Shreyas Ajit Katdare
Computer Science & Engineering
Indian Institute of Technology Bombay

22B0636
B.Tech.
Gender: Male
DOB: 08/05/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	HSC	Lakshya prep high school and junior college	2022	94.50%
Matriculation	SSC	Wamanrao Muranjan	2020	97.20%

Pursuing a **Minor** in **Artificial Intelligence and Data Science**

SCHOLASTIC ACHIEVMENTS

- Granted **AP (Advanced Performer)** grade (**top 1%** of students) in **3 courses** including **Computer Programming**. *(2023)*
- Awarded **Change of Branch** to **Computer Science & Engineering** department (only **18** out of **1400+** students).*(2023)*
- Secured percentile of **99.636** in **JEE Mains** (**1M+** candidates) & **98.62** in **JEE Advanced** (**2.5L+** candidates).*(2022)*
- Awarded the prestigious **KVPY fellowship** by **IISc** Bangalore and secured **AIR 1088** in KVPY 2022 -SX. *(2022)*
- Secured **All India Rank 16** in **Maharashtra Common Entrance Exam** out of over **2.3 Lakh+** candidates. *(2022)*
- Bagged **Silver Medal** in the prestigious **Dr. Homi Bhabha Junior Scientist Talent Search Competition**. *(2016)*
- Secured **All India Rank 9** in **All India Open Mathematics Scholarship Examination** conducted by the **IPM**.

PROFESSIONAL EXPERIENCE

Terrastack Technologies | Software Development Intern   *(Summer 2024)*
A collaboration between **Settlement Commissioner, Department of Land Records** *and* **Google Research**

- Worked on a project that aims to generate **modified village maps** that respect farm boundaries on ground while ensuring **minimum deviation** in **area** and **shape** from the digitized paper maps, for **40000** villages across Maharashtra.
- Developed custom **QGIS plugins** to streamline land record management and spatial data analysis, ensuring seamless integration with **PostgreSQL** databases using **Python** & **PyQt API** to enhance overall data processing efficiency.
- Designed **map editing tools** for precise spatial adjustments and dynamic visual updates using **PyQGIS** & **PostgreSQL**.
- Developed a **codebase** consisting of over **5K+ lines** along with comprehensive **documentation** for all the plugins.

KEY PROJECTS

Algorithmic Trading   *(Autumn 2023)*
Guide: Prof. Ashutosh Gupta | Course Project, Data Structures and Algorithms   *IIT Bombay*

- Implemented a simple **buy low, sell high** strategy, using stock values estimated from the most recent traded price.
- Created a **model of trading market** system that handled orders, their expiration. Implemented an advanced **priority queue** mechanism to match orders of traders prioritizing the **price** followed by **time** ensuring fairness.
- Developed an **efficient algorithm** leveraging comprehensive **order book** processing to detect **arbitrage** opportunities across multi-quantity stock orders, optimizing market strategies for consistent **profit** with no net stock transactions.
- Implemented a **moving median** strategy to trade in the market, improving trading **efficiency** and **profitability**.

Semi-Automatic Brain Tumor Segmentation   *(Spring 2024)*
Guide: Prof. Suyash Awate | Course Project, Medical Image Computing   *IIT Bombay*

- Implemented the **Multiscale Otsu Segmentation** algorithm on original and edge-aware smoothed MRI images.
- Applied **K Nearest Neighbours** algorithm to combine the segmentations and generate improved segmentation.
- Extracted the tumor region using the **bi-directional region growing** algorithm based on an initial seed point.
- Achieved a **true positive rate** of about **95%** and a **false positive rate** of **0.6%** validating the robustness of algorithm.

Cache Optimizations & Data Prefetching   *(Autumn 2023)*
Guide: Prof. Biswabandan Panda | Course Project, Digital Logic Design & Computer Architecture   *IIT Bombay*

- Implemented **LRU, FIFO, LFU** and **BIP** replacement policies for the L2C cache within **ChampSim** micro-architecture simulator and conducted comparative analysis on Speedup and L2C Miss Rate across different traces.
- Explored the implementations of the **IP-Stride prefetcher** and implemented the design and optimization of a **Stream prefetcher**, determining prefetching degree and monitoring region distances to amplify **system Speedup**.
- Achieved a **16.8 %** significant enhancement in **IPC** and a **speed up** of **1.30** compared to the IP-Stride prefetcher.

Sentiment Analysis & Text Generation   *(Summer 2024)*
Self Project   *IIT Bombay*

- Developed an **LSTM-based** sentiment analysis bot using the **IMDB dataset** and **GloVe embeddings**, performing text cleaning and normalization to classify movie reviews and provide ratings out of 10 with semantic understanding.
- Designed & trained a **many-to-one LSTM** model on a text corpus to generate coherent & contextually relevant sequences.
- Enhanced text generation variability & coherence by implementing **entropy scaling** & adjusting **softmax temperature**.

