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