Dhairya Kantawala   23B3321

Mathematics   B.S.

Indian Institute of Technology Bombay   Gender: Male

                                                       DOB: 20/07/2005

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2027	9.58
Intermediate	CBSE	Green Valley High School	2023	94.00%
Matriculation	CBSE	V & C Patel English School	2021	93.80%

*Pursuing a **Minor** in **Artificial Intelligence and Data Science** from **C-MInDS**, IIT Bombay*

SCHOLASTIC ACHIEVEMENTS

- Awarded an **AP Scholar Award** with **perfect scores** in Calculus BC, Physics C: Mechanics, and Chemistry *('22)*
- Currently **3rd** in the Department of Mathematics at IIT Bombay, showcasing consistent academic excellence *('24)*
- Secured All India Rank 1039 in JEE Mains 2023, being in the **top 0.1%** of **1 million+** candidates nationwide *('23)*
- Qualified for Regional Round for **International Finance Olympiad (IFO)** conducted **by IIFM and ET** *('19)*

PROFESSIONAL EXPERIENCE

No-Code Solution for Algorithmic Trading | *Intern Project: BreakoutAI, Germany* *(Jul '24 - Present)*
Germany's first AI-driven company specializing in automated algorithmic trading from user's custom strategies

- Designed the **end-to-end** architecture for a no-code algorithmic trading platform, utilizing the **Langchain library** in Python to effectively integrate front-end and back-end components, enhancing functionality and user interaction
- Transformed raw company data into **vector embeddings** using **Pinecone**, effectively enabling the re-training of a **Large Language Model** (**LLM**) to intelligently and swiftly generate trading algorithms from user prompt input
- Developed a website using **Mercury** that executes **generated trading strategies** in real time on **stock market data**, providing users with instant insights and **an interactive graph** that visualizes the trading performance

KEY PROJECTS

Option Trading Strategies | *Summer of Science (SoS), MnP club, IIT Bombay* *(May '24 - Jul '24)*

- Conducted comprehensive research on option trading strategies, leveraging insights from **Option Volatility and Pricing by Sheldon Natenberg** and credible online resources to evaluate strategies and their market effectiveness
- Developed a deep understanding of derivative trading strategies, emphasizing key **technical indicators** and the **Greeks** that influence market behavior and help assess risk and potential profitability in various trading scenarios

Time Series Analysis of Sales Data | *Seasons of Code (SoC), WnCC, IIT Bombay* *(May '24 - Jul '24)*

- Developed a robust expertise in advanced **time series analysis** methods, including **S-ARIMA** and **LSTM**, to effectively model, analyze, and accurately predict complex sales trends across various market conditions and scenarios
- Conducted comprehensive **exploratory data analysis** on daily sales data from given stores, uncovering critical insights that significantly enhanced my **modeling strategies** and informed data-driven decision-making processes
- Developed a powerful **XGBoost** forecasting model achieving an impressive **90.53%** accuracy, ranking my project in the **top 500 globally** and showcasing its potential impact on business outcomes and strategic decision-making

Interest Rate Hike Prediction Model | *FinSearch, Finance Club, IIT Bombay* *(Jun '24 - Aug '24)*

- Developed a machine learning model to predict interest rate hikes by scraping news data, building an LSTM model on the daily news data, focusing on **sentiment analysis** and keyword extraction to gauge potential policy changes
- Developed a strong understanding of macroeconomic factors and their significant influence on global financial markets, achieving **98%** accuracy in effectively forecasting future interest rate adjustments using the scraped data

Equity Research Competition | *Research project, Finance Club, IIT Bombay* *(Sep '24)*

- Did comprehensive stock analysis using macroeconomic factors, **SWOT analysis**, and key quantitative metrics
- Developed an investment thesis through assessments of the industry and company to predict stock price movements

Introduction to Hyperbolic Geometry | *Course Project: Prof. Sudhir Ghorpade* *(Aug '23 - Nov '23)*

- Delved into hyperbolic geometry, a fascinating branch of **non-Euclidean geometry**, focusing on how it deviates from Euclidean concepts by **re-imagining space** and distance, offering a radically different mathematical framework
- Explored key aspects: **the geometry of geodesics**, represented by semicircles or vertical lines; **hyperbolic triangles** with angle sums less than π, and calculating distances between points using advanced logarithmic methods
- Investigated the unique features of circles and angles within hyperbolic geometry, where curvature and non-Euclidean properties twist classical ideas, providing fresh perspectives on **symmetry**, congruence, and geometric relationships

