Sarthak Mittal

B. Tech. • UG Third Year • Computer Science
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Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2024	9.39
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** (Advanced Performer) grade for exceptional performance in the first-semester course CH105: Organic and Inorganic Chemistry (ranked among the top **7** out of **1400**+ students)
- Secured AIR **34** in JEE Advanced among 1,50,000 | Secured AIR **261** in JEE Mains among 1.1million

Internship Experience

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

International Workplace delivers globally accredited digital programs for occupational safety and health

- Used **pandas** in Python to analyse and group **1300**+ content titles mapped to multiple objectives
- Implemented **prefix matching** and a **probability function** with **3 variables** to predict outcomes
- Deployed **language model** mapping newsfeed to learning outcomes as a **web API** using **Azure ML**

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

A team of 60 developing Harmony, a platform to aid pharmaceutical companies in medicine development

- Utilised Python API for **OpenCV** and **MTM** in image resizing and multi-scale **template matching**
- Made multiple **algorithmic enhancements** to improve template to destination matching speed by **60%**

Data Analyst Pre-Intern | *YoZu - IIT Bombay EdTech startup* (May '21)

YoZu is developing an AI chatbot assistant for instant redressal of students' (K10) academic doubts

- Classified **450**+ queries into **5** structural categories to optimize fine-tuning of **T5 transformer model**
- Enhanced **query-context** mapping of retrieval pipeline by improving **corpus** raising efficiency by **20%**

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* (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

Interface for GitHub Profiles | *Course Project* (Sep '21)

- Created an **HTML** webpage for user profiles secured with client-side **HTTP Authentication** tokens
- Implemented the backend using **Django** along with **PostgreSQL** database and GitHub REST API
- Deployed the project on **Heroku** Cloud Application Patform using GitLab **CI/CD** integration and CLI

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

- Performed **s-t cuts** on a generated graph of **superpixels** to implement **binary** image segmentation
- Identified user **scribbles** to initialise **Boykov-Kolmogorov** algorithm and achieved accuracy of **80%**

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

- Utilised **Flutter SDK** (Google's UI Toolkit) integrated with **Android Studio** and **Dart** programming language (developed by Google) as codebase to **develop** and **debug** applications on a **virtual device**
- Successfully built **3 Android applications** (apk packages) from scratch including a 10-digit calculator, a true/false quiz app and a location-based weather app (by integrating an externally offered **weather API**)

Other Projects

Unblock Car Puzzle Solver | *Course Project* (Feb '22)

- Applied Python API of **Z3** to **encode** moves and overlaps of unblock car puzzle into a **SAT** problem
- Solved the puzzle under the **constraint** of limited moves using **conflict-driven clause learning**

Scotland Yard on a Grid | *Course Project* (Oct '21)

- Completed a **Java** implementation of **8** $\times$ **8** grid Scotland Yard using **semaphores** and **concurrency**
- Simulated **client-server model** with socket connections and **upto 10** player threads listening on ports

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

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

RISC Processor | *Course Project* (May '22)

- Devised an efficient **finite-state automaton** for a processor with predefined functionality using **VHDL**
- Tested architecture using testbench built in **Quartus** and a **Python wrapper** for assembly translation

Mandelbrot Zoom Sequence | *Course Project* (Nov '21)

- Rendered Mandelbrot Zoom using **Simple DirectMedia Layer** library and Object-Oriented **C++**
- Used Binary Search **Tree**, Bipartite **Graph** and **Heap** data structures for parts of the functionality

Graphic Snake Game | *Self Project* | *Learner's Space, IIT Bombay* (Jul '21)

- Implemented a **graphics-based** snake game using **object-oriented Python** and **PyGame** module

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 | *IIT Bombay* (Dec '21 - Jun '22)

- **MA109 - Calculus I**: Selected as a tutor for weekly interactive sessions with **45+** first-year students
- **MA106 - Linear Algebra**: Assisted the professors by **coordinating** exams and arranging sessions
- **BB101 - Biology**: Part of a team of **20** UG TAs and **25** PG TAs for tutoring **600+** first-year students

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

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

Technical Skills

Languages	Python, C/C++, Java, Dart, LaTeX, VHDL, Assembly, Bash, Sed, Awk, Prolog
Data Science	NumPy, Pandas, Matplotlib, SciPy, OpenCV-Python, Scikit-Learn, AzureML
Development	Django, JS, HTML, CSS, React, Redux, PostgreSQL, Flutter, Android Studio
Software	MATLAB, Git, Quartus, Wireshark, Keil μVision, NS3, VTune, GDB, Docker

Major Courses Undertaken

Mathematics	Calculus, Linear Algebra, Differential Equations, Probability, Derivative Pricing
Computer Science	Discrete Structures, Data Structures & Algorithms, Data Analysis & Interpretation, Software Systems, Algorithm Design & Analysis, Computer Networks, Logic, Digital Logic Design & Computer Architecture, Medical Image Computing, Automata Theory*, Operating Systems*, Artificial Intelligence & Machine Learning*, Foundations of Intelligent & Learning Agents*, Research & Development*

(* to be completed by November '22)

Extracurricular Activities

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