Aida Afshar Mohammadian

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Curriculum Vitae

Research Interests

- **Reinforcement Learning**
- **Multi-Agent Systems**
- **Optimization**

Education

Sharif University of Technology — Tehran, Iran
Bachelor of Science — 2018–current

- Major: Applied Mathematics
- Minor: Computer Science
- GPA: 17.54/20

Farzanegan High School — Tehran, Iran
Diploma in Mathematics and Physics — 2011–2018

- Member of National Organization for Development of Exceptional Talents (NODET)
- GPA: 19.9/20

Research Experience

Hierarchical Potential-based Reward Shaping from Task Specifications — Vienna, Austria
Research Internship at Vienna University of Technology (TU Wien) — Summer 2022 - Present

- Advisor: Dr. Radu Grosu   —   PhD Supervisor: Luigi Berducci
- Defining an effective, compatible reward function can be the trickiest step in solving a large family of control tasks. *HPRS* is a hierarchical, potential-based reward-shaping approach trying to automate the reward definition by formalizing the task as a set of safety, target, and comfort requirements.
  In order to diversify the application and further prove the practical usability of HPRS, I implemented this method for Highway-Env, an RL environment for decision-making in autonomous driving.
- Link to HPRS paper preprint 🔗
- Link to HPRS GitHub repo
- Link to Highway-Env GitHub repo

DyFEn: Agent-Based Fee Setting in Payment Channel Networks — Tehran, Iran
Bachelor Thesis at Sharif University of Technology [under review] — Fall 2021–Fall 2022

- Supervisor: Dr. Mojtaba Tefagh
- Payment Channel Networks are decentralized transaction mechanisms among a large number of users. Every two users can conduct a transaction with each other if there is a path of sufficiently charged payment channels between them. Each channel on this path can charge a fee to route the transaction and owners of the channels

desire to maximize their profit by choosing the best fee for their channels. Currently, the Bitcoin Lightning Network is the most popular, widely-used payment channel network.

We proposed DyFEn, a dynamic fee-setting environment that can suggest a profitable fee policy for payment channel owners. With the help of the Lightning Network simulator, LEViN, real-world snapshots of the Lightning Network can be fed into DyFEn. We hope that this work facilitates the use of RL in novel crypto-economic applications.

- Link to paper preprint 🔗
- Link to GitHub repo ⭕

Disobedience in Student-Teacher Framework   Tehran, Iran
Remote Internship at the University of New South Wales Sydney, Australia (UNSW)   Spring 2022 –Present

- Supervisor: Dr. Francisco Cruz
- A Student-Teacher framework is a multi-agent reinforcement learning setup in which an agent (or multiple agents) is getting advice on its actions from a teacher (or multiple teachers). The teacher can be a human, an oracle, a pre-trained agent, or another training agent. In most cases, there is a possibility of the teacher making mistakes and giving bad advice. Hence, it is useful to enable the student with a mechanism for disobedience, so it can prioritize its own actions over the teacher's unreliable advice. I am working on the already existing work done by Cruz et al. named *what makes a good teacher?*, trying to add a dynamic mechanism for disobedience to the agents.

Awards

- Third place in !Optimizer Competition of SOAL Optimization Lab 🔗   Summer 2021
Department of Mathematics, Sharif University of Technology

  - The optimization problem was a biology-inspired, multi-objective mathematical programming. The competition had five stages, and the final goal was to provide a novel and efficient algorithmic approach for Multi-feasibility variable selection in the presence of error.
  - Link to the detailed explanation of the optimization problem 🔗
  - Link to my team's Github organization ⭕

Teaching Assistance

- **Computer Networking** - Dr. Laleh Arshadi   Spring 2022

- **Operations On Research** - Dr. Hani Ahmandzadeh   Fall 2021

- **Applied Linear Algebra** - Dr. Mojtaba Tefagh ⭕   Spring 2021

- **Principles of Computer Systems** - Dr. Laleh Arshadi   Fall 2020

Working Experience

Spleen Medical Segmentation ⭕   Spring & Summer 2021
Data Science Internship at AIMedic

- Supervisers : Dr. Alireza Vafaei Sadr, Dr. Mehdi Yousefzade
- Developed a NN for 3D and 2D Segmentation in PyTorch using Monai Toolkit
- Dataset : 3D CT-Scan images from Medical Decathelon - Spleen Task

Academic Projects

Reinforcement Mechanism Design for Cooperative Multi-Agent System ⭘   Fall 2021

Algorithmic Game Theory Course Project

- − Supervisor: Dr. Mojtaba Tefagh

Alien Invaders Game ⭘   Spring & Summer 2019

Advanced Programming Course Project

- − Presenters : Dr. Hossein Boomeri, Dr. Alireza Zarei
- − My Version of Chicken Invaders Game Implemented in Java
- − The project had 4 stages: Design, Graphics (Swing), Network (Socket Programming), Database (mySQL)

Wild Life Simulator   Spring 2020

Operating System Course Project

- − Presenter : Dr. Alireza Zarei
- − Multi Processing ⭘ and Multi Threading ⭘ in Java

Relevant Courses

- Machine Learning Theory (Graduate Course)
- Advanced Linear Algebra (Graduate Course)
- Convex Optimization
- Semidefinite Programming
- Linear Programming
- Algorithmic Game Theory (Graduate Course)
- Advanced Programming
- Stochastic Processes
- Automata Theory
- Computer Organization and Design

Self Studies

- Reinforcement Learning Lecture Series - Google Deep Mind 🔗   Fall 2021
  - Presenters : Hado van Hasselt, Diana Borsa , Matteo Hessel
- Introduction to Numerical Analysis - Coursera 🔗   Spring 2021
  - Presenter : Evgeni Burovski

Skills

- **Programming:**
  1. Julia (Advanced)
  2. Python (Advanced)
  3. Java (Advanced)
  4. C++ (Intermediate)
  5. Matlab (Intermediate)

- **Optimization:**
  1. JuMP (Advanced)
  2. MathOptInterface (Basic)
- **ML:**
  1. PyTorch (Intermediate)
  2. TensorFlow (Intermediate)
  3. Keras (Intermediate)

- **Web:**
  1. HTML/CSS (Basic)
- **Tools:**
  1. LaTeX (Advanced)
- **Techs:**
  1. Git (Intermediate)

Languages

- **English:** Proficient
- **Persian:** Native

Mentoring

- Mathematics Summer School at Sharif University of Technology 🔗   Summer 2019
  I mentored High School students and helped them to solve geometry questions.
- Mathematics Workshop at Farzanegan 4 Junior High school   Summer 2019
  Mentored newcomer Junior High School students (in collaboration with Fekrvarz Group)
  I gave a simple presentation about Diagrams and designed a game for the practical participation of the students.

References

References are available upon request.