Fateme Zahra **Bakhshande**

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Education

Iran University of Science and Technology (IUST) *Tehran, Iran*

B.Sc. in Computer Engineering *Sep. 2019 - Present*

- **Ranked 4th best university in Iran based on 2024 QS Ranking (World Rank: 451)**
- **GPA (Last two years, 64 units): 19.42/20** (4/4)
- **GPA (up to now, 139 units): 18.74/20** (3.86/4)
- Supervisor: Prof. Sauleh Eetemadi

Research Interests

- Computer Vision / Image Processing
- Machine Learning and Applications
- Deep Learning
- Vision-Language Multi-modalities

Research Experiences

IUST Natural Language Processing Laboratory *Tehran, Iran*

Deep Learning and Multimodal Research Assistant - Supervisor: Dr. Sauleh Etemadi *Jul. 2022 - Present*

- Started as an intern, gaining hands-on experience in machine learning, deep learning, and **implementing networks from scratch**.
- Explored **VQA** tasks through in-depth study of research papers, engaging in **multimodal** research with textual and visual data.
- Currently contributing to the "SEMEVAL 2024 TASK 4: **Multilingual Detection of Persuasion Techniques in Memes"** project, specializing in multilabel classification and multimodal data analysis (text and images).
- Applying **transformers** and attention mechanisms, experimenting with model architectures like **Double Visual Textual Transformer**, **Visual-Bert**, and **MultiModal BiTransformers** for advanced multimodal fusion in persuasion technique detection.

IUST Computer Vision Laboratory *Tehran, Iran*

Computer Vision Research Assistant - Supervisor: Dr. Mohammad Reza Mohammadi *May. 2023 - Aug. 2023*

- Conducted research in computer vision, focusing on **image segmentation**, **Siamese networks**, and **one-shot object detection**.
- Developed a **Siamese U-Net** segmentation model for **crack detection**, optimizing training with weighted binary cross-entropy and **dice loss** functions, and evaluating using **dice coefficient**, **IoU**, precision, and recall metrics. [GitHub]
- Collaborated with **real-world** tiles and patterns datasets to discern discrepancies, ensuring its applicability to practical scenarios.
- Applied **image processing** techniques including edge detection, polygon extraction, ORB keypoint-based matching, histogram matching, and perspective transformation.

Selected Academic Projects

Deep / Machine Learning

- **Predicting COVID-19 From Chest X-Ray Images** [GitHub]
  - Utilized image pre-processing and diverse data augmentations for accurate COVID-19 prediction.
  - Fine-tuned Squeeze-Net using PyTorch for medical image analysis
- **Malware Detection** [GitHub]
  - Trained multiple deep models to classify malware vs. benign samples in a dataset.
  - Improved accuracy with Gradient Boosted Decision Trees and optimized thresholds using precision-recall curves.
- **Time Series Anomaly Prediction** [GitHub]
  - Engineered three anomaly prediction models (Simple RNN, LSTM, GRU) optimized for time series data.
  - Innovated with a self-supervised learning task to enhance model performance.
  - Balanced data via sampling and boosted accuracy with Min-Max scaling and L2 normalization.
- **Berkeley CS188 Projects** [GitHub]
  - Coded the Pac-Man projects from Berkeley's CS188
  - Search Problems, Informed Search, Adversarial Search, MDP, and Reinforcement Learning (RL).

Computer Vision & Image Processing

- **CamScanner with OpenCV and Numpy** [GitHub]
  - Utilized Contour detection, Perspective transform, and Morphology Operations for document processing.
  - Applied various image processing techniques to emulate CamScanner filters.
- **Multi-Feature Image Classification** [GitHub]
  - Implemented a Local Binary Pattern (LBP) image feature extractor to capture texture information.
  - Extracted compactness, eccentricity, and solidity features to characterize shapes.
  - Employed an SVM classifier for accurate classification of images in the Ships and Airplanes dataset.

- **Car Company Classification** [GitHub]
  - Implemented a CNN model for multi-class car producer classification.
  - Utilized transfer learning from MobileNetV2 with fine-tuning to improve model accuracy
- **IOU-Based Face Detection** [GitHub]
  - Utilized image labeling tools and sliding window operations for generating proposals.
  - Implemented Intersection over Union (IOU) for proposal classification

Computational Intelligence

- **Radial Basis Function Network** [GitHub]
  - Implemented RBF Network with K-means, GMM, and Random clustering for function approximation.
- **TSP Approximation with Kohonen Network** [GitHub]
  - Designed a Kohonen(SOFM) network to solve the NP-Hard TSP problem roughly close to the real answer.
- **Hopfield Neural Network** [GitHub]
  - Implemented a Hopfield network for pattern recognition, noise removal, and data recovery.
- **Fuzzy Logic Controller** [GitHub]
  - Designed a Fuzzy Control System for temperature prediction
- **Genetic Algorithms** [GitHub]
  - Developed a genetic algorithm from scratch for the knapsack problem, with crossover and fitness functions.

