Amirhossein Safari

M.Sc. Student, Seeking Ph.D. Position in Computer Science

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Research Interests

- Applied ML/DL
- Protain and Gen analysis
- Optimizing Energy Consumption of IoT Devices
- Sensors Signal Processing
- Semantic Analysis (Natural Language Processing)
- Object detection (Computer Vision)

Education

The Institute for Advanced Studies in Basic Sciences (IASBS) **Sep. 2022 – Now**

Master's in Artificial Intelligence *Zanjan, Zanjan, Iran*

- GPA – **4/4 (Rank 3rd)**

University of Zanjan **Sep. 2018 – Sep. 2022**

Bachelor of Science in Computer Engineering *Zanjan, Zanjan, Iran*

- GPA – **3.54/4 (Rank 5th out of 60)**

Technical Skills

Data Analysis

- **Scripting**: Python, MATLAB, C/C++, Java, JavaScript, SQL, ORMs, Bash, V.
- **Methods**: Deep Neural Networks, Regression, Clustering, PCA, Exploratory Data Analysis (EDA).
- **Visualization**: Matplotlib, Seaborn.
- **Environment**: VS Code, Vim, , Google Cloud Platform, Jupyter Notebook, Git/Github, Atom, Eclipse, Docker.
- **Database**: MySQL, PostgreSQL, MongoDB, Redis, Firebase, NoSQL, RabbitMQ, ORMs.

Machine Learning & Deep Learning

- **Methods**: Logistic Regression, DecisionTree, RandomForest, SVM, XGBoost, CNN, LSTM, Transformers, LLMs.
- **Library**: Sklearn, Tensorflow, PyTorch, Numpy, Pandas.

Hardware Programming

- **Scripting**: C, Assembly, Verilog, AVR Microprocessor Programming.
- **Environment**: AVR Studio, Quartus, Proteus.
- **Devices**: Arduino, Raspberry PI.

Machine-to-Machine Communication

- Socket Programming
- MQTT Protocol: Mosquitto
- Protocol Implemenation

Front-End

- HTML/CSS, XML, JSON, JavaScript, Angular.js, React.js, Redux, Vue.js, Nuxt.js, Redux.js, Rxjs.

Back-End

- Django, Nodejs, Next.js.

Operating Systems

- Linux (Linux System Administrator: LPIC 101), Windows.

Graphics Tools: Photoshop, Figma.

General: Microsoft Office, LaTeX.

Soft Skills: Leadership, Time management, Teamwork, Problem solving, Critical thinking.

Honors and Awards

- DeepLearning.AI Certification in Structuring Machine Learning Projects. **2024**
- Founder and Lead Designer of Computer Science Seminars in the CS Department. **2024**
- DeepLearning.AI Certification in Improving Deep Neural Networks: Hyperparameter Tuning and Optimization. **2024**
- DeepLearning.AI Certification in Neural Networks and Deep Learning. **2024**
- Stanford University Online Certification in Unsupervised Learning, Recommenders, Reinforcement Learning. **2024**
- Stanford University Online Certification in Advanced Learning Algorithms. **2024**
- Completed the 4-day 9th Winter Seminar Series at Sharif University, focusing on advanced topics in AI & CS. **2023**
- Workshop attended: The 5th NOAA Workshop on Leveraging AI in Environmental Sciences. **2023**
- Representative of the Computer Science Department - The 24th Research and Technology Week Exhibition. **2023**

- Stanford University Online Certification in Supervised Machine Learning: Regression and Classification. **2023**
- Certificate of Kaggle's Intermediate Machine Learning course. **2023**
- Certificate of Kaggle's Intro to Machine Learning course. **2023**
- Prequalified for the AWS AI and ML scholarship in AWS DeepRacer Student (Reinforcement Learning). **2023**
- Harvard University CS50W Certification: Web Programming with Python and JavaScript. **2022**
- Completed CSW's Three-Day Seminar Series. **2022**
- Certification in Complete React JS Web Development with ES6 Bootcamp. **2020**
- Ranked top 6% in the national Rahnema College competition out of 2500 participants. **2019**
- Qualified in the Mathematical Olympiad, First Round (PRMO). **2014**

Publications

"Evaluation of Efficient Electrocardiomatrix-based Identification Using Deep Learning Methods"

Authors: Amirhossein Safari, Narges Mokhtari, Mohsen Hooshmand, Sadegh Sadeghi, Peyman Pahlevani

Conference: The 14th International Conference on Computer and Knowledge Engineering (ICCKE), 2024

Status: Accepted

Link: Coming soon! (will be published by IEEE)

Implementation link: View Code (private for now)

"Practical Security Analysis and Attack Strategies on Permutation Functions used in IoT Supply Chain Systems"

Authors: Narges Mokhtari, Amirhossein Safari, Sadegh Sadeghi, Nasour Bagheri, Samad Rostampour, Ygal Bendavid

Journals: Wireless Networks: The Journal of Mobile Communication, Computation and Information, 2024

Status: Under Review

Link: Coming soon!

