

# Samet Demir

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

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## Research Interests

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

## Education

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- **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

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### Peer-reviewed

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- **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

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- **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

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- **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

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- **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

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

## Industry Experience

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- **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

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- **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)

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

## References

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- **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