Pouya Shati

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EDUCATION

University of Toronto, Toronto, Canada 2019 – 2024
- Ph.D. in Computer Science
- Supervisors: Prof. Sheila McIlraith, Prof. Eldan Cohen
- Thesis: Interpretable and Constrained Machine Learning via Combinatorial Optimization
- Affiliated with **Vector Institute for Artificial Intelligence**

Sharif University of Technology, Tehran, Iran 2014 – 2019
- B.Sc. in Software Engineering
- Minor in Mathematics
- GPA: 18.52 / 20
- Major GPA: 19.34 / 20

RESEARCH INTERESTS

- Interpretable and Constrained ML • Deep Learning and Generative AI • Operations Research • Combinatorial Optimization • Boolean Satisfiability • Formal Methods

HONORS

- Accepted for the **ISTernship** program at **IST Austria** to work in **Prof. Chatterjee** group 2018
- Ranked **270th** nationwide and **15th** regionwide in university entrance exam 2014
- Awarded the School of Graduate Studies **Conference Grant**, University of Toronto 2024
- Ranked **1st** at **Research Experience for Undergraduates program**, Computer Engineering Department, Sharif University of Technology 2016

CONFERENCE PAPERS

- **Neural Sequence Generation with Constraints via Beam Search with Cuts: A Case Study on VRP**
  Pouya Shati, Eldan Cohen, Sheila McIlraith. SoCS 2024.
- **Bi-Criteria Diverse Plan Selection via Beam Search Approximation**
  Shanhe Zhong, Pouya Shati, Eldan Cohen. SoCS 2024.
- **SAT-Based Learning of Compact Binary Decision Diagrams for Classification**
  Pouya Shati, Eldan Cohen, Sheila McIlraith. CP 2023.
- **Optimal Decision Trees For Interpretable Clustering with Constraints**
  Pouya Shati, Eldan Cohen, Sheila McIlraith. IJCAI 2023.
- **SAT-Based Approach for Learning Optimal Decision Trees with Non-Binary Features**
  Pouya Shati, Eldan Cohen, Sheila McIlraith. CP 2021.

JOURNAL PAPERS

- **SAT-based Optimal Classification Trees for Non-Binary Data**
  Pouya Shati, Eldan Cohen, Sheila McIlraith. Constraints, 28(2): 166-202.
- **The Evolution of Indirect Reciprocity Under Action and Assessment Generosity**
  Laura Schmid, Pouya Shati, Christian Hilbe, Krishnendu Chatterjee. Scientific reports, 11(1): 1-14.

PROFESSIONAL ATTENDANCES

- **The 17th International Symposium on Combinatorial Search + Doctoral Consortium** 2024
- **The 34th International Conference on Automated Planning and Scheduling (ICAPS)** 2024
- **Optimization Days 2024** 2024
- **The 29th International Conference on Principles and Practice of Constraint Programming + Doctoral Consortium** 2023
- **Verification of Concurrent Systems Summer School** 2017
- **The Second IPM Advanced School on Computing: Theory and Practice of Programming Languages** 2017

WORK EXPERIENCES

- Research-oriented internship at **Fujitsu Laboratories of America, Inc.** 2021
  Capacitated Vehicle Routing Problems with Pickup and Deliveries
  Supervisor: Dr. Hayato Ushijima-Mwesigwa

RESEARCH PROJECTS

- **Decoding Large Language Models using Beam Search with Cuts**
  Supervisors: Prof. Sheila McIlraith and Prof. Eldan Cohen.
- **Improving Reward Machine Expressiveness for Formal Goal Specification in RL**
  Supervisors: Prof. Sheila McIlraith and Prof. Eldan Cohen.
- **An Improved Coding for Straggler Mitigation in Distributed Matrix Multiplication**
  Bachelor thesis. Supervisor: Prof. Hamid Zarrabi-Zadeh
- **An Investigation of Direct and Indirect Reciprocity in the Contexts of Quantitative Information, Incomplete Information, and Communication**
  Supervisor: Prof. Krishnendu Chatterjee
- **Procedural Generation of Video Game Levels With Constraints**
  Supervisor: Prof. Elias Khalil
- **Exploitation of Dependencies via Recourse Decomposition for Two-stage Stochastic Problems**
  Supervisor: Prof. Merve Bodur
- **Unsupervised Learning of 3D Objects Using Synthetic 2D Images of Faces**
- **Probabilistic Verification of Program Fairness**
- **Using Multidimensional Chromosomes for Genetic Evolution of Cellular Automata**
- **Emergence of Cooperative Behavior by Using Genetic Algorithms for Playing Prisoner's Dilemma with Finite-Automata Strategies**
- **Extended Büchi Automaton of Records, a Formal Semantic for the Reo Coordination Language**

SELECTED COURSES

- **Machine Learning for Mathematical Optimization**, A+
- **Stochastic Programming and Robust Optimization**, A+
- **Neural Networks and Deep Learning** , A+
- **Topics in Knowledge Representation and Reasoning**, A+
- **Advanced Propositional Reasoning**, A+
- **Topics in Verification Program Synthesis**, A+
- **Topics in Machine Learning, AI and Ethics**, A+
- **Computability and Logic**, A+
- **Algorithmic Game Theory**, 20/20
- **Theory of Computation and Computational Complexity**, 20/20
- **Approximation Algorithms**, 20/20
- **Economical and Social Networks**, 20/20
- **Graph Theory and its Applications**, 20/20
- **Compiler Design**, 20/20
- **Algebra 1**, 19.6/20
- **Computer Architecture**, 19.9/20

TEACHING ASSISTANTSHIP

Theory of Languages and Automata (Head TA)	Fall 2017, Winter 2017
Design of Algorithms (Head TA)	Fall 2017
Discrete Structures (Head TA)	Fall 2016
Knowledge Representation and Reasoning	Fall 2024
Introduction to the Theory of Computation	Fall 2020, Fall 2023
Algorithm Design, Analysis and Complexity	S'20, S'21, F'22, W'23, W'24
Computational Complexity and Computability	Winter 2020, Winter 2021, Winter 2022
Enriched Introduction to the Theory of Computation	Winter 2020, Winter 2022
Software Verification and Testing	Fall 2019
Programming Languages	Fall 2018
Algorithmic Game Theory	Fall 2018
Artificial Intelligence	Winter 2018
Compiler Design	Winter 2017
Discrete Structures	Winter 2017, Winter 2016
Advanced Programming in Java	Winter 2016

PROJECTS

- **SATree**, Python Library for learning decision trees using SAT
- **Sharif AI Challenge 2016-2018**, Lead game design, graphics programming, and committee member
- **Rasan** game, developed for the visually impaired in **Khwarizmi Student Competition**

LANGUAGES

- Persian: Native, English: Fluent

TOOLS

- PyTorch, Java, Various SAT and MaxSAT solvers, Gurobi, MiniZinc, Google OR-Tools, Unity, LaTeX