OTHER PROJECTS

CNN from Scratch *(Spring 2024)*
Guide: Prof. Swaprava Nath | Course Project, Artificial Intelligence & Machine Learning — IIT Bombay

- Developed a basic **Convolutional Neural Network** from scratch in **Python** using **NumPy** to gain a deep understanding of CNN operations, architecture, their practical implementation details and performance analysis.
- Trained the CNN model on the **MNIST** dataset to classify handwritten digits, achieving high accuracy of about **98%**.
- Implemented a **CNN** in **PyTorch** to classify **32×32 RGB** weather images into different weather condition classes.

Enhancing xv6 OS functionality *(Spring 2024)*
Guide: Prof. Mythili Vutukuru | Course Project, Operating Systems — IIT Bombay

- Added multiple **System Calls** in the **xv6 operating system** codebase to enhance process & memory management.
- Implemented the **weighted round robin scheduler** in xv6 enhancing process scheduling based on priority values.
- Implemented **Demand Paging** and enhanced **fork** with **Copy-On-Write** functionality optimizing memory usage.

Text Processing and Compression *(Autumn 2023)*
Guide: Prof.Ashutosh Kumar Gupta | Course Project, Data Structures and Algorithms — IIT Bombay

- Designed an **auto-complete feature** for a dictionary of words using a **Prefix Trie**, and the **KMP algorithm**.
- Explored the **Lempel-Ziv'77 algorithm** to perform lossless compression and advanced back-referencing techniques.
- Implemented text compression using **RLE algorithm and Huffman coding** and compared their relative efficiencies.

Strategic Game Agent Development *(Spring 2024)*
Guide: Prof. Swaprava Nath | Course Project, Artificial Intelligence & Machine Learning — IIT Bombay

- Developed strategies for **Tic-Tac-Toe** using **backward induction** to find the **subgame perfect equilibrium**.
- Implemented **Alpha-Beta Pruning** algorithm for a zero sum game **Notakto** to find the **maxmin value** for any given game history, significantally optimizing the decision-making process for maximizer and minimizer player.
- Tested the computed policies by playing against the bot strategies using a custom script with the **Pygame** package.

Building a Shell *(Spring 2024)*
Guide: Prof. Mythili Vutukuru | Course Project, Operating Systems — IIT Bombay

- Developed a **Shell** in **C** to execute Linux commands using **fork**, **exec** and **wait** system calls managing user inputs.
- Added functionality to include **background execution**, ensuring **SIGINT** signal terminates only foreground process.
- Extended shell functionality to include both **Series** and **Parallel** execution of multiple **foreground** processes.

POSITIONS OF RESPONSIBILITY

Teaching Assistant | MA 105 - Calculus, MA 110 - Linear Algebra & Differential Equations *(2023-24)*

- Conducted weekly tutorial sessions for **35+ students** in association with **Department of Mathematics IITB**
- Arranged additional concept discussion sessions and hosted doubt discussion forum on WhatsApp

Mentor | Seasons of Code, Web & Coding Club IIT Bombay *(Summer 2024)*

- Guided 8 students on a project based on sentiment analysis & text generation using **RNN** and **LSTM**

TECHNICAL SKILLS

Programming Languages	C/C++, Python, MATLAB, SQL, VHDL, MIPS, PostgreSQL, PyQGIS, HTML
Data Science Libraries	PyTorch, NumPy, SciPy, Matplotlib, Pandas, Jupyter Notebook, Pulp, Pygame
Softwares and Tools	Git, GitHub, LaTeX, Docker, Autocad, QGIS, PostGIS, MarkDown

COURSES UNDERTAKEN

Computer Science	†Data Structures and Algorithms, Discrete Structures, Data Analysis and Interpretation, Design and Analysis of Algorithms, †Digital Logic Design and Computer Architecture, † Artificial Intelligence and Machine Learning,† Operating Systems, Medical Image Computing, Logic and Automata Theory, †Software Systems Lab**, †Computer Networks**, †Abstractions & Paradigms in Programming**,Computer Programming and Utilization
Mathematics	Calculus, Linear Algebra, Differential Equations, Optimization Models
Others	Quantum Physics, Classical Physics, Engineering Mechanics, Makerspace, Physical Chemistry, Organic & Inorganic Chemistry, Biology, Economics, Management, Philosophy

*†Course has corresponding lab   **to be completed by November 2024*

EXTRACURRICULAR ACHIEVEMENTS

- **Active Competitive Programmer** : Achieved a contest rating of **1853 (4 stars)** on **CodeChef** platform.*(2024)*
- Completed an intensive year-long **National Sports Organisation (NSO)** programme in **Chess** at IIT Bombay.*(2023)*
- Built a **Line Following Bot** which can climb **inclined surface** & **deliver goods** as a project in makerspace.*(2023)*
- Secured **Gold Medal** in **National Karate Championship** conducted by **Nihon Shotokan Sports Organization**.
- Achieved the prestigious **black belt in Karate** showcasing discipline, dedication for **9+ years** in martial arts. *(2018)*