Implementation link: View Code (private for now)

"An overview of secure authentication methods using ECG biometrics with deep learning algorithms"

Authors: Narges Mokhtari, Amirhossein Safari, Sadegh Sadeghi

Journals: Biannual Journal Monadi for Cyberspace Security (AFTA), 2023

Status: Published (in Farsi)

Link: http://monadi.isc.org.ir/article-1-263-en.html

Implementation link: View Code

Work in Progress

Project Title: ***"Improving access control for implantable medical devices using deep learning approaches."***

Description: Introducing a distance-bounding protocol using ECG signals and deep learning to authenticate implantable medical device (IMD) owners and thwart replay attacks.

Project Title: ***"Revealing the vulnerabilities and unreliability of authentication systems relying on Physically Unclonable Functions (PUFs) through targeted machine learning attacks."***

Description: Applying diverse machine learning and deep learning models to PUF datasets to identify vulnerabilities in the underlying concepts.

Project Title: ***"Efficient Sequence Feature Embedding for Genomic and Protein Analysis in Classifying Healthy and Patient Users, and Identifying Causative Genes Using Machine Learning and Deep Learning."***

Description: Developing sequence graph-based embeddings to capture dependencies in genomic and protein sequences, aiming to classify healthy and patient users and identify causative genes using machine learning and deep learning techniques.

Project Title: ***"Bridge failure detection at Karun's Bridge in Iran during reconstruction using sensor data and deep learning approaches."***

Description: Utilizing sensor data from Karun's Bridge in Iran during pre-construction, construction, and post-construction phases to train deep learning models, identifying the optimal time for detecting potential bridge failures.

Research Experience

Graduate Research

Wireless Communication Networks Laboratory **December 2022 - Now**

***Supervisors*:** Dr. Payman Pahlevani, Dr. Sadegh Sadeghi, Dr. Mohsen Hooshmand, Dr. Nasour Bagheri

***Broad Research Area*:** Privacy preservation in systems

***Specific Research Focus*:** Enhancing the privacy of implantable medical devices (IMDs) using energy-efficient deep learning methods.

***Thesis Title*:** "Improving access control for implantable medical devices using deep learning approaches."

***Thesis Approach*:** Introducing a distance-bounding protocol using electrocardiogram (ECG) signals and deep learning models to authenticate implantable medical device (IMD) owners and prevent replay attacks.

***Additional Research Areas*:** Efficient authentication using ECG signals, Deduplication of data in servers and warehouses, Communication of IoT devices, Privacy checking of Physically Unclonable Functions (PUFs), Energy consumption of IoT devices, Bridge failure detection based on different stages of reconstruction.

***Technical Skills*:** Tensorflow, PyTorch, Sklearn, Signal processing, Python, Socket programming, Micro controller programming.

***Implementation links*:** (Some of the links are private for now!)

Undergraduate Research

Database Laboratory **April 2022 - September 2022**

***Supervisors*:** Dr. Saeed Rahmani

***Broad Research Area*:** Natural Language Processing, Data Science

***Specific Research Focus*:** Categorical analysis of news.

***Project Title*:** Rooznegar, an online news survey

***Project Approach*:** Collected news from multiple Iranian websites using Beautiful Soup and Scrapy, cleaned and preprocessed the text, developed an SVM model to categorize the news, and presented the categorized content in a unified format.

***Technical Skills*:** Python, Sklearn, Pandas

***Implementation links*:**

Teaching Experience

Institute for Advanced Studies in Basic Sciences (IASBS)

Teaching Assistant **Fall 2022**

Course: Artificial Neural Networks

Professor: Dr. Mahdi Vasighi

Responsibilities: Conducted monthly classes, assisted in grading students' assignments and projects, and held office hours to provide additional support.

University of Zanjan

Teaching Assistant **Winter 2022**

Course: Databases

Professor: Dr. Saeed Rahmani

Responsibilities: Graded assignments and provided support to students in implementing their assignments and projects.

