

# 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
- 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.
- 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 follow: A Policy-gradient Social Reinforcement Learning Method for Multi-armed bandit

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 (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

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### Deep Learning & Machine Learning (Link)

- Utilizing federated learning methods (FedAVG, FedADMM) for image segmentation task
- Training Distributed Deep Neural Networks for Fashion MNIST classification
- Implementing Generative Cooperative Network
- Setting up a Machine translation system with transformers (English to Persian)
- Implementing an Image Captioning Deep Network
- Performing Semantic segmentation on Camvid Dataset
- Detecting Parkinson's disease using signals of speech data with ensemble learning

### Reinforcement Learning (Link)

- Implementing Multi-Agent Reinforcement Learning Algorithms for Grid Environment
- Training Deep Reinforcement Learning Agents for turning the forest fires off
- Finding the best route in a 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

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### 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  $\text{\LaTeX}$

### Libraries and Frameworks

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

## Languages

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English

Fluent

Persian

Native

Turkish

Native

## Academic Courses

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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