultural Association
Department of Electrical Engineering, Sharif University of Technology, 2020 and 2021.
- **Student Scientific Committee**, 1st Sharif Neuroscience Symposium (SNS 2019)
Sharif University of Technology and Institute for Research in Fundamental Sciences (IPM)
- **Scientific Committee**, Coding Theory for High School Students
Rasta Scientific Outreach Group, Sharif University of Technology, 2021.