Last update on September 9, 2023

Arya Ebrahimi

Mashhad, Iran
aryaebrahimi2001@gmail.com
+98 (992) 068-3318
arya-ebrahimi.github.io
arya-ebrahimi

Education

Bachelor of Science in Computer Engineering *Sep 2019 - Present*
Ferdowsi University of Mashhad *Mashhad, Iran*
(Ranked within the top 7 universities in Iran, based on QS Ranking 2024)

CGPA: *18.56/20 (3.8/4)*
CGPA for the last three years: 18.99/20 (3.88/4)
Rank in Class: 8^{th} *out of 135 students*
Thesis Title: Investigating Representations and Auxiliary Tasks in Deep Reinforcement Learning

Research Interests

- (Deep) Reinforcement Learning
- Meta-Learning & Meta-Reinforcement Learning
- Robotics
- Representation Learning

Selected Courses

- Reinforcement Learning (Graduate Course) 20/20 (A+)
- Neural Networks (Graduate Course) 20/20 (A+)
- Robotics 20/20 (A+)
- Fundamentals of Computer Vision 18.35/20 (A+) (First in class)
- Fundamentals of Computational Intelligence 20/20 (A+)
- Fundamentals and Applications of Artificial Intelligence 19.2/20 (A+)
- Applied Linear Algebra 19/20 (A+)

Publications

A Contrastive NILM Approach for Appliance Detection. **Arya Ebrahimi**, Sara Ghavvampuor, Melika Zabihi Neyshaburi, Mohammad Hossein Yaghmae. The 7th International Conference on Internet of Things and Its Applications, 2023 (Submitted)

Academic Projects *Extra Projects on Github*

Investigating Representations and Auxiliary Tasks in DeepRL **Github repository**
Bachelor Thesis *Feb 2023 - Sep 2023*

- Implemented an unofficial version of **Investigating the Properties of Neural Network Representations in Reinforcement Learning** from scratch.
- Created a custom maze environment using Gymnasium.
- Developed a DQN agent with several auxiliary tasks to investigate their usages using PyTorch.
- Examined the effects of utilizing **Fuzzy Tiling Activation** and compared it with ReLU. (Blog post)
- Future work: Enable fine-tuning of the representations for further comparison with an approach in which initial parameters are learned by a meta-learner.

Enhanced Meta-Actor Critic with Advantage Weighting **Github repository**
Neural Networks & Deep Learning course project *Spring 2023*

- Wrote a literature review on Offline Meta-Reinforcement Learning. (Blog post)
- Improved the method introduced in **Offline Meta-Reinforcement Learning with Advantage Weighting** by adding a new head to meta-learn the Monte Carlo returns.

A Contrastive NILM Approach for Appliance Detection **Github repository**
Utilizing SupCon for Non-Intrusive Load Monitoring Appliance Detection *Spring 2023*

- Developed a framework for collecting RMS current and power consumption data using Arduino and SCT-013 non-invasive sensor.
- Utilized Supervised Contrastive loss to learn representations for appliance classification.
  (worked in a group of 3 people)

Parallax Eddie Platform with ROS2 **Blog post**
A comprehensive guide on how to get started with Parallax Eddie Robot Platform *Spring 2023*

- Calibrated wheel odometry.
- Created a ROS2 package for reading Android device sensory data and publishing a ROS2 IMU topic to fuse its data with odometry using Kalman filter. (Github repository)
- Tested RTAB-Map visual odometry.
  (worked in a group of 2 people)

RL Playground **Github repository**
Implementations of RL algorithms from "Reinforcement Learning: An Introduction" and recent Deep Reinforcement Learning papers

Stanford CS330 Course Assignments
Stanford CS330: Deep Multi-Task and Meta-Learning Course Assignments *Spring 2023*

- Black-Box Meta-Learning (Github repository)
- Model-Agnostic Meta-Learning (Github repository)

ROS2 & Gazebo **Github repository**
Introduction to ROS2, TF2, Gazebo, Motion planning using MoveIt2 and mobile robots *Spring 2023*

- Organized Robotics course projects and assignments as a step-by-step guide.

Deep Learning projects **Github repository**
Neural Networks & Deep Learning course projects at the Ferdowsi University of Mashhad
keywords: DCGAN, Convolutional Autoencoders, Transfer Learning, Domain Adaptation, Sentiment Classification

Classic AI Projects
Projects based on "Artificial Intelligence: A Modern Approach" *Fall 2021*

- Implemented A^*, BDS, BFS, DFS, $GBFS$, IDA^*, $IDDFS$ and $RBFS$ search algorithms introduced in "Artificial Intelligence: A Modern Approach" to solve a search problem. (Github repository)
- Implemented the Minimax algorithm with modifications such as alpha-beta pruning to play the Quoridor game. (Github repository)
- Solved multiple puzzles using CSP with LCV and MRV heuristics alongside AC3 and forward checking: (Magnet Puzzle), (Binairo Puzzle), (Nonogram Puzzle)

Other projects
Machine Learning projects (Github repository)
Computer Vision projects (Github repository)

Academic Experience

Ferdowsi University of Mashhad *Sep 2020 - Present*
Teaching Assistant *Mashhad, Iran*

- **Applied Linear Algebra** Jan 2022 - May 2023
  Instructor: Dr. Modjtaba Rouhani
  - Designed assignments related to singular value decomposition, projections, and orthonormal matrices.
  - Designed practical notebook projects from scratch for students to solve, including (spectral clustering), (Nyström kernel approximation method), and (offline adaline).
  - Graded assignments and provided feedback to students.

