

Sarthak Mittal

B. Tech. • Fourth Year • Computer Science
Indian Institute of Technology Bombay

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Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2024	9.15
Intermediate	Maharashtra HSC	Pace Junior Science College	2020	96.31%
Matriculation	ICSE	Lilavatibai Podar High School	2018	99.00%

Pursuing **Honors** in **Computer Science** and **Minor** in **Machine Intelligence and Data Science**

SCHOLASTIC ACHIEVEMENTS

- Awarded **AP** grade (top **7** out of **1400+**) for exceptional performance in **CH105 Chemistry** (2020)
- Secured **AIR 34** in JEE Advanced among 1,50,000 | **AIR 261** in JEE Mains among 1.1million (2020)

INTERNSHIP EXPERIENCE

Quantitative Strategist Intern | *Quadeye Securities, Gurugram, India* (May '23 - Jul '23)

Quadeye is India's leading proprietary trading firm (200+ employees) dealing in multiple asset classes

- Explored option theory to understand the applications of **greeks** in stocks and **derivative markets**
- Implemented the **Black Scholes** model in **C++** with low-latency (**700 μ s** for **200+** strikes per time snapshot) for computing option premium and **implied volatility (IV)** using Newton-Raphson method
- Traded **200+** **strikes** by parameterising the IV as a **3-D surface** over moneyness and option expiries
- Interpolated prices using moving difference as **alphas** judged using **PCA** component **correlations**
- Fitted a **3-knots cubic spline** over the IV (Nelder-Mead optimisation) for computing **risk-neutral density** distributions whose parameters were used to create **alphas** for trading **150+** underlyings

Machine Learning Intern | *Prodigal SoftTech, Mumbai, India* (Dec '22 - Jan '23)

Prodigal is a fast-growing AI software startup (YC W18) and a pioneer of consumer finance intelligence

- Compared **ROUGE** scores of **8+** models including PEGASUS, BART, T5 for **text summarisation**
- Fine-tuned the **BART-large** model on a **5% tweaked** SAMSum Corpus subset to analyse **plasticity**

Language Modeling Intern | *International Workplace, Cambridge, UK* (May '22 - Jul '22)

International Workplace is a leading provider of training programs for occupational safety and health

- Deployed a **language model** mapping newsfeed to learning outcomes as a **web API** using **Azure ML**
- Implemented **prefix matching** and a probability density function with **3 variables** to predict outcomes

Software Development Intern | *Greatfour Systems, Hyderabad, India* (Dec '21)

Greatfour (team of 60+) is developing platform to aid pharmaceutical companies in medicine development

- Utilised Python API for **OpenCV** and **MTM** in image resizing and multi-scale **template matching**
- Improved template to destination **matching speed** by **60%** by making **4+** algorithmic enhancements

KEY PROJECTS

Algorithmic Trading | *Self Project* | *Learner's Space, IIT Bombay* (Jul '21)

- Designed trading strategies in **Python** and compared styles like **momentum** and **paired switching**
- Executed the algorithms on **SENSEX 30** data of 2009-2020 and achieved profit upto **160%** and **500%**

P2P Network Simulator | *Course Project* | *Networks* (Mar '22 - Apr '22)

- Implemented **socket programming** in **C++** to transfer files between clients using **TCP** connections
- Analysed** the network simulation in **5** phases using configuration files and a **bash script** to automate

Attendance System | *Course Project* | *AI and ML* (Nov '22)

- Built an **automated** attendance system using **deep learning** techniques and **face recognition** nets
- Trained the **embedding vector** model using **triplet loss** and achieved **75%** accuracy in validation

Limestone Data Challenge | *Self Project* | *Finance Club, IIT Bombay* (Mar '23)

- Analysed a toy dataset using **elbow curve** and **k-means** to predict the composition of **15** stock indices

Mega NetWorks | *Course Project* | *Database Systems* (Apr '23)

- Designed a clone of **LinkedIn** with **10+** **database entities** using **PERN** stack along with CSS styling
- Supported **5** key features, including connections, jobs, profiles, **dynamic** scroll feed and chat messaging

OTHER PROJECTS

Image Segmentation via s-t Cuts | *Course Project* | *Image Computing* (Apr '22)

- Performed **s-t cuts** on a generated graph of **superpixels** to implement **binary** image segmentation
- Obtained an accuracy of **80%** by initialising **Boykov-Kolmogorov** algorithm through user **scribbles**

