Mohammad Javad Ranjbar — CV

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Research Interests

- Machine Learning
- Deep Learning
- Computer Vision
- Human–Computer Interaction
- Natural Language Processing
- Speech Recognition

Education

- **Master of Science** 2022 – Present
  University of Tehran Tehran-Iran
  - Computer Software Engineering
    - Overall GPA: : **4/4 (18.7)**

    Supervisors: Dr. Heshaam Faili and Dr. Azadeh Shakery
- **Bachelor of Science** 2016 – 2021
  Amirkabir University of Technology Tehran-Iran
  - Electrical Engineering
    - Last 2 years GPA: : **3.64/4 (17.1)** via 67 passed credits
  - **Thesis: Facial Expression Recognition**
    Transfer learning has been used to fine-tune ResNet, and it has been implemented on a personal assistant robot. The robot reacts to its owner's emotions, shows various gestures, and is commendable in using speech to perform the task of playing music based on audience expressions. Additionally, a data mining app has been implemented to find emotions and relevant durations in videos.
    Supervisors: Dr. Mohammad Bagher Menhaj and Dr. Hassan Taheri

Work Experience

- University of Tehran
  - Teaching assistant
    - Machine Learning: Designed and developed the final project. Jan 2023 – Present
    - Satanical Inference: Created and organized the first homework assignment. Jan 2023 – Present
  - Research assistant at Natural Language Processing lab Jan 2023 – Present
- Amirkabir University of Technology
  - Teaching assistant for Introduction to Computational course Intelligence Oct 2021 – Jan 2022
  - Research assistant at Computer Intelligence and Large Scale System Research Lab 2020 – 2022
- Sharif University of Technology
  - Research Assistant at DML lab at Sharif University of Technology Oct 2021 – Jan 2022
- Amirkabir Robotics and Programming school (FIRA Academy)
  - Instructor of image processing course: Developed and delivered an engaging course on introduction to machine learning and computer vision, focusing on image processing concepts 2020 – 2021
  - Member of the production team of SWIMBot (Designed for Diginext): SWIMBot is a platform for implementing various applications such as image processing, mapping, obstacle avoidance and more. March 2021
- Volunteer works
  - Innovation Center of Amirkabir University of Technology: Member of the executive committee. 2019 – 2020
  - International Conference on Robotics and Mechatronics: Member of Student committee. 2019 , 2021
- Internship
  - Internship at Internship at Canavat electric Iranian Arvand: Implemented a low-priced IR-remote dimmer with the help of Arduino Nano Summer 2019

Publications

MJ. Ranjbar, MB. Menhaj, H. Taheri. "Social Robots: An Open-Source Framework for Personal Assistant Robots." Published in *Proceedings of the 10th RSI International Conference on Robotics and Mechatronics (ICRoM 2022)*.

Selected Courses

- Machine Learning (Grad) 4/4 (20/20)
- Statistical Inference (Grad) 4/4 (19.2/20)
- Algorithm Design 4/4 (17/20)
- Natural Language Processing (Grad) 4/4 (18.2/20)
- Trust Worthy AI (Grad) 4/4 (17.4/20)
- Computational Intelligence 4/4 (17/20)
- Computational Intelligent lab 4/4 (20/20)
- Research Methods & Report Writing 4/4 (19/20)

Online Courses

- Machine Learning [Certificated]
- Deep Learning Specialization [In-progress]
- Reinforcement Learning Specialization [In-progress]
- Algorithms Specialization [Certificated]
- Natural Language Processing [Certificated]
- Generative AI with LLMs [Certificated]

Technical & Personal Skills

- **Programming/Scripting:** Python *(Pytorch, Tensorflow, Keras, NLTK, OpenCV, SciPy, Scikit-learn, Pandas, Matplotlib, Numpy, Pygame, Pyaudio, Threading, PyQt, Xlsxwriter)*, R, C/C++, C#, Matlab, VHDL, Assembly, HTML, MySQL, LaTeX
- **Simulation Tools and hardware:** ARM(STM32), Arduino, Raspberry Pi, NodeMCU, Simulink, Proteus, H SPICE, Advanced Design System.
- **IDEs/Tools:** Jupyter Notebook, Google Colab, Visual Studio, Keil5, STM32 Cube MX, Microsoft Office, Word, Excel, PowerPoint, Adobe Photoshop, Adobe Premiere, Adobe Animate, After Effects, Unity, Git, Docker
- **Language:** Persian(Native), English(Fluent), Toefl Score: 107 (R: 29, L: 30, S: 24, W: 24)

