Last update on March 1, 2025

Arya Ebrahimi

Mashhad, Iran
arya.ebrahimi@ualberta.ca | +98 (992) 068-3318 | arya-ebrahimi.github.io | arya-ebrahimi

Education

Bachelor of Science in Computer Engineering *Sep 2019 - Feb 2024*
Ferdowsi University of Mashhad *Mashhad, Iran*

CGPA: *18.58/20 (3.8/4)*
CGPA for the last 60 credits: ***19.07/20 (3.9/4)***
Rank in Class: *7^{th} out of 135 students*
Thesis: *Investigating Representations and Auxiliary Tasks in Deep Reinforcement Learning Score: 20/20 (A+)*

Research Interests

My research interests lie at the intersection of robotics and machine learning, particularly I am interested in developing embodied continual learners. My current focus is on finding better ways for machines/robots to represent their interactions with the environment, enhancing their learning process.

- Reinforcement Learning
- Continual Learning
- Robotics

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*

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+**)

Honors & Awards

- Ranked within the **top 1.0%** in Iranian University Entrance Exam 2019 among nearly 170,000 participants.
- Best paper award (poster section) at the 7th International Conference on Internet of Things and Its Applications, 2023

Recent Projects

Investigating Representations and Auxiliary Tasks in DeepRL Report - Code
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.
- Future work: Enable fine-tuning of the representations for further comparison with an approach in which initial parameters are meta-learned.

Enhanced Meta-Actor Critic with Advantage Weighting Code
Meta-learning the unbiased returns from offline trajectories *Spring 2023*

- Wrote a literature review on Offline Meta-Reinforcement Learning. [Report]
- 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 **Code**
Utilizing SupCon for Non-Intrusive Load Monitoring Appliance Detection *Spring 2023*

- Developed a framework for calculating RMS current and power consumption data using Arduino and SCT-013 non-invasive sensor.
- Utilized Supervised Contrastive loss to learn representations for appliance classification.

SLAM for Parallax Eddie Platform with ROS2 **Report**
A comprehensive guide on how to get started with Parallax Eddie Robot Platform and SLAM *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]
- Conducted 2D SLAM using SLAM_Toolbox and Nav2.
- Tested RTAB-Map visual odometry for Visual SLAM.

RL Playground **Code**
Implementations of tabular RL algorithms and recent deep reinforcement learning papers

- Proximal Policy Optimization (**PPO**) for both discrete and continuous action spaces. [Code]
- Soft Actor-Critic (**SAC**), tested on both MuJoCo and classic control environments. [Code]
- Twin Delayed DDPG (**TD3**): Improved version of DDPG utilizing clipped double q-learning. [Code]
- Deep Deterministic Policy Gradient (**DDPG**), tested on classic control environments. [Code]
- More algorithms are available in the [GitHub repository].

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

- Black-Box Meta-Learning using Memory-Augmented Neural Networks. [GitHub repository]
- Model-Agnostic Meta-Learning [GitHub repository]

Extra Projects on Github
A complete list of my works, including deep learning, computer vision, machine learning, classic AI, and robotic projects, is available on my GitHub.

Experience

Research Assistant *Jan 2023 - Jan 2024*
Ferdowsi University of Mashhad *Mashhad, Iran*

- Reinforcement Learning researcher
  Supervisor: Dr. Ahad Harati
  - Researched on model-based reinforcement learning approaches, especially Dreamers.
  - Wrote a literature review on Dreamers. [Report]

Teaching Assistant *Sep 2020 - May 2023*
Ferdowsi University of Mashhad *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 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 & Dr. Saeid Abrishami
  - Designed CSP projects. Nonogram puzzle, and Binairo puzzle
  - Conducted tutorial classes.
- **Microprocessors and Assembly Language** Sep 2022 - Dec 2022
  Instructor: Dr. Yasser Sedaghat
- **Logic Circuits** Sep 2020 - May 2022
  Instructor: Dr. Yasser Sedaghat
- **Advanced Programming** Jan 2022 - May 2022
  Instructor: Dr. Mostafa Nouri-Baygi
- **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
- **Computer Networks** Sep 2021 - Dec 2021
  Instructor: Dr. Mohammad Hossein Yaghmaee Moghaddam

Machine Learning Intern *Mar 2022 - Jun 2022*
Wise Intelligent Agents - Website *Mashhad, Iran*
Implemented a framework to collect Persian news data using Scrapy and weak labeled them by clustering. 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, Pandas
Robotic Tools	ROS2, Gazebo, MoveIt2, Nav2, RTAB-Map, SLAM Toolbox
Hardware Programming	Verilog HDL, STM32, ESP32
Linux Distributions	Debian, Manjaro
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 FA** Certificate

Deep Reinforcement Learning
CS 285 at UC Berkeley

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

Deep Learning Specialization
DeepLearning.AI on Coursera
- **Neural Networks and Deep Learning** Certificate
- **Improving Deep Neural Networks** Certificate
- **Structuring Machine Learning Projects** Certificate
- **Convolutional Neural Networks** Certificate
- **Sequence Models** Certificate

Machine Learning
Stanford University on Coursera Certificate

Language proficiencies

Persian	Native
English	IELTS Academic **Overall: 7.5**, Reading: 8.5, Listening: 7.5, Writing: 7.0, Speaking: 7.0

References

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

Prof. Modjtaba Rouhani (Google Scholar)
Associate Professor at Ferdowsi University of Mashhad
rouhani@um.ac.ir

Prof. Mohammad Hossein Yaghmaee Moghaddam (Google Scholar)
Professor at Ferdowsi University of Mashhad
hyaghmae@um.ac.ir