Cryptocurrency Network | *Course Project* | *Blockchains* (Jan '23 - Apr '23)

- Simulated transactions in a **P2P cryptocurrency network** by modelling latencies and probabilities
- Implemented **selfish** and **stubborn** modes of adversary obtaining around **10-15%** of **faulty** blocks

Introduction to App Development | *Web & Coding Club, IIT Bombay* (Jul '21)

- Utilised **Flutter SDK** integrated with **Android Studio** and **Dart** language codebase to develop and debug **3 Android applications** on a virtual device including a calculator, quiz app and a weather app

MDP Planning & Cricket | *Course Project* | *RL* (Oct '22)

- Designed an MDP planner using **3 key RL methods** including **Howard's PI** and linear programming
- Utilised a pipeline of **encoder**, **planner** and **decoder** to predict outcome of a **6-balls cricket game**

SNAP Moodle | *Course Project* | *Software Systems* (Oct '21 - Nov '21)

- Developed a **dynamic learning environment** with a **Django REST** framework for the modular **object-oriented backend** consisting of **models** for Students, Teachers, Assignments and Courses
- Created an interactive **user interface** using **HTML** and **React JavaScript** library for the frontend

Other Course Projects | *Dept. of Computer Science, IIT Bombay* (Sep '21 - Apr '23)

- **iplC-compiler**: compiler for **C-like** language using **scanner**, **AST**, **parser**, semantic code generation
- **risc-processor**: processor with efficient **FSA** using **VHDL** and assembly translation in **Python**
- **db-systems**: made course portal using **PERN** and utilised **Spark/Kafka** for IMDB movies database
- **scotland-yard**: 8×8 grid game using **semaphores**, concurrency, sockets and **upto 10** player threads
- **speech-models**: evaluated and tuned **CRDNN** on **HVB** and trained **LLMs** using **MFCC** features
- **parking-sim**: parking lot escape using **Python API** of **gym**, base simulator and destination chasing

POSITIONS OF RESPONSIBILITY

Class Representative | *Dept. of Computer Science, IIT Bombay* (Aug '21 - May '22)

- Served as a **point of contact** between professors, CSE council, and a batch of **175+** undergraduates
- **Led the creation** of a Telegram group to host polls for collection of data representing batch opinion

Teaching Assistant | *Dept. of Computer Science, IIT Bombay* (Aug '22 - Present)

- **CS213-CS293 (Data Structures and Algorithms)**: Conducting problem solving sessions and labs
- **CS104 (Software Systems Lab)**: Awarded **Excellence in Teaching Assistantship** for Spring '23
- **CS251 (Software Systems Lab)**: Curated programming assignments for batch of **190+** sophomores

Department Academic Mentor | *Dept. of Computer Science, IIT Bombay* (May '22 - Apr '23)

- Selected in team of **30** Juniors from among **60+** applicants after extensive interviews & peer reviews
- Mentored **6** sophomores to assist them with academic difficulties and their **holistic development**

TECHNICAL SKILLS

Languages	C/C++, Python, Java, Dart, LaTeX, VHDL, Bash, Sed, Awk, Flex, Bison
Data Science	NumPy, Pandas, Matplotlib, SciPy, OpenCV-Py, Sklearn, AzureML, SQL
Development	Django, JS, HTML, CSS, React, Redux, Node, Flutter, Android Studio
Software	MATLAB, Git, Quartus, Wireshark, Keil μ Vision, NS3, VTune, GDB, Docker

MAJOR COURSES UNDERTAKEN

Mathematics	Calculus, Linear Algebra, Probability, Derivative Pricing, Numerical Analysis
Computer Science	Discrete Structures, Data Structures, Data Analysis, Software Systems, Algorithm Design, Networks, Logic, Architecture, Image Computing, Automata, OS, AI and ML, RL, Compilers, Databases, Blockchains, Speech Recognition, Game Theory*

(* to be completed by November '23)

EXTRACURRICULAR ACTIVITIES

- Received **special mention** for exemplary voluntary work at NSS Green Campus, IIT Bombay ('20 - '21)
- Completed **3** typesetting assignments in **L^AT_EX Bootcamp** at WnCC Learner's Space, IIT Bombay ('21)
- Awarded '**A**' grade in Elementary drawing examination held by Directorate of Art, Maharashtra ('14)