Ali Backour

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Education

Massachusetts Institute of Technology (MIT) Expected graduation date: May. 2026
B.S. in Computer Science and Engineering (6-3)
B.S. in Mathematics (18) ***GPA: 5.0/5.0***
Relevant Courses:Algorithm Design and Analysis,Intro to machine learning,Systems Engineering, Elements of Software Construction, Computational Structures, Probability and Random Variables, Algebra 1,Theory of Computation, Advanced Complexity Theory.
Courses taking in the fall: Fundamentals of statistics, Software Performance, Machine Learning, Probabilistic method in Combinatorics.

Experience and Leaderships

MIT CSAIL, Theory of Computation Group | Cambridge, MA 6/2024 - Present

Research Assistant

- Working with Prof. Ryan Williams to prove new circuit lower bounds for complexity classes using randomized time-bounded versions of Kolmogorov complexity.
- used a notion of time-bounded Kolmogorov complexity to provide easier proofs for known circuit lower bounds.
- **Technical Skill** : Complexity Theory, Algorithms, Probability.

MIT CSAIL, Language Programming Verification Group | Cambridge, MA 9/2023 - 5/2024

Research Assistant

- Worked with Prof. Adam Chlipala to develop and verify new features for the new programming language ATL (A tensor language)
- Conducted rigorous mathematical proofs to verify the ATL programming language.
- **Technical Skill** : Coq, Formal Verification, Programming Languages

MIT Operations Research Center | Cambridge, MA 06/2023 - 09/2023

Research Assistant

- Worked with Prof. Georgia Perakis to develop machine learning model that predicts which clothes should be replaced for Zara.
- Implemented data cleaning, transformation, and feature engineering techniques to extract meaningful insights from hundreds thousands of data rows.
- Worked with a team of 5 to build a model that predicts the two-item effect based on the new data I have extracted.
- **Technical Skill** : Pandas, SQL, Machine Learning, PyTorch

MIT EECS Department| Cambridge, MA 02/2023 - 05/2023

Lab Assistant

- Provided 1-on-1 session for 600+ students to debug and optimize their weekly Python programming projects during office hours as a part of the 'Fundamental of Programming (6.1010)' curriculum.
- Worked with a team of 80 lab assistants to enhance students' comprehension of course material.
- **Technical Skill** : Python, Debugging

Accomplishment

- **International Mathematical Olympiad (IMO) - Silver medal**.
- **Asian Pacific Mathematical Olympiad (APMO) - Bronze medal**.

Projects

- **Cara-A-Cara**: 01/2023 - 02/2023
  worked with a team of 2 to implement a two-player online cards game that achieved the semi-final stage of MIT web-Lab competition
- **Survey on the hardness of MCSP**: 03/2024 - 05/2024
  Wrote a seven-page survey paper about a research I did concerning the hardness of versions of the Minimum Circuit Size Problem (MCSP) as a part of the advanced complexity theory class (18.405).