OTHER PROJECTS

Origami and Mathematics | *Course Project: Prof. Madhusudan Manjunath* (Aug '23 - Nov '23)

- Researched classical origami constructions, focusing on some folding techniques that address geometric problems like **angle trisection** and **cube root extraction**, which cannot be solved using only a compass and straightedge
- Analyzed the relationship between **origami axioms** and **algebraic geometry**, demonstrating how paper folding techniques can be used to solve **polynomial equations** and explore higher-dimensional **geometric constructions**

Sudoku Solver Algorithm in C++ | *Self Project* (Mar '24 - Apr '24)

- Developed a **recursive backtracking algorithm** to solve Sudoku puzzles, while ensuring valid number placement
- The program **validates constraints** across rows, columns, and grids, ensuring correct placements before solution
- Implemented logic to **handle unsolvable cases**, ensuring the program backtracks **when no valid solutions** exist

Handwriting to Unicode Converter | *Self Project* (June '24 - July '24)

- Developed a Handwriting to Unicode Converter using Python, leveraging **Tkinter** for a drawing interface, and **PIL** for **real-time image processing** and transformation to a **28x28 pixel format** suitable for machine learning
- Integrated a **Support Vector Machine (SVM)** model for classification, using an **RBF kernel** to accurately predict handwritten digits from the processed image data, achieving **89% accuracy** and reliability in digit recognition
- Created a feature to store and **label drawn data** in CSV format for further training and enhancing model accuracy for future use, while ensuring smooth interaction with the user through **real-time predictions and feedback**

POSITIONS OF RESPONSIBILITY

Teaching Assistant MA105, Calculus | *Department of Mathematics* (Aug '24 - Present)

- Assisted **30+** first-year students in weekly **tutorial** sessions through problem solving and **doubt clarification**
- Provided **logistical** support to the professor-in-charge through invigilation and evaluations of **1400+ students**
- Organised and Conducted **help session** for students who don't understand English and are familiar with Hindi

Institute Academic Coordinator | *Student Support Services, UGAC* (June '24 - Present)

*Selected among **4 out of 150+** applicants via rigorous interviews, addressing queries of **5000+** undergraduates*

- Acquainted and assisted **over 1,000 undergraduate** students with their course registration process in the institute
- Organised **help sessions (TSCs)** for **15+** freshman and sophomore courses, witnessing an attendance of **500+**
- Executed a **1 week** long orientation for **1500+ UG new entrants** along with **2000+** parents in an offline setting
- Streamlined the process of **TA selection** across 5+ departments by effectively connecting professors and applicants
- Spread awareness about **Course Information** and **Mental Health** among undergraduate students by curating and designing series of impactful **social media posts**, recording a significant **36% increase** in online engagement

TECHNICAL SKILLS

Programming	Python, C/C++, LaTeX, Azure, Jupyter Notebook, AWS, Pinecone database, SQL
Libraries	TensorFlow, Keras, PyTorch, scikit-learn, NumPy, Pandas, MatPlotLib, LangChain
Data Analysis	Excel, Tableau, Power BI, Data Cleaning, Statistical Analysis, Data Interpretation

KEY COURSES UNDERTAKEN

Mathematics	Probability I*, Linear Algebra*, Calculus, An Introduction to Mathematical Concepts, Mathematics and Its History, Linear Algebra and Differential Equations, Basic Algebra*, Real Analysis*
Computer science	Programming for Data Science*, Computer Programming and Utilization
Other Courses	Economics*, Introduction to Classical and Quantum Physics, Introduction to Innovation & Entrepreneurship, Introduction to Design, Makerspace

(* To be completed by Nov '24)

EXTRACURRICULAR ACTIVITIES

Origami	• Created and managed online origami **portfolio** for 5 years, showcasing intricate designs
International Exposure	• Attended Summer School at the **University of Oxford**, where I gained invaluable global exposure in Business and Entrepreneurship, enhancing my understanding of markets • Participated in **British Origami Society** Convention, connecting with over 100 origamists, exchanging techniques, ideas, and fostering deeper appreciation for the art • Attended **Pacific Coast Origami Convention (PCOC) hosted by OrigamiUSA**, enhancing my origami skills while networking with global artists and enthusiasts
Volunteering	• **Mentored and guided** JEE Aspirants of 2024 and 2025 batches from across the nation • Volunteered to teach **Mathematics** to students under **Educational Outreach**, **NSS**