



Bhavish Jain

Entry No.: 2025MAS7107

Master of Science

Mathematics

Indian Institute of Technology, Delhi

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GitHub

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Research Interests

Operations Management, Operations Research, Stochastic Optimization, Supply Chain Management, Supply Chain Resilience, and Supply Chain Finance.

Education

• Indian Institute of Technology, Delhi

2025-Present

M.Sc. in Mathematics

CGPA: 7.89

Thesis: *Hypergraph Neural Networks and Graph-based Learning for Biomedical Applications*. Advisor: [Prof. Aparna Mehra](#)

Teaching Assistant: *MTL2003: Optimization Methods and Applications*. Instructor: [Prof. Harmender Gahlawat](#)

• Birla Institute of Technology, Mesra

2022-2025

B.Sc in Mathematics and Computing

CGPA: 8.88

Thesis: *A Study on Gradients of Non-Differentiable Functions*. Advisor: [Dr. Syeda Darakhshan Jabeen](#)

• Indus Public Senior Secondary School, Jhadol (Udaipur)

2022

Senior Secondary, RBSE

Percentage: 90.6

• Genius Public Secondary School, Ogha (Udaipur)

2019

Secondary, RBSE

Percentage: 95.33

Research Experience

• Research Intern, IIM Mumbai

(May, 2026 – July, 2026)

Operations & Supply Chain Division; Supervisor: [Prof. Vijaya Kumar Manupati](#)

- Developed a two-stage stochastic MILP model for resilient multi-echelon FMCG supply chain network design under supplier and warehouse disruptions, jointly optimizing facility location, production, inventory, transportation, cross-docking, lateral transshipment, capacity loss, and lost-sales decisions.
- Designed an Accelerated Benders Decomposition framework (valid inequalities, optimality and feasibility cuts, lazy-constraint callbacks) and applied Sample Average Approximation with Latin Hypercube Sampling for disruption-scenario generation and statistical validation.
- Implemented the models in Python and IBM ILOG CPLEX, benchmarking CPLEX Branch-and-Cut against Classical and Accelerated Benders Decomposition.

• Research Intern, IIM Calcutta

(July, 2026 – Present)

Operations Management; Supervisor: [Prof. Ayesha Arora](#)

- Studying digital supply chain innovation in e-commerce, focusing on the impact of AI-powered chatbots on consumer engagement and channel dynamics.
- Developing a game-theoretic model to analyze strategic interactions and equilibrium outcomes under AI-driven service innovation.

• M.Sc. Thesis, IIT Delhi

(July, 2026 – Present)

Department of Mathematics; Supervisor: [Prof. Aparna Mehra](#)

- Thesis: *Hypergraph Neural Networks and Graph-based Learning for Biomedical Applications*.
- Investigating hypergraph neural networks and graph-based learning methods for modelling higher-order relationships in biomedical data.

Working Papers & Manuscripts

- **Jain, B., Manupati, V. K.** *Resilient Multi-Echelon FMCG Supply Chain Network Design under Uncertainty: A Two-Stage Stochastic Programming and Accelerated Benders Decomposition Approach*. Manuscript completed; to be communicated to **Transportation Research Part E: Logistics and Transportation Review** (Elsevier).

- **Jain, B., Arora, A.** *AI-Driven Service Innovation in E-Commerce Supply Chains: A Game-Theoretic Analysis of Chatbot Adoption*. Manuscript in preparation; targeted for submission to **European Journal of Operational Research (EJOR)** (Elsevier).

- **Jain, B., Mehra, A.** *Hypergraph Neural Networks and Graph-based Learning for Biomedical Applications*. M.Sc. thesis, ongoing.

Independent Research Projects

• Interpretable Learning-Augmented Last-Mile Delivery Routing (Nov, 2025 - Dec, 2025)

Python, Operations Research, Interpretable ML, Route Optimization ([GitHub Repository](#))

- Developed an interpretable hierarchical zone-preference model using 6,112 Amazon last-mile delivery routes, with station-aware chronological train/validation/test splits and official challenge scoring.
- Reduced the aggregate median official route score by **39.9%** versus nearest-neighbour routing on 926 unseen test routes, improving **88.1%** of routes while limiting the median travel-time increase to **4.83%** through validation-only model selection.
- Characterized the travel-efficiency vs. zone-coherence trade-off through preference-weight sensitivity and route-level robustness analyses, cutting median zone re-entries from **21** to **0**.