- **Fundamentals and Applications of Artificial Intelligence** Jan 2022 - Dec 2022
  Instructor: Dr. Ahad Harati
  - Designed CSP projects.
  - Conducted troubleshooting classes, addressing questions and concerns related to projects.
- **Microprocessors and Assembly Language** Sep 2022 - Dec 2022
  Instructor: Dr. Yasser Sedaghat
  - Designed projects for the STM32F303 Discovery microcontroller.
  - Conducted troubleshooting classes, addressing questions and concerns related to projects.
- **Logic Circuits** Sep 2020 - May 2022
  Instructor: Dr. Yasser Sedaghat
  Head TA
  - Designed projects involving Verilog and circuit simulation.
  - Recorded high-quality educational videos to teach Verilog.
  - Conducted troubleshooting classes, addressing questions and concerns related to projects.
- **Data Structures** Sep 2021 - Dec 2021
  Instructor: Dr. Haleh Amintoosi
- **Computer Architecture** Jan 2021 - Dec 2021
  Instructor: Dr. Hamid Noori & Dr. Sara Ershadi-Nasab
- **Fundamentals of Computer Programming** Sep 2021 - Dec 2021
  Instructor: Dr. Mostafa Nouri-Baygi
- **Advanced Programming** Jan 2022 - May 2022
  Instructor: Dr. Mostafa Nouri-Baygi

Ferdowsi University of Mashhad *Jan 2023 - Present*
Research Assistant *Mashhad, Iran*

- Reinforcement Learning researcher
  Supervisor: Dr. Ahad Harati
  - Researched model-based reinforcement learning agents, especially Dreamers.
  - Wrote a literature review on Dreamers. (Blog post)

Working Experience

Wise Intelligent Agents *Mar 2022 - Jun 2022*
Machine Learning Intern *Mashhad, Iran*

Implemented a framework to collect Persian news data using Scrapy, and clustered the data using different clustering methods.
Utilized KNIME to create a dashboard for data visualization.

Technical Skills

Programming and Scripting Languages	Python, C/C++, Java, Bash, JavaScript, Octave, MATLAB
Libraries and Frameworks	PyTorch, TensorFlow, Keras, Numpy, OpenCV, Scikit-Learn, Gym/Gymnasium
Robotic Tools	ROS2, Gazebo, MoveIt2
Hardware Programming	Verilog HDL, STM32, ESP32
Linux Distributions	Debian, Manjaro, Kubuntu
Extra Tools	Git, LaTeX

Voluntary Activities

President of the Scientific Society of Computer Engineering Students *Sep 2022 - Aug 2023*
Ferdowsi University of Mashhad *Mashhad, Iran*

Member of the Scientific Society of Computer Engineering Students *Sep 2021 - Aug 2022*
Ferdowsi University of Mashhad *Mashhad, Iran*

Online Courses

Reinforcement Learning Specialization
University of Alberta on Coursera

- **Fundamentals of Reinforcement Learning** (Certificate)
- **Sample-based Learning Methods** (Certificate)
- **Prediction and Control with Function Approximation** (Certificate)
- **Sample-based Learning Methods** (Certificate)

Deep Reinforcement Learning
CS 285 at UC Berkeley

Deep Multi-Task and Meta Learning
CS 330 at Stanford University, Fall2021

Deep Learning Specialization
DeepLearning.AI on Coursera

- **Neural Networks and Deep Learning** (Certificate)
- **Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization** (Certificate)
- **Structuring Machine Learning Projects** (Certificate)
- **Convolutional Neural Networks** (Certificate)
- **Sequence Models** (Certificate)

Machine Learning
Stanford University on Coursera (Certificate)

Honors & Awards

- Ranked within the **top 1.0%** in Iranian University Entrance Exam 2019 among nearly 170,000 participants.

Language proficiencies

Persian	Native
English	Fluent, IELTS will be taken in late October

References

Prof. Ahad Harati
Associate Professor at Ferdowsi University of Mashhad
a.harati@um.ac.ir

Prof. Modjatab Rouhani
Associate Professor at Ferdowsi University of Mashhad
rouhani@um.ac.ir

Prof. Sara Ershadi-Nasab
Assistant Professor at Ferdowsi University of Mashhad
ershadinasab@um.ac.ir