

Rohit Roy

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About

I am a second year M.Sc. Data Science student at Chennai Mathematical Institute, with a keen interest in Topological Data Analysis and its applications in machine learning. I am passionate about exploring how topological concepts can provide unique insights into data-driven problems. My research interests have evolved from a strong foundation in Probability Theory and Stochastic Processes, to the field of Applied Topology.

Education

Chennai Mathematical Institute
M.Sc. in Data Science

Aug 2023 – Apr 2025 (expected)
CGPA : 9.07

Chennai Mathematical Institute
B.Sc. (Hons.) in Mathematics and Computer Science

Dec 2020 – Apr 2023
CGPA : 7.88

Key Courses Undertaken

Mathematics :

- Real and Complex Analysis
- Probability Theory and Stochastic Processes
- Group, Ring and Field Theory
- Linear Algebra
- Topology
- Enumerative Combinatorics
- Statistics
- Ordinary and Partial Differential Equations
- Hilbert Spaces and Quantum Probability
- Measure Theoretic Probability
- Stochastic Integration

Computer Science and Data Science :

- Design and Analysis of Algorithms
- Programming Language Concepts
- Foundations of Machine Learning
- Theory of Computation
- Topological Data Analysis
- Advanced Machine Learning
- Database Concepts
- Simulation Techniques
- Undecidability in Algebra & Topology
- Natural Language Processing
- Applied Data Analytics

Internships

Research Intern

LaBRI [🔗](#), *Universite de Bordeaux*

Bordeaux, France
May 2023 – Jul 2023

- Worked under [Prof. Jean-Francois Markert](#) [🔗](#) on directed animals in 2D.
- Investigated open combinatorial questions concerning directed animals, a concept representing percolation clusters in directed percolation models and conducted simulations of directed animals on triangular and square lattices.
- More details can be found [here](#) [🔗](#), with the complete internship log [here](#) [🔗](#).

Data Analysis Intern (Industry Internship)

NPTEL [🔗](#), *IIT Madras*

Chennai, India
May 2024 – Aug 2024

- Classified colleges on their performance in NPTEL courses using clustering and came up with metrics for comparison.
- Created System Dynamic (SD) models using Vensim to mimic NPTEL course enrollment and registration trends across semesters with real world factors in play.

Projects

Classification of Graphs using Persistence Diagrams

Sep 2023 – Present

- Part of a grant funded by Fujitsu Research, working under [Prof. Siddharth Pritam](#) [🔗](#) at Chennai Mathematical Institute.
- The goal of this project is to classify temporal graphs using methods from TDA. We extract topological features from these graphs and then these are fed into kernel-based methods for classification.
- The arXiv preprint for this project is [here](#). [🔗](#)

Branching Processes and Convergence Concepts

May 2022 – Jul 2022

- This was a reading project under Prof. Ayan Bhattacharya [✉](#) from IIT Bombay.
- Learnt about Galton-Watson process, genealogical trees and the probability of extinction of the same process.
- Discussed about various limit theorems in probability and had a brief overview of branching random walks.

Markov Chains and related concepts

May 2022 – Jul 2022

- This was a reading project under Prof. Rajeeva Karandikar [✉](#) from Chennai Mathematical Institute.
- Guided reading of the book “An Introduction to Probability Theory and its Applications” by William Feller.
- Learnt about Markov Chains and Stochastic Processes.

Presentations and Activities

- Presented the work on **Classifying Graphs using Persistence Diagrams** at [Data Science Summer School 2024](#) [✉](#), jointly hosted by IIT Madras and CMI. My slides can be found [here](#). [✉](#)
- Part of a research seminar series, headed by Prof. Siddharth Pritam and Prof. Priyavrat Deshpande [✉](#) at Chennai Mathematical Institute, where we discuss about temporal graphs and complexes associated with it.
- Presented a paper [Deep Learning with Topological Signatures](#) [✉](#) as part of Topological Data Analysis course at CMI. My slides can be found [here](#). [✉](#)
- Attended a workshop on [Applied Topology and Complex Networks](#) [✉](#). Learnt about the applications of the Borsuk-Ulam Theorem in Geometry and Combinatorics (lectures by Prof. Arijit Ghosh [✉](#)) and analysis of Temporal Networks as generalizations of graphs and algorithms based on them (lectures by Prof. Esteban Bautista [✉](#)).
- Presented the proof of generalized Riesz Representation Theorem as part of Stochastic Integration course at CMI. The slides can be found [here](#). [✉](#)
- Presented some theorems on \mathcal{L}^p spaces and inequalities as part of Measure Theoretic Probability course at CMI. The slides can be found [here](#). [✉](#)

Academic Achievements

- **Olympiad Mathematics** : Qualified for the Indian National Mathematical Olympiad (INMO) in 2018.
- **KVPY-SA 2018 Fellow** : Recipient of the KVPY scholarship given yearly.
- **Mathematics Talent Reward Programme (MTRP)** held in ISI Kolkata : Qualified in 2017 and 2019, and received 3rd prize in 2017.

Teaching Experience

Data Mining and Machine Learning

Jan 2025 - Present

- Instructor : Prof. Madhavan Mukund
- Intended for : M.Sc. Data Science 1st Year

Distributed Computing and Big Data

Jan 2025 - Present

- Instructor : Prof. Venkatesh Vinayakrao
- Intended for : M.Sc. Data Science 1st Year

Introduction to Martingales

Jan 2025 - Present

- Instructor : Prof. Rajeeva Karandikar
- Intended for : B.Sc. 3rd Year and M.Sc.

Natural Language Processing

Aug 2024 - Dec 2024

- Instructor : Prof. Ramaseshan Ramachandran
- Intended for : M.Sc. Data Sci. & M.Sc. Comp. Sci.

Probability Theory

Jan 2024 - Apr 2024

- Instructor : Prof. Rajeeva Karandikar
- Intended for : B.Sc. Mathematics 1st Year

Mathematical Methods in Analysis

Aug 2022 - Nov 2022

- Instructor : Prof. Rajeeva Karandikar
- Intended for : M.Sc. Data Science 1st Year

Technical Skills

Languages : Python, C++, Java, Haskell

Tools : \LaTeX