Aditya Chauhan

M.Sc. Candidate in Mathematics | Graduate Researcher

CONTACT

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EDUCATION

IIT Bhubaneswar
M.Sc. Mathematics
May 2026 (Expected)
CGPA(semester 1–3): 8.42/10.0
Coursework: Probability, Convex Optimization, Functional Analysis, Numerical Linear Algebra, Topology.

VNSGU, Surat
B.Sc. Mathematics
May 2024
CGPA: 8.63/10.0
Focus: Algebra, Linear Algebra, Real Analysis, Mathematical Modeling.

SKILLS

Languages
Python, C++, Java, MATLAB, R

Libraries
NumPy, Pandas, Matplotlib

Tools
LaTeX, Git, Linux (Ubuntu)

Technical Expertise
Spectral Methods, Convex Optimization, Numerical Analysis

AWARDS

Qualified IIT JAM 2024
Secured admission to premier institute via Joint Admission Test.

JEE Advanced 2020
Ranked in top percentile of India's most competitive engineering entrance.

Academic Excellence
Consistently top-ranked student at VNSGU (2021-24).

RESEARCH INTERESTS

Core Areas: Spectral Graph Theory, Convex Optimization, Numerical Linear Algebra, Probability.

Applications: Machine Learning Theory, Graph Neural Networks (GNNs), Algorithm Design.

RESEARCH EXPERIENCE

Graduate Researcher June 2024 – Present
IIT Bhubaneswar | Supervisor: Prof. Sasmita Barik
Project: Graphs Determined by Adjacency Spectrum (DAS)

- **Investigated** the spectral uniqueness of graph class G_n to address the isomorphism problem, focusing on eigenvalue characterization.
- **Derived** closed-form characteristic polynomials for graphs constructed from K_n with pendant attachments using block matrix analysis.
- **Proved** the DAS property for G_n by employing spectral invariants (trace, triangle counts) to definitively rule out cospectral mates.
- **Validated** theoretical bounds via extensive Python/NumPy simulations on generated graph datasets to confirm analytical results.

PUBLICATIONS

A. Chauhan & S. Barik(In Prep).
Spectral Determination of Graphs with Pendant Attachments.
Drafted manuscript based on M.Sc. thesis work detailing spectral invariants and DAS properties.

SELECTED PROJECTS

Optimization Algorithms 2024
Course Project | Python, Convex Optimization

- **Developed** a convex optimization solver in Python implementing Gradient Descent and Newton-Raphson methods from scratch.
- **Benchmarked** algorithm convergence rates against standard non-convex test functions (e.g., Rosenbrock) to analyze efficiency.
- **Visualized** optimization trajectories and cost function landscapes using Matplotlib to demonstrate gradient flow.