

Amit Rajaraman

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🐙 amitrajaraman

🌐 <http://amitrajaraman.github.io/>



Research Experience

- 2022 **Summer Internship** *Guides: Piyush Srivastava and Hariharan Narayanan | TIFR, Mumbai*
- Analyzed a novel multiscale Markov chain on convex bodies that mixes rapidly from a cold start
 - Proved that the coordinate hit-and-run Markov chain mixes rapidly from a cold start
- 2022 **B.Tech. Project** *Guides: Prof. Niranjana Balachandran and Prof. Rohit Gurjar | IIT Bombay*
- Working towards proving Bagchi's conjecture, a problem in combinatorial geometry
 - Studied various results in the analysis of boolean functions, including the KKL Theorem and a result on independent sets in graph products due to Dinur, Friedgut, and Regev
 - Covered various general methods to solve combinatorial problems, also preparing a report on all the topics and papers studied, which can be found [here](#).
- 2021 **Summer Internship** *Guide: Navin Goyal | Microsoft Research, Bengaluru*
- Worked towards proving the KLS Conjecture and Hyperplane Slicing Conjecture, elusive problems in high-dimensional geometry, using the localization and stochastic localization methods
 - Prepared a report on the topics studied, covering several topics in asymptotic convex geometry from scratch, which can be found [here](#)




Publication(s)

- 1 H. Narayanan, A. Rajaraman, and P. Srivastava, *Sampling from convex sets with a cold start using multiscale decompositions*, 2022. [DOI: 10.48550/ARXIV.2211.04439](#).




Reading Projects

- 2022 **Representation Theory of Finite Groups** *Summer of Science under Math Club, IIT Bombay*
Studied representation theory from *Representation Theory of Finite Groups* by Benjamin Steinberg
Prepared a report on the topics studied, which can be found [here](#).
- 2022 **Derandomization and Pseudorandomness Course Project**
Presented a paper on pseudorandom generators for space-bounded computation by Nisan
- 2020 **Topics in Algebra II Course Project**
Prepared a presentation on the quiver of the Tits algebra and the Saliola lemma
- 2020 **Coding Theory** *Summer of Science under Math Club, IIT Bombay*
Studied Coding Theory from *Essential Coding Theory* by Guruswami, Rudra, and Sudan and *A First Course in Coding Theory* by Raymond Hill
Prepared a report on the topics studied, which can be found [here](#)







Education

2019 – 2022*	 Indian Institute of Technology Bombay, India B.Tech. with Honors in <i>Computer Science and Engineering</i> Minor in Mathematics	9.73 CPI (top 10% of department)
2017 – 2019	 Sri Chaitanya Junior College, India Intermediate/+2	97.80%
2010 – 2017	 Delhi Public School, Hyderabad, India Matriculation	10.0 GPA

Other Projects

2022	 Compiler for C-like language • Developed a compiler for a subset of C, supporting functions, scope levels, and control sequences • Used lex for tokenizing and yacc for parsing to construct the Abstract Syntax Tree and Three Address Code	<i>Guide: Prof. Uday Khedkar IIT Bombay</i>
2020	 Red Plag: Plagiarism Checker • Implemented a modified version of latent semantic analysis which calculates the cosine similarity between different vectors in the covariance matrix corresponding to the data • Added further functionality for reliable detection if the program is written in C++, Python, or Java for ignoring language-specific syntax • Built a user interface using Angular with a Django backend where registered users can upload and process files and view the similarities between the different pairs, visualised as a heat map	<i>Guide: Prof. Amitabha Sanyal IIT Bombay</i>
2021	 IITB Proc • Developed a 16-bit processor using VHDL to execute operations based on instruction format • Implemented a finite state machine for the execution of 15 instructions in a 6-stage pipeline	<i>Guide : Prof. Virendra Singh IIT Bombay</i>

Scholastic Achievements

2019	 Secured All India Rank 12 in JEE Advanced among 245,000 aspirants
2019	 Secured All India Rank 102 in JEE Main among 1.2 million aspirants
	 Awarded AP grade in
2022	MA214 (Numerical Analysis), awarded to 7 out of 739 students
2020	MA106 (Linear Algebra), awarded to 8 out of 1108 students
2019	CS101 (Computer Programming and Utilization), awarded to 1 out of 1212 students
2019	MA105 (Calculus), awarded to 35 out of 1137 students
2019	PH107 (Quantum Physics and Application), awarded to 12 out of 1115 students
2019	 Secured All India Rank 2 in the admission test to Indian Statistical Institute, Kolkata
2019	 Secured Rank 17 in the Telangana State EAMCET among 142,000 candidates
2019	 Scored 415/450 in BITSAT (Birla Institute of Technology and Science Admission Test)

Scholarships and Recognition

- 2017 📌 Recipient of the prestigious Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship
- 2019 📌 Amongst the top 300 students across the nation in NSEC and appeared for the INChO
- 2019 📌 Amongst the top 300 students across the nation in NSEA and appeared for the INAO
- 2015 📌 Attended a camp in Delhi for securing All India Rank 33 in the DPS Talent Examination

Technical Skills

- Software 📌 \LaTeX , MATLAB, Git, LEAN
- Programming 📌 C++, C, Python, Bash, Java, Julia

Select Courses Undertaken

- Computer Science 📌 Derandomization and Pseudorandomness, Game Theory and Algorithmic Mechanism Design, Artificial Intelligence and Machine Learning, Special Topics in Automata and Logics
- Mathematics 📌 Weak Convergence and Martingale Theory, Graph Theory, Combinatorics I, Topics in Algebra II, Real Analysis, Complex Analysis, General Topology, Linear Algebra

Miscellaneous

- 2020 📌 **Teaching Assistant, MA 109 (Calculus I)** *Instructor: Prof. Ravi Raghunathan | IIT Bombay*
Responsible for conducting tutorial sessions for a batch of 45 students throughout the semester, helping them clear conceptual doubts through personal interaction, and correcting answer sheets
- 2021–2022 📌 **Mentor, Summer of Science**
Guided students interested in topology and graph theory by creating an action plan, recommending resources, clearing doubts, having discussions, and reviewing their reports
- 2020–2022 📌 **Notes**
Prepared notes for various undertaken courses and other topics, referred to by hundreds of peers, which can be found at amitrajaraman.github.io/notes

Extracurriculars

- 2019 📌 Successfully completed an intermediate course in Table Tennis under the National Sports Organization at IIT Bombay
- 2016 📌 Appointed as the Deputy Vice Head Boy at Delhi Public School, Hyderabad
- 2019 📌 Engineered an app-controlled bot as a part of the XLR8 competition organized by ERC, IIT Bombay