Course Projects

Graduate Projects

DL projects | *Pytorch, Sklearn, Pandas, Google Colab* **April 2023**

- Developed and implemented Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) networks to predict stock market trends, optimizing performance through advanced time-series analysis and predictive modeling techniques.
- Designed an autoencoder architecture (encoder & decoder) and successfully applied it to the MNIST dataset for dimensionality reduction and feature extraction.
- Designed and implemented Generative Adversarial Networks (GAN) architecture, specifically focusing on both the Generator and Discriminator components, and applied it to the MNIST dataset using varied learning rates to enhance model performance.
- Provided a comprehensive explanation and analysis of Wasserstein GANs (WGAN) to prevent mode collapsing and improve training stability and convergence.
- Implemented the architecture of Transformer models, focusing on their capacity for sequence modeling and self-attention mechanisms, furthering their application in a range of deep learning tasks.

ML projects | *Sklearn, Pandas, Google Colab* **January 2023**

- Implemented Logistic Regression on imbalanced Cifar10, Mnist, and Iris datasets in both two-class and multi-class contexts. Explored strategies, including class weighting, minority class oversampling, and ensemble methods, to address data imbalance. Provided concise explanations for each approach, highlighting their respective advantages and disadvantages.
- Implemented Naive Bayes, GaussianNB, and SVM models on the MNIST dataset. Explored SVM with various kernels, along with multiclass approaches like one-vs-one and one-vs-all, reporting the final accuracy achieved for each of the approaches.
- Applied weighted logistic regression for data classification, including parameter tuning for improved accuracy.
- Implemented the Gradient Descent algorithm and validated its efficacy by optimizing parameters on sinusoidal data
- Applied linear regression to data extracted from a sinusoidal function, effectively modeling the underlying pattern for insightful analysis and pattern recognition.

ANN projects | *MATLAB* **November 2022**

- Developed various Artificial Neural Networks using different algorithms, like Perceptron Learning Rule, Delta Learning Rule, Multilayer Perceptron, Backpropagation Learning, Radial Basis Function Networks (RBFN), and Self-Organizing Maps (SOMs), to solve tasks like classification and clustering.

Probabilistic Graphical Model (PGM) | *Probabilistic graphs, Pandas, Jupeter notebook, Sklearn* **November 2022**

- Developed a probabilistic graphical model to identify optimal gene interaction networks.
- Applied the Metropolis-Hastings algorithm to explore graph structures and maximize likelihood.
- Evaluated model convergence using maximum likelihood.

Advanced data mining projects | *Pandas, Google Colab, Sklearn* **November 2022**

- Calculated similarities of two dataset features to see their dependency on each other.
- Predicted values of a feature in a dataset by using decision tree Random forest models in the sklearn library as the course's final project.

Advanced python projects | *Python, Pandas, Google Colab, Matplotlib* **November 2022**

- Analysed data from Iran's Electricity Industry Company (IGMC) to calculate how much the share of governmental companies' usage of electricity is and then plotted the graph of that usage in a figure.
- Solved python questions in Quera (a website like Leet code which provides algorithm questions).

Undergraduate Projects

Rooznegar, an online news survey (NLP) | *Sklearn, Google Colab, Django, Python, Vue.js, Scrapy* **October 2022**

- Developed a News survey of multiple Iranian news websites using Django and Vue.js.
- Used SVM classifier as our news classifier, which has been developed in the Google Colab platform.
- Used Scrapy and beautiful soup as the web data extractor.

Task manager | *PHP* **December 2021**

- Developed a simple task manager in PHP for the Internet engineering course.
- Implemented to search Asynchronously.

Micro controller project | *C, Micro controllers* **November 2021**

- Developed projects in C, working with microcontrollers for the microcontrollers course.
- If we want to mention some of the projects, we can mention making a calculator, flashing LEDs, and creating communication of two chips to display the temperature and potential of some sensors.
- Implemented in Code vision and Proteus environments.

Game theory projects | *Google colab, deep learning* **January 2022**

- Developed projects in google colab environment for deep learning course.
- Projects are calculating confusion of MNIST dataset with CNN (convolutional neural network), using neural network for forecasting ETH (Ethereum) price and LSTM (Long Short Term Memory) implementation.

Traffic Sign Detection (AI) | *Python, Google Colab* **April 2021**

- Developed a network using YOLO V5 in Python Language.
- Implemented in Google Colab platform.
- Collected images for creating a dataset and annotated the images by LabelImg to detect ten various driving signs.

Comparison of Different Local Search Algorithms | *Artificial Intelligence, Python* **December 2020**

- Solved Timing Interval Units Recovery problem in a group of two, using different local search algorithms involved: Hill Climbing, Simulated Annealing, Genetic Algorithm.
- Compared mentioned algorithms' performance through a plot.

