Ali Taghibakhshi

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EDUCATION

University of Illinois at Urbana-Champaign (UIUC) Aug. 2019 – Aug. 2023

Ph.D., Scientific Machine Learning

- **Advisors**: Matthew West (ME), Luke Olson (CS)
- **Coursework**: Statistical Reinforcement Learning, Iterative Methods and Multigrid, MDP and Reinforcement Learning, Mathematical Methods, Stochastic Process, Statistics and Probability, Random Process, Scientific Machine Learning
- **GPA**: 3.98 out of 4

Sharif University of Technology Sep. 2015 – Jun 2019

B.Sc. in Mechanical Engineering

- **GPA**: 3.91 out of 4

RESEARCH AND INTERNSHIP EXPERIENCE

NVIDIA May 2022 – Aug. 2022

Deep Learning Algorithms Intern

- Developed a new hierarchical GNN for entity resolution for a large cybersecurity dataset (million nodes and billion edges). The method improved state-of-the-art by 5%, and NVIDIA submitted a U.S. patent for the invention. Presented this work at an NVIDIA main event held by the vice president of deep learning (Click for more information).

John Deere May 2020 – May 2022

Machine Learning Intern

- **2020:** Fully automated John Deere robot mower for local navigation and accurate docking using reinforcement learning and computer vision (Click for more information). Applied the developed method to the John Deere fairway mower for AI-assisted parking.
- **2021:** Developed a computer vision-based precision planting and optimized mowing using dynamic scene shape reconstruction and semantic segmentation.

University of Illinois at Urbana-Champaign Sep. 2019 – Present

Graduate Assistant

- Working on unsupervised and reinforcement learning methods for algebraic multigrid algorithms (iterative partial differential equation solvers) utilizing graph convolutional neural networks.
- Optimization-Based Algebraic Multigrid Coarsening Using Reinforcement Learning (Published at NeurIPS 2021, code is available here.)
- Learning Interface Conditions in Domain Decomposition Solvers (Published at NeurIPS 2022, code is available here)
- Learning Multilevel Domain Decomposition using Hierarchical Graph Neural Networks (Accepted at ICML 2023, code is available here.)
  All other research papers are available on my Google Scholar account, and all code repositories are on my GitHub account.

Sharif University Jan. 2018 – Jun 2019

Research Assistant

- Simulated molecular systems and analyzed the physical movements of atoms and molecules using Molecular Dynamics and Monte Carlo simulations utilizing MATLAB, LAMMPS, NAMD, and VMD, (published paper link here).
- Developed a partial differential equation model for approximating 3D tumor growth in a microfluidic culture system using COMSOL Multiphisics (published paper link here).

Young Scholars Club Jun. 2013 – Sep. 2014

Mathematical Olympiad

- **2014** Silver medalist at 32nd Iranian National Mathematical Olympiad.
- **2014** Bronze medalist at 1st Geometry Olympiad.
- **2013** Silver medalist at 31st Iranian National Mathematical Olympiad.

HONORS AND AWARDS

- **2022:** The machine learning method I developed at NVIDIA was noted as one of the main quarterly highlights in the whole deep learning team at NVIDIA, and was presented to the NVIDIA vice president of deep learning. U.S. patent for this invention is submitted by NVIDIA. We also prepared a paper for this method (Link to paper).
- **2020:** Top technical innovation at UIUC research park (top 3 among about 840 interns) for developing fully AI-assisted docking for John Deere robot mower (Link to paper).
- **2019:** UIUC MechSE Distinguished Fellowship Award.
- **2019:** Ranked 2nd among more than 120 bachelor students in the Mechanical Engineering School of Sharif University of Technology, the best engineering school in Iran.
- **2016-2017-2018:** Annual Mechanical Engineering Elite Student Award in three consecutive years among more than 120 mechanical engineering students at Sharif University of Technology.
- **2013-2014:** Silver medalist at 32nd and 31st Iranian National Mathematical Olympiad, Bronze medalist at 1st Geometry Olympiad.
- **2013:** Became a member of the Young Scholars Club (YSC) and Iran's National Elite Foundation (INEF) due to exceptional performance at 31st Iran's National Mathematical Olympiad.

PROGRAMMING AND SKILLS

Language : Python, Matlab, C/C++, CUDA, R, Shell, TCL
Operating systems : Linux, macOS, Microsoft Windows
Scientific libraries : PyTorch, DGL, PyG, OpenCV, Keras/Tensorflow, Numpy, Scipy, Pandas, Scikit-Learn, PyAMG
Technical tools : Git, bash, Slurm, Docker
Documentation : LaTex, Beamer, Microsoft Office, Keynote
Skills : Graph Neural Networks, Iterative Solvers, Reinforcement Learning, Unsupervised Learning, Linear Algebra, Computer Vision (Semantic Segmentation, Object Detection), Parallel Programming, Combinatorial Optimization