

Amirhossein Mesbah

GRADUATE STUDENT · RESEARCH ASSISTANT

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Education

University of Tehran

Tehran, Iran

M.Sc. IN ARTIFICIAL INTELLIGENCE AND ROBOTICS

2020 - 2023

- Thesis: Subgoal Discovery using Subspaces and a Free Energy Paradigm
- Supervisors: Dr. Nili Ahmadabadi, Dr. Hosseini
- Advisor: Dr. Shariatpanahi
- Overall GPA: **19.48/20 (4/4)**

University of Tabriz

Tabriz, Iran

B.S. IN COMPUTER ENGINEERING

2016 - 2020

- Thesis: news scrapping dashboard using Scrappy and Django frameworks for news clustering
- Overall GPA: 18.23/20 (3.79/4)
- **3rd Rank** among Graduated Bachelor Students based on Overall GPA among 70 students

Research Interests

Reinforcement Learning Deep Reinforcement Learning

Deep Learning Theory of Deep Learning

Machine Learning Trustworthy ML

Research Experience

Research Assistant

Tehran, Iran

COGNITIVE SYSTEMS LAB, UNIVERSITY OF TEHRAN

2021 - present

- Exploring the role of **Free Energy** and **Subspaces** in **Subgoal Discovery** for **Goal-Conditioned RL** and **Hierarchical RL**.
- Developing new methods for **Social Reinforcement Learning**.
- Compared different methods of Social Reinforcement Learning in a **systematic review**. ([Link](#))

Publications

Subgoal Discovery using Subspaces and a Free Energy Paradigm

Reinforcement Learning

A.Mesbah, R.HOSSEINI, P.SHARIATPANAHI, M.NILI

2023

- Preparing to submit

Who to Learn from: A Preference-based Method for Social Reinforcement Learning

Reinforcement Learning

B.KARIMIAN, *E.MIRZAEI, *A.Mesbah, R.HOSSEINI, P.SHARIATPANAHI, M.NILI (* EQUAL CONTRIBUTION)

2022

- submitted to IEEE Transactions on Cognitive and Developmental Systems (TCDS). ([Link](#))

Teaching Experience

Regular Teaching Assistant

Neuromatch Academy

UNITED STATES (VIRTUAL - ONLINE)

2022

- Selected as TA for full-time supervision on the learning of 16 students **from different countries**, and leading 2 research group projects during 3 weeks in English for Computational Neuroscience. (Certificate)

Mentor

HooshBaaz Summer School

UNIVERSITY OF TEHRAN, TEHRAN, IRAN

2022

- Group collaboration with 7 other mentors for educating 80 students during 14 workshops on Data Analytics and Machine Learning.

Teaching Assistant for Graduate Courses

University of Tehran

SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING, COLLAGE OF ENGINEERING, UNIVERSITY OF TEHRAN, TEHRAN, IRAN

2021-2023

- TA of advanced courses like **Advanced Deep Learning**, **Interactive Learning**, Machine Learning, and Data Analytics.

Projects

Deep Learning & Machine Learning (Link)

- Utilizing **federated learning** methods (**FedAVG**, **FedADMM**) for image segmentation task locally for each car.
- Training Distributed Deep Neural Networks for Fashion MNIST classification using **Gossip Training** method.
- Implementing **Generative Cooperative Network** for generating images with given style and facial expression.
- Setting up a Machine translation system with **transformers** and **Attention** mechanism (English to Persian).
- Implementing an **Image Captioning** Deep Network by combining VGG Network and LSTMs to generate captions for given images.
- Performing **Semantic segmentation** on Camvid Dataset for detecting different objects from the perspective of an autonomous car.
- Detecting Parkinson's disease using signals of speech data with **ensemble learning**.

Reinforcement Learning (Link)

- Desining personalized environments and wrappers using different libraries like **Gymnasium**, **Pybullet**, and **Panda-Gym**.
- Implementing **Multi-Agent Reinforcement Learning Algorithms** for Grid Environment.
- Training Deep Reinforcement Learning Agents for turning the forest fires off in a cooperative multi-agent setting.
- Finding the best route for packet routing in the network with multi-armed bandit algorithms.

Neuroscience (Link)

- Implementing multiple Neural Dynamic models of single cell and population models.
- Evaluating Discrete-Time Neural Signals.
- Studying Continuous-Time Neural Signals for different data modalities.
- Analyzing behavioral data of subjects collected by designing a Psychopy task.
- Investigating the Role of Imitation and Emulation in Decision Making.

BigData (Link)

- Launching a real-time **data pipeline** on the Crypto and Stocks market.
- Using Apache Spark for NLP, Social Networks Analysis and dimensionality reduction tasks.

Skills

Theoretical Experience

Statistical Machine learning, Reinforcement Learning, Deep Learning, Design of Algorithms and Databases

Programming & Scripting

Python, SQL, HTML, CSS, JavaScript, Matlab, C, C++ and Java and \LaTeX

Libraries and Frameworks

PyTorch, Tensorflow, Keras, Numpy, Scipy, Scikit-learn, Pandas, BeautifulSoup, NLTK, Opencv, Django and Scrapy

Languages

English - Toefl IBT with an overall of 97 - planning to retake on 22nd of November 2023

Fluent

Persian

Native

Turkish

Native

Academic Courses

Principles of cognitive science, 19.49/20

2022

Massive Data Analysis and Systems, 20/20

2022

Data Analysis, 19.5/20

2021

Distributed Optimization and Learning (Special Topics in Control Eng), 19/20

2021

Deep Learning with applications in machine vision and audio processing, 19.5/20

2021

Biological Computing, 19.6/20

2021

Interactive Learning (Special Topics in Control Eng), 18.5/20

2020

Machine Learning, 19.9/20

2020