• Quasi-Causal Analysis of Dispatch Delays and Late-Delivery Risk in E-Commerce (Dec, 2025 - Jan, 2026)

Python, Causal Inference, AIPW, Supply Chain Analytics ([GitHub Repository](#))

- Conducted an end-to-end quasi-causal supply-chain study on **81,941** Olist orders, defining dispatch-deadline breach as the treatment and late customer delivery as the outcome through audited joins across relational e-commerce data.
- Implemented five-fold cross-fitted Augmented Inverse Probability Weighting (AIPW) with leakage-safe seller histories and pre-treatment operational covariates, estimating a **14.11 percentage-point** higher adjusted late-delivery risk (95% CI: **12.81–15.41 pp**).
- Validated robustness through overlap, covariate-balance, nonlinear nuisance-model, threshold, temporal, cohort, and placebo analyses; achieved maximum weighted |SMD| of **0.053**, with reproducible notebooks, automated tests, GitHub Actions CI, and a technical report.

Relevant Coursework

- Foundations of Statistical Learning, Optimization, Probability Theory, Stochastic Processes, Linear Algebra, Mathematical Programming, and Optimization Techniques.

Technical Skills

- **Programming Languages:** Python, C, C++, R, MATLAB, SQL, LaTeX
- **Optimization & Scientific Computing:** IBM ILOG CPLEX, Gurobi, Wolfram Mathematica, MATLAB
- **Libraries & Frameworks:** NumPy, Pandas, Matplotlib, Scikit-learn, TensorFlow, PyTorch
- **Core Competencies:** Mathematical Optimization, Statistical Modeling, Data Analysis, Machine Learning, Deep Learning, Generative AI (LLMs, RAG)
- **Soft Skills:** Problem Solving, Critical Thinking, Communication, Teamwork, Leadership

Awards & Achievements

- Secured an **All India Rank of 129** in **IIT JAM 2025** (Mathematics).
- Secured **Rank 1** in the Summer Mentorship Program organized by **EEESoc BIT Mesra**.
- Secured **2nd position** in the Tech Quiz event in **Data Science Summit by SDS BIT Mesra**.
- Successfully completed **Level 1** of the prestigious **Mathematics Training and Talent Search (MTTS)** Program, 2025, held at **IISER Pune**.
- Awarded the **MCM Scholarship** for consistent academic excellence and a strong CGPA at IIT Delhi.
- Awarded the **GP Birla Scholarship** for consistent academic excellence and a strong CGPA at BIT Mesra.
- Qualified in national-level entrance exams: **JEE Main**, **JEE Advanced**, and **CUET-UG**.

Positions of Responsibility

• Mathematics Society (MatSoc), IIT Delhi (Apr, 2026 – Present)

PG Coordinator

- Work on academic projects in collaboration with the research team of the Mathematics Society (MatSoc).

• IGTS, IIT Delhi (July, 2026 – Present)

Coordinator (formerly Executive)

- Contribute to an ongoing research project in collaboration with the IGTS research team.

• Society for Data Science (SDS), BIT Mesra (Mar, 2023 – May, 2025)

Joint Secretary (formerly R&D Head, Member)

- Progressed from Member to R&D Head to Joint Secretary; led research initiatives, machine-learning workshops, and technical events.

• Training & Placement (TnP) Cell, BIT Mesra (Dec, 2023 – May, 2025)

Coordinator (formerly Volunteer)

- Supported campus placement drives and coordinated employer engagement and student logistics.

• Dristi – NGO, BIT Mesra (Jan, 2023 – May, 2025)

Joint Secretary, Diksha

- Led the Diksha initiative providing education to underprivileged children through volunteer outreach programs.

Recommendations

Prof. Vijaya Kumar Manupati

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Operations & Supply Chain Division
Indian Institute of Management Mumbai
Email: *manupativijay@iimmumbai.ac.in*

Prof. Aparna Mehra

Professor
Department of Mathematics
Indian Institute of Technology Delhi
Email: *apmehra@maths.iitd.ac.in*

Prof. Ayesha Arora

Assistant Professor
Operations Management Group
Indian Institute of Management Calcutta
Email: *ayeshaarora@iimcal.ac.in*

Prof. Neeraj Joshi

Assistant Professor
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Indian Institute of Technology Delhi
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