Others

- **Mobile Data Tracker App** [GitHub]
  - Developed an Android app in Kotlin for mobile data monitoring, usage tracking, and data limit configuration.
- **Student Hub Website with .NET Blazor** [GitHub]
  - Built a website for students to rate professors, access course resources, and make informed course decisions.

Teaching Assistant

- **Computational Intelligence** - Dr. Nasser Mozayani — Fall 2023
- **Algorithms Design and Analysis** - Dr. Marzieh Malekimajd — Spring 2023
- **Software Engineering (Mentor)** - Dr. Behrouz Minaei-Bidgoli, Dr. Mehrdad Ashtiani — Fall 2023, Spring 2023
- **Database Design** - Dr. Hossein Rahmani — Spring 2021
- **Operating Systems** - Dr. Reza Entezari-Maleki — Fall 2022
- **Logical Circuits** - Dr. Hajar Falahati — Fall 2021
- **Fundamentals of Computer and Programming** - Dr. Reza Entezari-Maleki, Dr. Tayebe Rafiei — Fall 2020, Spring 2020
- **Advanced Programming** - Dr. Tayebe Rafiei — Spring 2021
- **Computer Workshop** - Dr. Marzieh Malekimajd — Fall 2022

Industrial Experiences

Irangard Startup — *Part-Time | Tehran, Iran*

Back-end Developer — *Feb. 2022 - Aug. 2022*

- Developed a web-based **travel experience sharing application**. Users can create posts, follow others, rate locations, etc. [GitHub]
- Implemented **CI/CD** pipelines for deployment.
- Created a **real-time chat system** using WebSocket technology.
- Integrated a **payment gateway** for user upgrades.

Kooleposhti Startup — *Part-Time | Tehran, Iran*

Back-end Developer — *Oct. 2020 - Dec. 2020*

- Developed a comprehensive PWA **education platform** for teachers and students, including course enrollment, live classes, etc. [GitHub]
- Integrated **Skyroom API** for conducting live online classes.
- Utilized **Scrum** project management principles and Trello.

Honors & Awards

- **First Place** in the **IUST Machine Learning Challenge**, Awarded for achieving the highest rank in the classification task — May 2023
- Granted an opportunity to enroll in the **M.Sc.** program at the Department of Computer Engineering at **IUST**, **Sharif University of Technology** and **AmirKabir University of Technology**, without taking the "Iranian University Entrance Exam" as an **Exceptional Talented Student Award** — May 2023
- Ranked **3rd** highest GPA among 100 graduated bachelor's students at the Department of Computer Engineering. — July 2023
- Ranked **4th** at **IUST ACM** — Dec 2019
- Ranked among the top **0.5%** from 144,000 contestants in the "Iranian University Entrance Exam for Bachelor's Degree". — July 2019

Selected Coursework

- Special Topics I: Deep Learning (20/20)
- Computer vision (19.93/20)
- Computational Intelligence (18.5/20)
- Algorithms Design and Analysis (20/20)
- Graph Theory and Algorithms (20/20)
- Advanced Programming (19.54/20)
- Programming Competitions (20/20)
- Signals and Systems (19.5/20)
- Software Engineering (20/20)
- Database Design (20/20)
- Compiler Design (20/20)
- Operating Systems (20/20)
- Computer Networks (20/20)
- Security of Computer Systems (19.5/20)
- Computer Architecture (20/20)
- Microprocessors and Assembly Language (20/20)
- Engineering Probability and Statistics (19.5/20)
- Discrete Mathematics (19.75/20)

Online Courses

- **Convolutional Neural Networks** [Certificate] — Coursera - Andrew Ng
- **Structuring Machine Learning Projects** [Certificate] — Coursera - Andrew Ng
- **Improving Deep Neural Networks** [Certificate] — Coursera - Andrew Ng
- **Neural Networks and Deep Learning** [Certificate] — Coursera - Andrew Ng
- **Algorithms on Strings** [Certificate] — Coursera - University of California San Diego
- **Data Structures** [Certificate] — Coursera - University of California San Diego
- **Advanced Algorithms and Complexity** [Certificate] — Coursera - University of California San Diego
- **Algorithms on Graphs** [Certificate] — Coursera - University of California San Diego
- **Algorithmic Toolbox** [Certificate] — Coursera - University of California San Diego
- **Using Python to Access Web Data** [Certificate] — Coursera - Charles Russell Severance
- **Python Data Structures** [Certificate] — Coursera - Charles Russell Severance
- **Building Web Applications in Django** [Certificate] — Coursera - Charles Russell Severance
- **Web Application Technologies and Django** [Certificate] — Coursera - Charles Russell Severance

Skills & Languages

Programming	**Python, C#** | C++, VHDL, Verilog, SQL, Bash, MATLAB, LaTeX
Machine Learning	**TensorFlow, Keras, OpenCV, PyTorch** | Scikit-Learn, Matplotlib
Web Development	**Django-Rest, Django** | ASP.NET, HTML, CSS
Others	**Git, Azure DevOps, Trello, Proteus, AVR, Linux** | SQLite PostgreSQL, ANTLR
Languages	**English (TOEFL iBT Exam will be taken soon), Persian (Native)**

References

Available upon request.