

Samet Demir

Ph.D. Candidate, Computer Science & Engineering, Koc University

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Research Interests

Learning theory, high-dimensional statistics, random matrix theory, universality, robust learning

Education

- **Ph.D., Computer Science and Engineering** Aug 2020 – Present
Koc University, Turkey (Advisor: Prof. Zafer Dogan)
- **B.S., Computer Engineering** Aug 2015 – Aug 2020
Bogazici University, Turkey

Publications

Peer-reviewed

- Samet Demir and Zafer Dogan. *How Data Mixing Shapes In-Context Learning: Asymptotic Equivalence for Transformers with MLPs*. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2025.
- Samet Demir and Zafer Dogan. *Asymptotic Analysis of Two-Layer Neural Networks after One Gradient Step under Gaussian Mixtures with Structure*. In *Proceedings of International Conference on Learning Representations (ICLR)*, 2025.
- M. Oguzhan Gultekin, Samet Demir, Zafer Dogan. *Learning Rate Should Scale Inversely with High-Order Data Moments in High-Dimensional Online Independent Component Analysis*. In *Proceedings of IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2025.
- Yigit E. Yildirim, Samet Demir, Zafer Dogan. *Benefits of Online Tilted Empirical Risk Minimization: A Case Study of Outlier Detection and Robust Regression*. In *Proceedings of IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2025.
- Samet Demir and Zafer Dogan. *Asymptotic Study of In-context Learning with Random Transformers through Equivalent Models*. In *Proceedings of IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2025.
- Samet Demir and Zafer Dogan. *Optimal Nonlinearities Improve Generalization Performance of Random Features*. In *Proceedings of the Asian Conference on Machine Learning (ACML)*, 2023.
- Samet Demir and Zafer Dogan. *Studying Generalization Performance of Random Feature Model through Equivalent Models*. In *Proceedings of the IEEE Signal Processing and Communications Applications Conference (SIU)*, 2024.
- Samet Demir, Hasan F. Eniser, Alper Sen. *DeepSmartFuzzer: Reward Guided Test Generation For Deep Learning*. In *Proceedings of the IJCAI 2020 Workshop on Artificial Intelligence Safety (AISafety 2020)*, 2020.

Preprints

- **Samet Demir** and Zafer Dogan. *Implicitly Normalized Online PCA: A Regularized Algorithm with Exact High-Dimensional Dynamics.* arXiv preprint, arXiv:2512.01231, 2025.
- **Samet Demir** and Zafer Dogan. *Optimal Attention Temperature Enhances In-Context Learning under Distribution Shift.* arXiv preprint, arXiv:2511.01292, 2025.
- **Samet Demir** and Zafer Dogan. *Random Features Outperform Linear Models: Effect of Strong Input-Label Correlation in Spiked Covariance Data.* arXiv preprint, arXiv:2409.20250, 2024.
- **Samet Demir**, Uras Mutlu, Ozgur Ozdemir. *Neural academic paper generation.* arXiv preprint, arXiv:1912.01982, 2019.

Research Experience

- **KUIS AI Research Center, Koc University** Sep 2020 – Present
Research Assistant (Advisor: Prof. Zafer Dogan)
- Research on high-dimensional learning theory, with emphasis on nonlinear feature learning
- **Dependable Systems Group, Bogazici University** Mar 2019 – Jul 2020
Undergraduate Research Assistant (Advisor: Prof. Alper Sen)
- Research on the robustness of deep learning and adversarial methods.
- **PILAB–SIGMA Research Group, Boğazici University** Sep 2018 – Jan 2019
Undergraduate Research Assistant (Advisor: Prof. A. Taylan Cemgil)
- Research on Turkish word embeddings with online matrix factorization

Teaching Experience

- **Introduction to Modern Learning Theory, Koc University** Sep 2025 – Present
Head Teaching Assistant (Instructor: Prof. Zafer Dogan)
- **Programming for Engineers, Koc University** Sep 2024 – Present
Head Teaching Assistant (Instructor: Prof. Zafer Dogan)
- **Algorithms & Complexity, Koc University** Sep 2023 – Jun 2024
Teaching Assistant (Instructor: Prof. Deniz Yuret)
- **Software Engineering, Koc University** Feb 2023 – Jun 2023
Teaching Assistant (Instructor: Prof. Attila Gursoy)
- **Programming with Python, Koc University** Sep 2022 – Jan 2023
Teaching Assistant (Instructor: Prof. Cigdem Gunduz Demir)
- **Computer Systems and Programming, Koc University** Sep 2020 – Jun 2022
Teaching Assistant (Instructor: Prof. Aykut Erdem)
- **Introduction to Computing, Bogazici University** Sep 2017 – Jan 2018
Undergraduate Teaching Assistant

Supervision Experience

- Supervising M.S. Students — two publications so far Spring 2025 – Present
Students: Oguzhan Gultekin, Onat Ure, Yigit Yildirim, Ilke Genc

Industry Experience

- Machine Learning and Artificial Intelligence Intern Jan 2019 – Mar 2019
armut.com
- Software Engineering and Business Analysis Intern Aug 2019 – Sep 2019
Intertech
- Software Engineering Intern Aug 2018 – Sep 2018
TUBITAK (The Scientific and Technological Research Council of Turkey)

Honors & Awards

- AI Fellowship Fall 2020-Present
KUIS AI Research Center
- Ph.D. Scholarship Fall 2020-Present
TUBITAK (The Scientific and Technological Research Council of Turkey)
- NeurIPS 2025 Scholar Award Fall 2025
Neural Information Processing Foundation
- ICLR 2025 Financial Assistance Award Spring 2025
International Conference on Learning Representations
- Travel Grant 2023, 2024, 2025
Graduate School of Sciences and Engineering, Koc University
- Teaching Assistant Award Fall 2024
Graduate School of Sciences and Engineering, Koc University
- Honor Certificate 2020
B.S., Computer Engineering, Bogazici University

Academic Service (Peer-Reviewing)

- International Conference on Learning Representations (ICLR) 2025, 2026
- Neural Information Processing Systems (NeurIPS) 2025
- Asian Conference on Machine Learning (ACML) 2024, 2025

References

- Zafer Dogan (Ph.D. Advisor) — Asst. Professor, Koc University zdogan@ku.edu.tr
- Alper T. Erdogan — Professor, Koc University alperdogan@ku.edu.tr
- Yucel Yemez — Professor, Koc University yyemez@ku.edu.tr