

Hooman Zolfaghari

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LinkedIn



GitHub



Website

Education

B.S in Computer Science at Sharif University of Technology

Courses of Interest Taken: (more information available on [website](#))

- **CS828: Machine learning:** A graduate-level ML course, learned topics from Theory, Classic Methods, Neural Networks, Unsupervised Learning, Boosting, RL etc.
- **CS635: Stochastic Processes:** An advanced probability course, studied Markov Chains, Gaussian Processes, Poisson Process, Martingales etc. [Final project](#) about “MCMC: Metropolis Hastings algorithm”.
- **EE841: High-dimensional Probability Analysis:** This is a graduate course where we study probabilistic methods and concentration inequalities in high-dimensional spaces, with applications in areas such as machine learning. I am currently studying this course.
- **CE718: Theory of Machine Learning:** This is a graduate course where we learn many of the mathematical concepts of today’s Machine Learning and Deep Learning. I am currently studying this course.
- Other courses: Statistical learning, Linear algebra, Game Theory, Databases, Data structures and Algorithms, Advanced programming, Probability Theory and its Applications, Statistics and its Applications, Operating Systems, Computer Networks, Principles of computer systems, Numerical Analysis

Research Experience

- *Research in **Graph Machine Learning** and **Geometric Deep Learning**, under supervision of [Dr.A.Rafiey](#) and [Dr.A.Vaezi](#):*

Here I had the opportunity to introduce many ideas and theoretical analysis, create theoretical proofs and conduct benchmark experiments. I studied concepts in Geometric Deep Learning and Graph NNs, Fractional Graph Theory, Optimization, Topology, High Dimensional Probabilistic Proofs and Analysis. Paper is in draft stage.

- *Research in **Vision and Computational Neuroscience**, under supervision of [Dr.H.Peyvandi](#):*

We are working on a Bayes-Markov model for Cortical Orientation Selectivity, which is based on Markov Random Fields and Bayesian Inference, in vision tasks, improving on and experimenting with the model.

Teaching Experience

- **EE120: Deep Generative Models**, [Dr. S. Amini](#), Fall 2024 :

This is a graduate course at the Electrical Engineering department at Sharif University of Technology. I am currently responsible for theoretical and practical exercises on Generative Flow Models. [Course Page](#).

- **CE477: Introduction to Machine Learning**, [Dr. A.Sharifi-Zarchi](#), Fall 2024 :

I am creating educational content on Multi-Modal, Self-Supervised and Contrastive DL, and course slides for Unsupervised Learning and Clustering. Course Page.

In the following courses I had many responsibilities like creating exercises, conducting workshops and TA classes, grading, creating projects, mentoring etc. details are available on my Website:

- *Algorithmic Creativity and Programming in Python, Dr. A.Sharifi-Zarchi, Summer 2023*
- *Computer Networks, Dr.H.Peyvandi, Spring 2024*
- *Operating Systems, Dr. A.Vaezi, Spring 2024*
- *Data structures and Algorithms, Dr. H.Mehrabiun, Spring 2024*
- *Advanced Programming, Dr. H.Boomeri, Spring 2024*

Skills

- **Theory:** Machine Learning Theory, Probability Theory, Geometric Deep Learning, Generative Deep Learning, Statistical Learning and Stochastic Processes. Also, Topology and Optimization at beginner level.
- **Programming Languages:** Python, C++, Java, C#, SQL, Assembly
- **Frameworks and Libraries:** PyTorch, PyG (PyTorch Geometric), CuPy, JAX, NumPy, Pandas, SciPy, Scikit-learn, CVXPY, ASP.NET Core
- **Tools:** Git, LaTeX, RabbitMQ, Docker
- **Techniques:** Deep Learning, Reinforcement Learning, Generative Models, Kolmogorov-Arnold Networks
- **Methodologies:** Agile, Scrum, Event-driven Programming, Concurrent Programming, Microservices

Activities

- Creating Generative Models with Kolmogorov-Arnold Networks (GitHub)
- Working on Robustness of KANs, such as Certified Robustness and Catastrophic Overfitting.
- Worked on Domain Adaptation with Graph NNs.
- CS236: Deep Generative Models, Stanford
- CS224W: Machine Learning with Graphs, Stanford
- Completed Neuromatch academy Deep Learning course (Certificate)
- Implemented Machine learning models and Techniques (GitHub)
- Neural Style Transfer project (GitHub)
- Implemented MCMC: Metropolis-Hastings algorithm (GitHub)
- Artificial Intelligence in Clinical Practice (Certificate)

Research Interests:

- Machine Learning Theory
- Generative Deep Learning
- Geometric Deep Learning
- Trustworthy ML
- Causal Inference