

## EDUCATION

Indian Institute of Technology, Bombay

(2021-2025)

Major & Honors in Computer Science and Minor in Mathematics

Current Major CPI/GPA after 5 semesters: 9.37/10

## RESEARCH INTERESTS

Algorithms & Complexity, Game Theory, Graph Theory, Markov Decision Processes

## KEY PROJECTS

Evolutionary Game Theory (arXiv) (doi)

Summer '23

Guide : Prof. Krishnendu Chatterjee | Research Internship

Chatterjee Group, IST Austria

- Examined the **morán process** with birth-death and death-birth updating for weighted population networks
- Showed robust, modular amplifiers for **birth-death** and **death-birth** updating resolving an important open problem
- Showed existence of quantities that are impossible to improve for death-birth and birth-death updating simultaneously
- **Accepted** by PLOS Computational Biology, a **peer reviewed journal** for publication

Extension of Matroids (Report) (Survey)

Autumn '23 & Spring '24

Guide : Prof. Rohit Gurjar | Research Project

IIT Bombay

- Proved that if matroids have a **small extension** complexity then the **matroid union** also has a small extension
- Studied the extension complexity for transversal, regular matroids and exploring it for **dilworth truncation**
- Surveyed **randomised communication** based protocols for finding extension complexity of  $k - l$  sparsity matroids

Distributional safety for MDPs

Autumn '23 & Spring '24

Guide : Prof. S. Akshay | Research Project

IIT Bombay

- Examining algorithms for template based approaches to **affine invariant synthesis** for affine safety objectives
- Proved that for 2-state MDPs, distributional strategies with initialised safety, **memoryless** strategies suffice
- Examining the **computational complexity** of the problem for the affine safety of general MDPs

## SCHOLASTIC ACHIEVEMENTS

- Received the **Institute Academic Award** for **Institute Rank 1** among **1400+** students (2022)
- Secured **5 AP (Advanced Proficiency)** grades awarded to **top 1%** among 1400+ students (2022)
- Secured **All India Rank 46** in Joint Entrance Examination Advanced amongst **0.25 million** candidates (2021)
- Achieved **All India Rank 39** and was awarded the prestigious **KVPY fellowship** by IISc Bangalore, India (2021)

## OLYMPIADS

- Qualified for the **Mathematics Olympiad Orientation Camp (MOOC)** conducted by HBCSE (2021)
- Cleared **Indian Olympiad Qualifier in Mathematics (IOQM)** conducted by MTA(I) with **State rank 1** (2021)
- Among **top 64** students in the country in the **Indian National Chemistry Olympiad (INChO)** (2021)
- Attended the **Chemistry Olympiad Orientation Camp (COOC)** conducted by HBCSE (2021)

## TEACHING & EXPOSITORY EXPERIENCE

Popularizing higher mathematics in School

Autumn 2022 - Spring 2023

Guide: Prof. Rekha Santhanam | Summer Undergraduate Research Project (SURP)

IIT Bombay

- **Published a book**, introducing **Linear Algebra**, with aspects of cryptography, geometry in the theme of the story
- The story, a book of **8 chapters**, and associated **math expository sessions** have impacted **2000+ students**

Teaching Assistant

Autumn 2022 - Spring 2023

Dept. of Mathematics | Prof. Sanjoy Pusti, Prof. Niranjan Balachandran & Prof. Dipendra Prasad IIT Bombay

- Worked as a **TA** for **Calculus-I (MA109)**, **Calculus-II (MA111)** & **Linear Algebra (MA106)** courses
- Conducted **weekly interactive and problem solving sessions** for 45+ 1<sup>st</sup> year UG students

## RELEVANT COURSES

**Theoretical Computer Science:** Data Structures and Algorithms, Discrete Structures, Design and Analysis of Algorithms, Logic for CS, Extremal Combinatorics, Automata Theory, Applied Algorithms, Spectral Graph Theory, Approximation Algorithms

**Mathematics:** Linear Algebra, Calculus-I, Calculus-II, Differential Equations, Real Analysis, General Topology, Complex Analysis, Numerical Analysis

**Machine Learning:** Data Analysis and Interpretation, Introduction to AI and ML