Saba Heidari Gheshlaghi

Milwaukee, WI | heidari.sabaa@gmail.com | +1 301 919 8519 | saba-heidari.github.io/
linkedin.com/saba-heidari | github.com/Saba-Heidari

Summary Statement

PhD Candidate in Computer Science with over 7 years of experience specializing in machine vision and machine learning models for medical imaging applications. Expertise encompasses generative models, adversarial robustness, classification, and segmentation, along with a strong background in supervised, semi-supervised, and unsupervised learning techniques. Demonstrated ability to analyze data and leverage advanced machine learning and statistical methodologies to drive innovation and identify opportunities for accelerating business growth.

Technical Skills

- **Programming Languages:** Python, Matlab, C++, R
- **Tools and Platforms:** Linux/Unix, Visual Studio, Jupyter Notebooks, Anaconda, Amazon Web Services (AWS)
- **Machine/Deep Learning Libraries:** PyTorch, OpenCV, TensorFlow, Keras, scikit-learn, Torchvision, PyTorch_geometric, MONAI, fastai

Education

Marquette University, Doctor of Philosophy (Ph.D.) in Computer Science — Sept 2020 – May 2025

Amirkabir University of Technology (Tehran Polytechnic), Master of Science in Electrical Engineering — Sept 2015 – May 2018

Shahid Rajaee Teacher Training University, Bachelor of Science in Electrical Engineering — Sept 2010 – May 2015

Experience

Graduate Research Assistant, Machine Learning, Optimization and Data Lab (MODLab Lab), Marquette University – Milwaukee, WI — May 2022 – Now

- Conducted advanced research on adversarial attacks and robustness in graph neural networks (GNNs), developing methods to enhance model security and reliability.
- Implemented uncertainty estimation techniques in deep learning models to quantify prediction confidence, improving model interpretability and trustworthiness in medical imaging applications.
- Enhanced robustness and data augmentation strategies for GNNs and whole slide images (WSIs), including stain normalization, to optimize performance and generalization in computational pathology.
- Conducted computerized indexing of medical terminology for detecting and classifying human diseases using natural language processing (NLP) and large language models (LLM) such as BERT and ClinicalBERT, improving the efficiency and accuracy of medical text analysis.

Graduate Research Assistant, Machine Learning and Image Processing (MLIP) Lab, Marquette University – Milwaukee, WI — August 2020 – May 2022

- Developed deep learning algorithms to predict breast cancer tumor sub-types, enhancing diagnostic accuracy and supporting personalized treatment strategies.
- Built state-of-the-art Generative Adversarial Networks (GANs) to generate synthetic medical images, overcoming challenges related to limited access to medical imaging data.
- Enhanced reproductive organ segmentation for pediatric CT organ dose estimation by developing both 2D and 3D deep learning models, improving precision in radiation dose calculations.
- Applied a wide range of statistical and machine learning techniques—including regression analysis, clustering, decision trees, ensemble methods, convolutional neural networks (CNNs), and long short-term memory (LSTM) networks—to solve complex problems in medical imaging.

Graduate Research Assistant, Rockefeller Neuroscience Institute, West Virginia University – Morgantown, WV August 2019 – August 2020

- Designed and developed a state-of-the-art Neural Architecture Search (NAS) framework for segmenting retinal layers in OCT scans, enhancing segmentation accuracy and efficiency.
- Developed Super-Resolution Generative Adversarial Networks (SRGANs) to improve low-quality and noisy images, resulting in clearer medical images for better diagnostic analysis.

Developer Engineer, Information Technology Architects Company (ITA) – Tehran, Iran February 2015 – August 2019

- Worked in the R&D department focusing on Building Management Systems (BMS), Intelligent Tunnel Systems (ITS), and Supervisory Control and Data Acquisition (SCADA), enhancing system efficiency and reliability.
- Programmed Remote Terminal Units (RTUs) and developed Programmable Logic Controller (PLC) programs to automate and optimize industrial processes.

Graduate Research Assistant, Computational Intelligence and Large Scale Systems Research Lab, Amirkabir University of Technology – Tehran, Iran August 2016 – February 2018

- Developed machine learning algorithms to detect multiple sclerosis lesions, enhancing early diagnosis and treatment planning.
- Applied statistical and machine learning techniques—including fuzzy C-means clustering, Support Vector Machines (SVMs), and XGBoost—to effectively analyze medical imaging data.

Publications

Age encoded adversarial learning for pediatric CT segmentation, Bioengineering 2024
Saba Heidari Gheshlaghi, Chi Nok Enoch Kan, Taly Gilat Schmidt, Dong Hye Ye

Adversary-Robust Graph-Based Learning of WSIs, Under Review 2024
Saba Heidari Gheshlaghi, Milan Aryal, Nasim Yahyasoltani, Masoud Ganji

Explainability-Based Adversarial Attack on Graphs Through Edge Perturbation, Under Review 2024
Dibaloke Chanda, **Saba Heidari Gheshlaghi**, Nasim Yahyasoltani

Robust and transferable graph neural networks for medical images, 2023
International Conference on Machine Learning and Applications (ICMLA)
Saba Heidari Gheshlaghi, Nasim Yahyasoltani

Artifact-Robust Graph-Based Learning in Digital Pathology, Under Review 2023
Saba Heidari Gheshlaghi, Milan Aryal, Nasim Yahyasoltani, Masoud Ganji

Deep learning for breast cancer classification of deep ultraviolet fluorescence images toward intra-operative margin assessment, IEEE engineering in medicine & biology society (EMBC) 2022
Tyrell To, ***Saba Heidari Gheshlaghi***, Dong Hye Ye

Breast cancer histopathological image classification with adversarial image synthesis, IEEE engineering in medicine & biology society (EMBC) 2021
Saba Heidari Gheshlaghi, Chi Nok Enoch Kan, Dong Hye Ye

OCT Image Segmentation Using Neural Architecture Search and SRGAN, 2021
International Conference on Pattern Recognition (ICPR)
Omid Dehzangi, ***Saba Heidari Gheshlaghi***, Annahita Amireskandari,
Nasser M. Nasrabadi, Ali Rezai

Efficient OCT Image Segmentation Using Neural Architecture Search, IEEE 2020
International conference on image processing (ICIP)
Saba Heidari Gheshlaghi, Omid Dehzangi, Ali Dabouei, Annahita Amireskandari,
Ali Rezai, Nasser M. Nasrabadi

A superpixel segmentation based technique for multiple sclerosis lesion detection, Arxiv Submission 2019
Saba Heidari Gheshlaghi, Amin Ranjbar, Amir Abolfazl Suratgar, Mohammad Bagher Menhaj, Fardin Faraji

Multiple Sclerosis Diagnosis with Fuzzy CMeans, Computer Science & Information Technology (CS & IT) 2018
Saba Heidari Gheshlaghi, Abolfazl Madani, Amir Abolfazl Suratgar, Fardin Faraji

Achievements

- Awarded NMDSI Student Research Scholar for Summer 2024 for the Robust Classification of Whole Slide Images project.
- Top 10 Finalist status in the Spring 2024 Three Minute Thesis (3MT) Competition at Marquette University.