Compiler for Small-Lang | *Python, PLY* **December 2020**

- Developed a compiler for small-lang language in a group of 3, which can operate three stages of lexical analysis(with and without using tools), syntactic analysis, and generating middle code.
- Used PLY library for implementing Lexer(lexical analysis) and Yacc(syntactic analysis).

MIPS Cache-Simulator| *Python* **June 2020**

- MIPS cache simulator, which supports different structures and replacement policies.
- Used python to implement the MIPS cache simulator and support structures.

Huffman and Traveling Salesman | *Python, Algorithms* **May 2020**

- Implemented Huffman and Traveling salesman algorithm.
- Used python to implement algorithms and support structures.

Managing university project | *Java, JavaFx, Scene builder* **July 2019**

- Developed an app to manage taking courses by students, creating courses by professors, and managing staff by manager of the university.
- Used Java for the core logic of the project.
- Used JavaFX and scene builder for the UI of the project.

Download manager | *Java* **June 2019**

- Developed a custom download manager which can download a webpage and webpages whose URLs of them are in previous webpage in any depth that the user wants.
- Used Java for the core logic of the project.
- Developed with parallel multi-core processing technology.

Other Projects

React task manager | *React, Javascript* **February 2021**

- Developed a task manager in which one can get, add, and delete tasks using React.

Twitter app | *Django, Python, Javascript* **December 2020**

- Developed a Twitter-like social network website, in which a user can make and edit his posts, following users and like/unlike posts, using Django and Javascript.

Email app | *Django, Python, Javascript* **December 2020**

- Developed an Email app that a user can send, view, reply to, and archive/unarchive emails in his mailbox using Django and Javascript

Ecommerce website | *Django, Python, Javascript* **November 2020**

- Developed an e-commerce website in which users can make an auction to sell goods, bid on that stuff, and win by offering the highest bid (the owner of the auction can close the auction), using Django and Javascript.

10 projects of React Bootcamp | *React, Firebase, Ath0* **October 2020**

- Developed ten projects of Complete React JS web developer with ES6 Bootcamp course.
- Developed projects using Google Firebase, Ath0.

Wikipedia | *Django, Python* **October 2020**
- Developed an encyclopedia, like Wikipedia, using Django.
- Implemented pages of encyclopedia using Python-markdown2

Google search interface | *HTML, CSS* **April 2020**
- Developed interfaces for google search, google image, and advanced google search pages.

Four-In-A-Row Game | *ReactJS, Javascript* **September 2019**
- Developed a Four-In-A-Row game using ReactJS.

Simple Car-Shopping-App | *ReactJS, Javascript* **September 2019**
- Developed a simple car shopping app using ReactJS and Javascript.

Testing | *Travis, Django* **October, 2019**
- Designed a simple Django flight app using Travis, so any time there is a push in the code on GitHub, some prebuild tests will be run automatically.

Which Cafe? | *Angular-CLI, SCSS, Typescript* **October, 2019**
- Developed a static website showing information about different cafes using Angular-CLI, Typescript, and SCSS.

Tesla's rodster website | *HTML, CSS, Bulma, Responsive website* **August, 2019**
- Developed a responsive website showing information about the Tesla Roadster car using Bulma.

Working Experience

Freelancer **May 2019 – Now**
Front End Developer *Abhar, Zanjan, Iran*
- Designed and Developed several web apps using Angularjs, Reactjs, Vue.js, and Django Frameworks.
- Experienced using various databases, such as MongoDB, Mysql, Microsoft SQL Server, and SQLite.
- Experienced working with multiple Linux distributions like Ubuntu and Debian.
- Worked with Google Firebase to manage user-inputted data across multiple platforms, including web and mobile apps.
- Collaborated with team members using version control systems such as Git to organize modifications and assign tasks.

Sanay Company **November 2019 – December 2019**
Frontend Developer *Zanjan, Zanjan, Iran*
- Developed UI for several static websites.
- Designed the Structure of logic of 2 projects.
- 1. Dong
- A financial app for calculating every person's share during a hang-out group meeting.
- 2. Trello like app
- An app like Trello to manage the tasks of a person or a group.
- Quited because of covid-19 pandemic.

Languages

Persian: Native
Azarbaijani: Native
English: Fluent

Test of English as a Foreign Language (TOEFL) **January 2022**
- Reading – **23** Listening – **24** Speaking – **22** Writing – **21**
- **Overall** – **90**
- Expired – I will sign up for new one soon!

References

Name	Email	Website
Dr. Mohsen Hooshmand	mohsen.hooshmand@iasbs.ac.ir	Website
Dr. Sadegh Sadeghi	s.sadeghi@iasbs.ac.ir	Website
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