

Mohammad Jalali

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Research Interests

- **Machine Learning:** Deep Learning, Generative Models (Diffusion Models, GANs, LLMs), GNNs, ML Theory
- **Applied Mathematics:** Algorithmic Graph Theory, Game Theory, Information theory, Approx. algorithms

Education

B.Sc. in Computer Engineering 2018 - 2023

Isfahan University of Technology, Isfahan, Iran.

GPA: 17.42/20

Thesis: On Learning in GANs by using Learning Algorithms in Multi-agent Systems. Grade: 20/20

B.Sc in Mathematics (Double Major) 2019 - 2023

Isfahan University of Technology, Isfahan, Iran.

Thesis: Improving Ranking Algorithms using Algorithmic Graph Theory. Grade: 19/20

Publications

An Information-Theoretic Evaluation of Generative Models in Learning Multi-modal Distrib. 2023

M Jalali, CT Li, F Farnia

Accepted in the 37th conference on Neural Information Processing Systems (**NeurIPS 2023**).

Games of GANs: Game Theoretical Models for Generative Adversarial Network Jun 2021

M Mohebbi Moghadam, B Boroomand, M Jalali*, A Zareian*, A DaeiJavad, MH Manshaei, M Krunz*

Accepted in the *Artificial Intelligence Review* journal.

Towards a Scalable Identification of Novel Modes in Generative Models Under Review

J Zhang, M Jalali, CT Li, F Farnia

Maximizing Rank Agreement Under Noisy Comparisons Under Review

M Jalali, R Javadi

* Equal Contribution

Research Experience

Undergraduate Research Assistant Dec 2023 - Present

National Institute of Health Data Science, Peking University

○ Supervisor: **Prof. Shenda Hong**

○ Working on using Diffusion Models for Medical time series data imputation.

Undergraduate Research Assistant Aug 2023 - Present

Department of Computer Science and Engineering, Chinese University of Hong Kong

○ Supervisor: **Prof. Farzan Farnia**

○ Working on novelty and uncommonness evaluation of generative models using quantum information theory.

Research Intern Jun 2022 - Jun 2023

Department of Computer Science and Engineering, Chinese University of Hong Kong

○ Supervisor: **Prof. Farzan Farnia**

○ Developed a novel metric using graph algorithms and quantum information theory to evaluate the Generative models.

○ Implemented popular GANs from DCGAN to SAGAN and compared our metric with others.

Undergraduate Research Assistant Aug 2020 - Dec 2022

Game Theory and Mechanism Design Research Lab., Isfahan University of Technology

○ Supervisor: **Prof. Mohammad Hossein Manshaei**

○ Reviewed the literature on the game theoretic aspects of GANs and showed how game theory models can address specific challenges of generative models and improve the GAN's performance.

○ Working on a Generative Adversarial Network framework and designing a novel GAN using multi-agent algorithms to improve the diversity and the convergence speed of GANs.

Undergraduate Research Assistant Jan 2022 - Feb 2023

Department of Mathematical Sciences, Isfahan University of Technology, Iran

○ Supervisor: **Prof. Ramin Javadi**

○ Working on designing an approx. algorithm for maximizing the rank and clustering problem using Spectral Graph Theory.

Undergraduate Research Assistant

Mar 2022 - Aug 2022

Edge Networks Group, IMDEA Networks Institute, Madrid, Spain

- Supervisor: Prof. Jaya Prakash Champati
- We worked on Computation Offloading for ML Inferences using classical Reinforcement Learning algorithms like DQN.

Honors and Awards

- **Ranked 2nd** in cumulative GPA among **+50 B.Sc. Mathematics** students in class, 2018 beginners, Isfahan University of Technology. (2/50)
- **Top 2 percent** of **Iranian nationwide university entrance exam** for undergraduate studies, the field of Mathematics-Physics, among more than **150,000** students.
- Among the top Isfahan University of Technology students that could apply for a dual major.

Teaching Experience

Teaching Assistant

2018 - Present

Isfahan University of Technology, Isfahan, Iran.

- **Computational Data Mining** (Grad. Course), *SP 2023*
- **Algorithms of Data Science** (Grad. Course), *Fall 2023*
- **Applied Linear Algebra**, *Fall 2022, Spring 2021*
- **Graph Mining** (Grad. Course), *Spring 2022*
- **Game Theory**, *Fall 2021*
- **Formal languages and Automata**, *Spring 2021*
- **Computer Network**, *Spring 2022*
- **Advanced Programming**, *Spring 2021, Spring 2020*
- **Digital Design**, *Spring 2020*
- **Basic Programming**, *Fall 2019*

Co-head of Game theory and Mechanism Design Workshop

Aug 2020 – Sep 2020

Isfahan Math House, Isfahan, Iran

One-week workshops for high school students.

Selected Courses

- **Deep Learning** (Grad. Course), 17/20
- **Machine Learning** (Grad. Course), 18.1/20
- **Information Theory** (Grad. Course), 19.1/20
- **Fund. of Data Science** (Grad. Course), 18.2/20
- **Machine Learning on Graphs**, 19.9/20
- **Artificial Intelligence**, 19.25/20
- **Stochastic Processes**, 16/20
- **Numerical Linear Algebra**, 18.5/20
- **Algorithm Design**, 20/20
- **Game Theory**, 20/20
- **Cryptography**, 19.5/20
- **Cloud Computing**, 20/20
- **Data Structure**, 19.5/20
- **Advanced Programming**, 19.34/20

Work Experience

Software Engineer

Dec 2020 - Feb 2023

PayamPardaz, Shahidan Sharghi, Isfahan, Iran

- Proficient in test-driven programming, Scrum, and Agile.
- Programming using Python and Django framework and developing other applications in C++ and Java
- Implemented automated CI pipelines on GitLab CI for Dockerized applications.

Skills

- **Languages:** Python, C++, JavaScript, C, SQL
- **Personal Skills:** Teamwork, Eager to learn new things, Flexibility, Teaching
- **Frameworks:** PyTorch, TensorFlow, Django, Docker, Kubernetes
- **Other:** Git, Slurm, OOP, SOLID principles, Design patterns, Scrum and Agile methodologies

Languages

- Persian: Native
- English: C1 - IELTS: 7.5 (L: 8, R: 7.5, W: 6.5, S: 7)