Alireza Masoumian

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Research Interests

I am interested in sequential decision-making under uncertainty and by multiple agents. *Learning in Games* and *Multi Agent Reinforcement Learning (MARL)* are close keywords. I am also interested in mechanism design, statistical learning, and the common ground between information theory and statistics.

Game Theory Reinforcement Leaning, Bandits, Online Learning Statistical Learning

Education

University of Alberta — Edmonton, Canada
M.Sc in **Computing Science** / Supervisor: James R. Wright — Jan 2023–Now

Sharif University of Technology — Tehran, Iran
B.Sc. in **Electrical Engineering** and **Mathematics** as a minor field — 2017–2022

Publications and Preprints

1. A. Masoumian, J. R. Wright, 2024, **"Model Selection for Average Reward RL with Application to Utility Maximization in Repeated Games"**, *ArXiv preprint link*

2. A. Masoumian, S. Kiyani, and M.H. Yassaee, 2021, **"Sequential Estimation under Multiple Resources: a Bandit Point of View"**, *ArXiv preprint link*

Research Experiences

Utility Maximization in Repeated Games via Reinforcement Learning
Prof. James R. Wright/ University of Alberta — Oct 2023 - Now

- The motivating question is "How should a utility maximizer learner play against an opponent?". When the opponent has a limited memory policy, it turned into proposing an online model selection algorithm for average reward RL, which better captures the utility maximization *link to the paper*. We are now working on a more general case where the opponent is also deploying a learning algorithm.

Non-stationary Contextual Bandit with Costly Features
Prof. Setareh Maghsudi/ University of Tübingen — Jun 2021 - Sep 2021

- As a remote internship, I worked on a problem in non-stationary contextual bandit with costly features, where revealing parts of the context by the learner was costly.

Federated Online Estimation
Prof. Mohammad Hossein Yassaee/ Sharif University of Technology — Sep 2020 - July 2021

- We studied the sequential estimation of a parameter facing several resources with different qualities. We proved a lower bound on the performance of any algorithm showing a fundamental limit for federated parameter estimation and proposed an optimal algorithm for a special case of estimating the common mean of Gaussian distributions with different variances.

High Dimensional Statistics Reading/Research Group
Prof. Amin (Aminzadeh) Gohari/ Tehran Institute of Advanced Studies (Teias) Jul - Sep 2019 / Feb 2020 - Feb 2021

- The two main topics of these sessions were ML theory and Generalization Error from an information-theoretic viewpoint, and High Dimensional Probability/Statistics *(Link to the sessions)*.

Investigating Inter-Sensory Synchronization and Its Application
Prof. Hamid Karbalai Aghajan/ AirLab, Sharif University of Technology Sep 2018 - Sep 2019

– (Computational Neuroscience) By analyzing the brain's responses to some stochastic stimuli we studied the simultaneous perception of the auditory and visual aspects of an event, and how the brain adjusts for differences in physical transmission time and sensory processing time.

Teaching Assistant

- **Machine Learning 1** F24
  Undergrad Course / Vlad Tkachuk
- **Introduction to AI** W23
  Undergrad Course / Prof. James Wright
- **Information Theory, Stat., and Learning** F21
  Graduate Course / Prof. Mohammad Hossein Yassaee
- **High Dimensional Probability** W21
  Graduate Course / Prof. Mohammad Hossein Yassaee

Selected Courses

- **RL Theory** W23
- **Human in Loop RL** F23
- **Bayesian Statistics and Learning** F21
- **Coding for Networked Systems** W20
- **Distributed Systems** W20
- **Functional Analysis** F21
- **Computational Neuroscience** W18
- **Modelling Human Strategic Behaviour** W24
- **ML Theory** F23
- **Bandit Theory** W21
- **Block Chain** F19
- **Algorithmic Game Theory** F21
- **Information Theory** F19
- **Principals of Economy** W19

Honors and Awards

Silver Medal in National Mathematics Olympiad 2016
Exams include problems in Number Theory, Elementary Algebra, Geometry, and Combinatorics.

Programming Skills

- **Python**
- **Matlab**

Languages

- **Farsi:** Native
- **English:** Proficient

Other Experiences

Data Science Team
Prof. Saber Salehkaleybar/ Sharif University of Technology Sep 2019 - Feb 2020

– Some tricks and theoretical bases of data mining, and challenges in working with big data were discussed in every session, as a preparation for the International Data Analysis Olympiad (IDAO).

Committee Member of The 6th Iranian Geometry Olympiad
International Competition May 2019 - Sep 2019

– The Iranian Geometry Olympiad (IGO) is an international annual academic competition for high school students in geometry problem-solving. More than 6000 contestants participated in the 6th event from 55 countries.

Data Science and Machine Learning Summer School

Khatam University Aug 2019

- Compelling challenges, including distributed data analysis, AutoML, Submodularity in data science, etc have been discussed by mighty speakers.

Mathematics Olympiad for High School Students

Allameh Helli High School Jun 2017 - May 2019

- I taught general combinatorics to students preparing for the Mathematics Olympiad and was a member of the problem-designing committee.