Eren C. Kızıldağ

CONTACT INFORMATION

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RESEARCH INTERESTS

Applied probability, high-dimensional statistics, machine learning, and theoretical computer science

EMPLOYMENT

Columbia University

Distinguished Postdoctoral Fellow, Department of Statistics (July 2022 - July 2024)

EDUCATION

Massachusetts Institute of Technology

Ph.D. in Electrical Engineering and Computer Science (September 2017 - May 2022)
GPA: 5.0/5.0

- Advisor: Prof. David Gamarnik
- Thesis Title: Algorithms and Algorithmic Barriers in High-Dimensional Statistics and Random Combinatorial Structures

M.S. in Electrical Engineering and Computer Science (June 2017)
GPA: 5.0/5.0

- Advisor: Prof. Elfar Adalsteinsson
- Thesis Title: Improved Magnetic Resonance Chemical Shift Imaging at 3 Tesla using a 32-channel Integrated RF-Shim Coil Array

Minor in Mathematics (February 2017)

Bogazici University, Turkey

B.Sc. in Electrical and Electronics Engineering (June 2014)
GPA: 3.99/4.00

- 2nd rank in the university.
- Specialized in Control Theory.

JOURNAL PUBLICATIONS & PREPRINTS

Planted Random Number Partitioning Problem
Eren C. Kızıldağ
In preparation, 2023+

Sharp Phase Transition for Multi Overlap Gap Property in Ising p-Spin Glass and Random k-SAT Models
Eren C. Kızıldağ
In preparation, 2023+

Symmetric Binary Perceptron with Random Labels: Capacity, Universality, and Overlap Gap Property
Eren C. Kızıldağ, Tanay Wakhare
Submitted to IEEE Transactions on Signal Processing, 2023+

Shattering in the Ising Pure p-Spin Model
David Gamarnik, Aukosh Jagannath, Eren C. Kızıldağ
Submitted to The Annals of Probability, 2023+

Algorithmic Obstructions in the Random Number Partitioning Problem
David Gamarnik, Eren C. Kızıldağ
The Annals of Applied Probability, 2023

Stationary Points of Shallow Neural Networks with Quadratic Activation Function
David Gamarnik, Eren C. Kızıldağ, Ilias Zadik.
Mathematics of Operations Research (Minor Revisions), 2023+

Self-Regularity of Non-Negative Output Weights for Overparameterized Two-Layer Neural Networks
David Gamarnik, Eren C. Kızıldağ, Ilias Zadik.
IEEE Transactions on Signal Processing, 2022

Computing the Partition Function of the Sherrington-Kirkpatrick Model is Hard on Average
David Gamarnik, Eren C. Kızıldağ
The Annals of Applied Probability, 2021

Inference in High-Dimensional Linear Regression via Lattice Basis Reduction and Integer Relation Detection
David Gamarnik, Eren C. Kızıldağ, Ilias Zadik.
IEEE Transactions on Information Theory, 2021

Neural Networks and Polynomial Regression. Demystifying the Overparametrization Phenomena
Matt Emschwiller, David Gamarnik, Eren C. Kızıldağ, Ilias Zadik
Preprint, 2020

Conference Papers

Symmetric Percepton with Random Labels
Eren C. Kızıldağ, Tanay Wakhare
International Conference on Sampling Theory and Applications (SampTA), 2023

Geometric Barriers for Stable and Online Algorithms for Discrepancy Minimization
David Gamarnik, Eren C. Kızıldağ, Will Perkins, Changji Xu
Conference on Learning Theory (COLT), 2023

Algorithms and Barriers in the Symmetric Binary Perceptron Model
David Gamarnik, Eren C. Kızıldağ, Will Perkins, Changji Xu
IEEE Symposium on Foundations of Computer Science (FOCS), 2022

The Random Number Partitioning Problem: Overlap Gap Property and Algorithmic Barriers
David Gamarnik, Eren C. Kızıldağ
IEEE International Symposium on Information Theory (ISIT), 2022

Self-Regularity of Output Weights for Overparameterized Two-Layer Neural Networks
David Gamarnik, Eren C. Kızıldağ
IEEE International Symposium on Information Theory (ISIT), 2021

Computing the Partition Function of the Sherrington-Kirkpatrick Model is Hard on Average
David Gamarnik, Eren C. Kızıldağ
IEEE International Symposium on Information Theory (ISIT), 2020

High-Dimensional Linear Regression and Phase Retrieval via PSLQ Integer Relation Algorithm
David Gamarnik, Eren C. Kızıldağ
IEEE International Symposium on Information Theory (ISIT), 2019

Improved spiral chemical shift imaging at 3 Tesla using a 32-channel integrated RF-shim coil array
Eren C. Kızıldağ, Jason P. Stockmann, Borjan Gagoski, Bastien Guerin, P. Ellen Grant, Lawrence L. Wald, Elfar Adalsteinsson
International Society for Magnetic Resonance in Medicine (ISMRM), 2016
(Summa Cum Laude Award, Top 5%)

