

Mohammad Mahdi Mirrashid

✉ amirmm379@gmail.com  Github  Personal Website

Education and Selected Courses

- 2019 – Ongoing | **Sharif University of Technology, Electrical Engineering - B.Sc.**
- Graduate Courses*
- Statistical Machine Learning (Differential Privacy, Interpretability, Bayesian Nonparametrics, PGMs)
 - High-Dimensional Probability Analysis (Concentration Inequalities, Covering/Packing Numbers, etc.)
 - Statistical Learning (Classical Machine Learning, Mathematical Foundations of Machine Learning)
 - Applied Stochastic Processes (Audited) (Markov Processes, Hitting Times, Monte Carlo Methods, etc.)
- Undergraduate Courses*
- Algorithms and Data Structures, Convex Optimization, Linear Algebra

Research Experience

Broad Research Interests: Applied Probability, Reliable and Secure Machine Learning, Theory of Deep Learning

- 2023 - Ongoing | **Graph Structural Shift - Research Assistant**
- Investigating the effect of homophily properties of graphs on domain adaptation techniques for graph neural networks. Wrote project code. [[Github](#)]
- 2023 - Ongoing | **Improving DP-SGD with Self-Supervision - Research Assistant**
- Proposed several ideas to improve upon DP-SGD (gradient and instance normalization, nearest centroids with self-supervised pretraining). Wrote project code. [[Github](#)]
- 2023 - Ongoing | **Revenue Maximization in The Bitcoin Lightning Network - Research Assistant**
- Helping develop a revenue optimization algorithm for the Bitcoin Lightning Network, as a multi-armed bandit problem with graph information.
- 2023 | **Self-Supervised Anomaly Detection - Independent Research**
- Proposed an approach utilizing self-supervised models such as DINO and developed a novel outlier threshold selection method. Wrote project code. [[Github](#)]
- 2022 - 2023 | **Transfer Learning for EEG Signal Classification - Research Assistant**
- Studied applications of transfer learning in EEG classification. Implemented papers and proposed novel ideas. Gave many presentations on the topic. [[Project Github](#)]
- 2022 - 2023 | **Speech Recognition for Farsi, Stable Diffusion with Persian Artstyle - Research Assistant**
- Fine-tuned deep speech recognition models such as the Conformer for Farsi. Worked on fine-tuning Stable Diffusion both language-wise (Farsi) and style-wise (Persian). [[Github](#)]

Teaching Experience

- 2022, 2023 | **Machine Learning Summer Workshop - Instructor**
Scientific Association of The Electrical Engineering Department at Sharif University
- Lecturer (2x) (60 participants at the 2023 workshop) [[2022](#), [2023](#)]
- 2021, 2022, 2023 | **Teaching Assistant**
- Privacy in Data Sciences (Graduate Course), EE Department
 - Introduction to Machine Learning (4x) - EE Department, IE Department [[Materials Example](#)]
 - Linear Algebra (Mathematical Methods in Engineering) - EE Department
 - Object-Oriented Programming (2x) (course project head, 200 students) - EE Department

Research Proposals

- 2023 | **3D Medical Image Segmentation with Segment Anything**
 - Proposed several research directions for automated and accurate 3D medical image segmentation with applications in radiotherapy. Helps and meets with students working on the projects.
- 2023 | **Architecture-Aware Deep Differential Privacy**
 - Proposed the idea of taking model architecture into account when designing DP mechanisms, by utilizing the dependence of backpropagation on gradient multiplications only.

Relevant School Projects

- 2022 | **SVM Implementation from Scratch - Convex Optimization**
 - Numpy implementation of an SVM classifier with interior-point optimization from scratch [[Github](#)]
- 2022 | **EEG Classification for Bistable Perception - Fundamentals of Neuroscience**
 - Classification of EEG when watching an optical illusion. Recorded data and trained deep classifier.

Skills

- Comfortable coding in Python, Matlab, C++, C, and Java
- Presentation of technical subjects to large audiences
- Team communication

Hobbies and Interests

- Wrote several simple games with an AI player
- Hosted and coordinated English free discussion sessions at Sharif University (3 years)
- Amateur pianist, writes little tunes sometimes