Selected Projects

- **Summarization with FLAN-T5** Generative AI with Large Language Models [2023]
  - Fine-tuned the FLAN-T5 model using both traditional fine-tuning techniques and PEFT methods like LORA to enhance its summarization capabilities. Additionally, implemented reinforcement learning (RL) training to improve the model's detoxification.
- **SOFIA** Personal Project [2023]
  - SOFIA, short for Social Omni-Present Bot for Instant Answers, is an advanced social bot that leverages the Retrieval-Augmented Generation (RAG) model to provide instant answers for a wide range of tasks and questions
- **FAQ chat bot** Natural language processing [2023]
  - FAQ chatbot specialized in selling airplane tickets, capable of detecting intents, classifying domains, and extracting slot values (e.g., destination city, date, etc.)
  - Specialized FAQ chatbot providing responses to users seeking information on weight loss strategies, nutrition, fitness, and general healthcare inquiries.
- **Training robust model** Trustworthy AI [2023]
  - A robust model was trained using data augmentation and the Angular loss function was utilized. Additionally, the model's resistance to fast gradient methods and its performance in the presence of noisy data were thoroughly examined.
- **Persian music dastgah detection** Machine Learning [2022]
  - After preprocessing the gathered data, audio features such as zero-crossing rate and short-time Fourier transform, among others, have been extracted. Multiple models, including Neural Networks, Support Vector Machines, and others, have been trained for detecting Dastgath. Additionally, various clustering methods were employed.
- **Correction of skewed text** DML lab [2021]
  - Developed a deep neural network using Self-Supervised Learning to accurately predict optimal page rotation angles of skewed text.
- **Self-driving Car** Personal Project [2021]
  - Using OpenCV to detect lanes and control the car movement in the Avis Engine simulator.
- **Snake game with Voice Control and Motion Detection** Advanced Programming [2020]
  - The game was developed using the Pygame module and features voice control, trained with 4 wake words. Motion control is implemented by detecting movement of a designated color.
- **2x2 Rubik's Cube Solver** Advanced Programming [2020]
  - The developed program allows user interaction with a 2x2 Rubik's Cube via command inputs. Color assignments provided by users are utilized in solving the Rubik's Cube using DLS (depth-limited search), with the required moves printed as output.

- **Face Recognition System** Advanced Programming [2020]
  - Applying the Eigenfaces method to project and classify faces by comparing their positions in a subspace with those of recognized individuals.
- **Irrigation System using STM32** Microprocessor Systems Interfaces [2020]
  - I used stm32, LCD, keypad and YL-69 to implement an irrigation system. The LCD shows the menu, the user can choose how long the irrigation should be, and YL-69 is used to find out the soil condition.
- **Smart Temperature Control System using STM32** Microprocessor Systems Interfaces [2020]
  - Developed a smart temperature control system using STM32, LM35, and Stepper motor HCSR05 components. Integrated remote control for setpoint adjustment via an Arduino Due.
- **Handwriting Digit Recognition** Introduction to Machine Learning [2019]
  - Various convolutional neural networks (CNNs) were employed, each with distinct activation functions and learning rates, to train on the Mnist dataset. Subsequent analysis involved comparing the impact of these variations on both loss and accuracy metrics.
- **Titanic: Machine Learning from Disaster** Introduction to Computational Intelligence [2019]
  - Implementing this project consisted of preprocessing the data and eliminating irrelevant features. Then training machine learning models (Decision Tree, KNN, etc.) to achieve high accuracy.
- **Music algorithm** Linear Algebra [2019]
  - Implementing a music algorithm for estimating the Direction Of Arrival (DOA) in sound sources.

Honors

- Ranked within the top 0.5% (76th) among approximately 13000 participants in the computer engineering national master entrance exam for Iranian universities. 2022
- Ranked within the top 1% (35th) among approximately 2000 participants in the computer science national master entrance exam for Iranian universities. 2022
- Ranked within the top 0.6% (27th) among approximately 4000 participants in the information technology engineering national master entrance exam for Iranian universities. 2021
- Ranked within the top 0.25% in the nationwide entrance exam for B.Sc. degree among 163000 participants. 2016
- Accepted to take part in "Iranian Physics Olympiad stage 2 " from top 5% of participants. 2015
- Accepted Three times to take part in "Iranian Olympiad on Astronomy and Astrophysics stage 2 " from the top 5% of participants. 2013–2015

For further information, and proofs check my Gitub