

SEPEHR AKBARI

EDUCATION	Department of CS & Mathematics, Lake Forest College <i>B.A. in Computer Science & Mathematics, minor in Data Science</i> • GPA: 4.0 • Coursework: computational algebraic geometry, tensor geometry, artificial intelligence, machine learning, computer vision, statistics, linear algebra, algorithms, numerical analysis, probabilities, bayesian methods, abstract mathematics, etc.	Lake Forest, IL 2023 - 2027 (<i>expected</i>)
RESEARCH INTERESTS	My current research interest is in the intersection of deep learning and combinatorial optimization. I am particularly interested in leveraging diverse architectures, ranging from reinforcement learning to computer vision, as tools to develop neural heuristics for NP-hard problems in mathematics and computer science.	
RESEARCH EXPERIENCE	Undergraduate Researcher Lake Forest College Utilizing Deep Learning to Predict Descriptors of Gröbner Bases and their Algorithmic Complexity Advisor: Prof. Jamshidi • Data generation of polynomial systems and their Gröbner bases using Macaulay2. • Complexity evaluation of Buchberger's algorithm using Set Transformers and Graph Neural Networks (GNNs). • Predicting the cardinality of reduced Gröbner bases with deep learning models and reinforcement learning.	2025.07 - Present
	Undergraduate Researcher Lake Forest College Quantifying Risk and Identifying Vulnerability Archetypes in Higher Education using Machine Learning and Bayesian Methods Advisor: Prof. Jamshidi • Bayesian hierarchical modeling (BHM) using Markov chain Monte Carlo (MCMC) to quantify risk of college closure based on state/region data. • Linear discriminant analysis (LDA), principal component analysis (PCA), and K-means clustering, paired with game theory methods (SHAP) and statistical inference to define vulnerability archetypes. • Statistical analysis of media narratives on college closures using latent dirichlet allocation (LDA). • Intensive data engineering, feature extraction, and dimensionality reduction.	2025.05 - 2025.8
	Research Assistant Lake Forest College Computer Vision Objectness-Based Data Augmentation Module using Deep Learning and Saliency Estimation Advisor: Prof. Banerji • Novel hybrid framework combining region proposal capabilities of regional convolutional neural networks (RCNN) with the saliency-based BING algorithm.	2025.04 - 2025.06

- High-performance orchestration in Go-lang, managing a Python-based Faster-RCNN (FRCNN) and C++-based BING implementation.
- Object filtering using non-maximum suppression (NMS), intersection over union (IoU), and saliency thresholds, to control model bias.
- Ultimately generating high quality training data of context-aware crops, to improve accuracy with limited data.

Undergraduate Researcher | Lake Forest College

2023.12 - 2024.06

Statistical Analysis on the Predictability of Pseudorandom Number Sequences Compared to Sequences Generated by Quantum Hardware

Advisor: Prof. Gard

- A novel statistical test suite for evaluating series of random numbers, using entropy, fast fourier transform (FFT), Chi-squared, Kolmogorov-Smirnov, serial, autocorrelation, etc.
- Quantum true random number generator (QRNG) using IBM Qiskit, and implementation of multiple pseudorandom number generators (PRNGs).
- Benchmarking and scoring system to compare the predictability of different sequences and corresponding generators. Formed into a work-in-progress Python and R package for public use.

Pre-Collegiate Researcher | MUWCI

2022.09 - 2023.04

Complexity Analysis of Re-Balancing Algorithms in Binary Search Trees

Supervisor: Amit Rastogi

- Complexity analysis of the re-balancing algorithm efficiency of a Splay Tree in comparison to an Adelson-Velskii and Landis (AVL) Tree upon value insertion and deletion.
- Underlying mechanisms of the trees like rotations, zig-zag, etc. were investigated and implemented in C, and tested in Java.

TEACHING

TA, Computer Vision & ML (CS 450), Instructor: Prof. Banerji	Spring 2026
TA, Artificial Intelligence (CS 325), Instructor: Prof. Jamshidi	Spring 2026
TA, Linear Algebra (MA 231), Instructor: Prof. Jamshidi	Spring 2026
TA, Abstract & Discrete Math (MA 230), Instructor: Prof. Bousquet	Spring 2026
Grader, Bayesian Comput. Statistics (MA 574), Instructor: Prof. Jamshidi	Fall 2025
TA, Data Structures & Algorithms (CS 317), Instructor: Prof. Banerji	Fall 2025
TA, Machine Learning (CS 250), Instructor: Prof. Bousquet	Fall 2025
TA, Statistical Programming (MA 250), Instructor: Prof. Gard	Fall 2025
TA, Abstract & Discrete Math (MA 230), Instructor: Prof. Jamshidi	Fall 2025
TA, Probability & Statistics (MA 150), Instructor: Prof. Nguyen	Summer 2025
TA, Computational Math (MA 240), Instructor: Prof. Jamshidi	Spring 2025
TA, Computer Science I (CS 112), Instructor: Prof. Nguyen	Spring 2025
TA, Web Development (CS 107), Instructor: Prof. Nguyen	Spring 2025
TA, Computer Science I (CS 112), Instructor: Prof. Nguyen	Fall 2024
TA, Computer Science I (CS 112), Instructor: Prof. Mirza	Spring 2024

INDUSTRY WORK	SWE @ Applied Data Center Lake Forest, IL	2025.07 - Present
	<ul style="list-style-type: none"> Develop full internal processing and analysis tools. 	
	SWE Intern @ TenacityAI Chicago, IL	2024.05 - 2024.08
	<ul style="list-style-type: none"> App development with React Native. Authorization flow with Supabase and Postgres. LLM chatbot integration. 	
	SWE Intern @ Elite Engineering Solution Tehran, Iran	2023.05 - 2023.08
	<ul style="list-style-type: none"> Database migration from MySQL to MongoDB. Focus on query and index optimization, enhancing system radically. Internal tool development with new Java Swing API endpoints development. 	
	SWE Intern @ Lavan Energy Tehran, Iran	2022.06 - 2022.08
	<ul style="list-style-type: none"> Build RESTful API flow from scratch, focusing on data applications. Frontend with Express, Node, and React. Deployment via AWS. 	
AWARDS AND HONORS	<ul style="list-style-type: none"> Emma O. Haas Merit Award, Best overall academic record in Class of 27 	2025
	<ul style="list-style-type: none"> Dean's List, Merit award in recognition of overall GPA 	2023, 2024
	<ul style="list-style-type: none"> Presidential Scholarship, Merit-based scholarship 	2023
	<ul style="list-style-type: none"> Davis Scholar, United World College Davis scholarship recipient 	2023
SKILLS	Programming	
	Python, PyTorch, CUDA, NumPy, scikit-learn/vision, OpenCV, TensorFlow, Julia, R, Macaulay2, Singular, PyMC3	
	C/C++, Java, SQL, Web/App development, JS/TS, Git, LaTeX	
	Languages	
	English (<i>native</i>), Persian/Farsi (<i>native</i>), German (<i>limited proficiency</i>)	
SERVICE	President , Computer Science Club @ LFC	2024 - Present
	Academic Advisory Committee , Math/CS Dept. @ LFC	2024 - Present
	Technical Coach , Salaam Schools Robotics Competition	2023 - 2024