

# 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 4<sup>th</sup> 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
- Vision-Language Multimodalities
- Deep Learning / Machine Learning
- Artificial Intelligence

## 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

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

- <b>First Place</b> in the <b>IUST Machine Learning Challenge</b> , Awarded for achieving the highest rank in the classification task	May 2023
- Granted an opportunity to enroll in the <b>M.Sc.</b> program at the Department of Computer Engineering without taking the "Iranian University Entrance Exam" as an <b>Exceptional Talented Student Award</b>	May 2023
- Received admission offers from <b>Sharif University of Technology</b> and <b>AmirKabir University of Technology</b>	Apr 2023
- Ranked <b>3<sup>rd</sup></b> highest GPA among 100 graduated bachelor's students at the Department of Computer Engineering.	July 2023
- Ranked <b>4<sup>th</sup></b> at <b>IUST ACM</b>	Dec 2019
- <b>Tuition scholarship</b> recipient for the top <b>4<sup>th</sup></b> Iranian Universities.	Aug 2019

## Selected Coursework

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- 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

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

## Skills & Languages

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

## References

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Available upon request.