Honors and Awards

- Columbia University, Distinguished Postdoctoral Fellowship at Statistics, 2022-24.
- University of Waterloo, Postdoctoral Fellowship in Probability & Mathematical Data Science, 2022 (Declined).
- MIT Graduate Student Council Travel Grant, 2019.
- *Summa cum laude* award (top 5%) in the 24th annual meeting of International Society for Magnetic Resonance in Medicine (ISMRM), 2016.
- Ranked 2nd in the graduating class of Bogazici University, 2014.
- Turkish Educational Foundation Supreme Success Scholarship, 2011-2014.
- Bogazici University Presidential Fellowship, 2010-2014.
- Turkish Ministry of Education Scholarship, 2010-2014.
- Semi-Finalist in Oyun'2010, 15th Turkish Intelligence Competition, 2010.
- Ranked 2nd in the graduating class of Ankara Science High School, 2010.[1]
- Ranked 11th among 1.8 million students in College Entrance Exam, 2010.
- Candidate in Turkish team for International Mathematical Olympiad (IMO), 2010.
- Silver Medal at International Silk Road Mathematical Competition, 2010.
- Bronze Medal at National Mathematical Olympiad, held by Scientific and Technological Research Council of Turkey (TUBITAK, Turkish equivalent of NSF), 2009.
- First rank at Mediterranean Mathematical Olympiad, 2009.
- First rank at Middle East Technical University Mathematical Competition, 2008.
- Bronze Medal at Mediterranean Mathematical Olympiad, 2007.
- Ranked 4th in the Centralized High School Entrance Exam, 2006.
- Gold Medal at National Junior Mathematical Olympiad, held by TUBITAK, 2006.

Selected Talks

- INFORMS Annual Meeting, October 2023.
- Columbia University, Statistics Student Seminar Series, October 2023.
- LU-UMN Joint Probability Seminar, September 2023.
- International Conference on Sampling Theory and Applications, July 2023.
- University of Chicago Theory Seminar, April 2023.
- Columbia University, Statistical Machine Learning Symposium, April 2023.
- Penn/Temple Probability Seminar, March 2023.
- IEEE Symposium on Foundations of Computer Science (FOCS), November 2022.
- NYU Bruna Group Meeting, November 2022.
- Northeast Probability Seminar, November 2022.
- Columbia University CS Theory Seminar, November 2022.
- Columbia University Statistics Seminar, September 2022.
- Random Structures and Algorithms, August 2022.
- IEEE International Symposium on Information Theory, July 2022.
- MIT Statistics and Data Science Conference (SDSCon), April 2022.
- MIT SIAM Seminar, March 2022.
- UIC Combinatorics and Probability Seminar, March 2022.
- MIT LIDS and Statistics Tea Talk, February 2022.
- MIT LIDS Student Conference, January 2022.
- Stanford Information Theory Forum, January 2022.
- Stanford CS Theory Lunch, January 2022.
- Bilkent University, Electrical & Electronics Engineering Seminar, January 2022.
- Simons Institute at UC Berkeley, Graduate Seminar, November 2021.
- Cornell ORIE Young Researchers Workshop, October 2021.
- IEEE International Symposium on Information Theory, July 2021.
- MIT LIDS and Statistics Tea Talk, May 2021.

[1] A special high school that was modeled after Bronx High School of Science, with a curriculum tailored for gifted students.

- MIT LIDS Student Conference, January 2021.
- MIT Machine Learning Tea Talks, July 2020.
- IEEE International Symposium on Information Theory, July 2020.
- Machine Learning at MIT Retreat, February 2020.
- IEEE International Symposium on Information Theory, July 2019.

Graduate Coursework

- ❑ Information Theory (A+)
- ❑ Fundamentals of Probability (A+)
- ❑ Inference and Information (A)
- ❑ Topics in Discrete Probability (A+)
- ❑ Real Analysis (A+)
- ❑ Optimization Methods (A+)
- ❑ Digital Image Processing (A)
- ❑ Data Acquisition & Image Recon. in MRI (A)
- ❑ Fourier Analysis: Theory & Applications (A+)

Teaching Experience

Massachusetts Institute of Technology

Residential:

- Teaching Assistant for 6.436 Fundamentals of Probability (Fall 2019).
- Teaching Assistant for 6.344 Digital Image Processing (Spring 2019).
- Teaching Assistant for 6.S077 Introduction to Data Science (Spring 2018).
- Teaching Assistant for 6.437 Inference and Information (Spring 2017).
- Conducted weekly recitations and office hours, prepared and graded problem sets and exams.

Online:

- Teaching Assistant for 6.431x Probability—The Science of Uncertainty and Data, an edX-based MOOC with 2k enrollments. Answered and moderated forum posts, developed problem sets and exams (Fall 2018).
- Developed 6.431x Probability—The Science of Uncertainty and Data (Fall 2017) and 18.650x Fundamentals of Statistics (Summer 2018).

Service

- Member of the program committee for Algorithmic Learning Theory, 2024.
- Member of the program committee for Conference on Learning Theory, 2023.
- Member of the organizing committee for Columbia University Statistical Machine Learning Symposium, 2023.
- Reading group organizer on Overlap Gap Property at Simons Institute program, *Computational Complexity of Statistical Inference*, Fall 2021.

Reviewer for

Random Structures & Algorithms, IEEE Information Theory Workshop (ITW), IEEE International Symposium on Information Theory (ISIT), Conference on Learning Theory (COLT), Algorithmic Learning Theory (ALT).

Computing Skills

C, MATLAB, HTML, LaTeX.

Languages

Turkish (Native), English (Fluent).

Personal

Citizen of Turkey, F-1 visa holder.