**Chaitanya Aggarwal**
**Computer Science & Engineering**
**Indian Institute of Technology Bombay**

**210050038**
**B.Tech.**
**Gender: Male**
**DOB: 07/11/2003**

| Examination | University | Institute | Year | CPI / % |
|---|---|---|---|---|
| Graduation | IIT Bombay | IIT Bombay | 2025 | |
| Intermediate | CBSE | Sri Guru Harkrishan Senior Secondary Public School | 2021 | 97.00% |
| Matriculation | CBSE | St. Anne's Convent School | 2019 | 98.40% |

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

## Scholastic Achievements

- Secured **All India Rank 8** in Joint Entrance Examination **Advanced** amongst the 1,50,000 candidates *(2021)*
- Achieved **All India Rank 51** and was awarded the prestigious **KVPY** fellowship by **IISc Bangalore**, India*(2020)*
- Awarded 2 **Advanced Performer(AP)** grade for exceptional performance in **Differential Equations**, **Economics** *(2022/3)*
- Received the **National Talent Search Examination** scholarship with **State Rank 1** conducted by NCERT*(2019)*
- Secured **All India Rank 62** in Joint Entrance Examination **Main** amongst the 0.9 Million candidates *(2021)*

## Olympiads and Scholarships

- One of **Top 30** students of North India to qualify **Regional Mathematics Olympiad** and appear for **INMO**. *(2020)*
- Amongst **6** (out of 1400) students shortlisted for interview stage of the prestigious **Aditya Birla Scholarship***(2022)*
- Ranked among the **National Top 10** in **Indian Olympiad Qualifier Astronomy Part II** and selected for and successfully completed the Orientation Camp 2021 for International Olympiad on Astronomy and Astrophysics*(2021)*
- Ranked among the National **Top 64** in **Indian Olympiad qualifier in Chemistry Part II** and selected for and successfully completed the Orientation Camp 2021 for **International Chemistry Olympiad** by **TIFR** *(2021)*
- Amongst the **Top 47** to qualify the **Indian National Astronomy Olympiad** conducted by **HBCSE** *(2020)*

## Work Experience

**Franklin Templeton Investments** | *Software Development and Data Science Intern* *May'23-July'23*

- Collaborated with Research Analysts to develop interactive charts, tables and various tools on the internal website using **Php and SQL** in backend and **JavaScript and AmCharts** in frontend to facilitate analysis of bonds
- Automated data extraction from **Bloomberg** using Python (xbbg and blpapi libraries), and facilitated seamless storage in CSV format; Developed and scheduled **Perl** scripts to subsequently upload the files to MySQL database
- Worked with Data Scientists on a loan default model using the **Random Forest** algorithm using Databricks and Spark
- Developed a Jupyter notebook that uses Bloomberg's **BAM** Model and Custom Prepayment Scenarios to generate profiles

## Key Projects

**FastChat** *Autumn 2022*
*Guide: Prof. Kavi Arya | Course Project : Software Systems Laboratory* *IIT Bombay*

- Developed a messaging platform that allows clients to share text and **images** through direct messaging or **group chat**
- Implemented **end-to-end encryption** of the messages using **Fernet** for group chats and **RSA** for direct messaging
- Used **PostgreSQL**'s Python API to maintain user profiles, online-users, public keys and storing undelivered messages
- Achieved **low latency** (order of 0.1s) and high-throughput by using **multiple servers** and a separate load balancing server

**Railway Itinerary - Journey Planner and Review System** *Autumn 2022*
*Guide: Prof. Supratik Chakraborty | Course Project : Data Structures and Algorithms Lab* *IIT Bombay*

- Assembled a Railway Journey Planner which stores and retrieves data on stations, trains, journeys, their reviews and ratings
- Implemented data structures like **Dictionaries, AVL Trees, Binary Heaps** to handle the data and perform quick queries
- Implemented **KMP** to retrieve reviews with desirable words; added **Search-Completion** for stations by using **Tries**
- Used popular algorithms like **Depth First Search, QuickSort, Dijkstras, BFS, MergeSort** and their **modifications** to allow the user to plan efficient journeys based on certain constraints such as **cost** and **time optimization**

**Bokeh Generator** *Winter 2022*
*Winter in Data Science | Deep Learning* *Analytics Club, IIT Bombay*

- Implemented a deep learning model to render **Non-Uniform Bokeh Effect** on complex input data with multiple objects
- Used **TensorFlow** to create a **Inverted Pyramid** Convolutional Neural Network (CNN) based on **PyNet CNN**
- Trained the model on 5k+ shallow/wide depth-of-field image pairs and achieved realistic looking results from model

**Cache Optimisation for Graph Applications** *Spring 2023*
*Guide: Prof. Biswabandan Panda | Course Project: Digital Logic and Computer Architecture* *IIT Bombay*

- Used **ChampSim** micro-architecture simulator to analyse cache and memory access patterns for various Graph Algorithms
- Implemented Cache hierarchies: Inclusive, Exclusive, Non-Inclusive and Replacement policies: LRU, LFU, LFRU, and FIFO
- Generated and plotted data by running traces on different architecture combinations with over **30 Million** instructions
- **Improved IPC** in graph workloads by developing a combination of exclusive and non-inclusive cache hierarchies

**Forecasting Fours** *Autumn 2022*
*HELLO FOSS | Open Source Github Event* *Web and Coding Club, IIT Bombay*

- Created a **Deep Neural Network** to classify the shot played by the batsman; trained the network on **5k+** images
- Desgined the architecture based on **ResNet9**, leveraged the use of **Skip Connections** to address the degradation problem
- The model consisted of **Convolution Layers**, **Max Pool Layers**, utilized **ReLU** activation and **Cross Entropy Loss**
- Utilized **PyTorch** for the project, fine-tuned hyperparameters to improve performance and achieved an accuracy of **90+**%

**CodeWars-V3** *Spring 2023*
*CodeWars | Bot Programming Competition* *Web and Coding Club, IIT Bombay*

- Designed a **multi-player strategy** game where players use the Custom API to create strategies to win a 4 player game
- Implemented the **back-end** of the game in **C++** and connecting it to the **Python API** using socket programming
- Incorporated modularity and documentation in code and used the **SFML** library to generate pixelized graphics of game

**Tic-Tac-Toe** *Autumn 2022*
*Guide: Prof. Kavi Arya | Course Project : Software System Lab* *IIT Bombay*

- Developed a multi-client version of the famous two player game tic-tac-toe in **Java** using **Socket Programming**
- Modeled each player as both a client and a server to allow them to listen to each other using **Server Socket** connections
- Implemented the **Peer-to-Peer** Model between players and achieved optimized game performance with **minimal lag**

**Introduction to Algorithmic Trading** *Summer 2022*
*Summer of Science | Learning Project* *Maths and Physics Club, IIT Bombay*

- Learnt about **Modern Portfolio Theory** and **Markowitz's hypothesis** and how it is used by traders in practice
- Understood methods to prevent **Data Snooping Bias** and **Survivorship Bias** and how to backtest strategies
- Gained knowledge about trading strategies such as **Momentum Strategy** and **Mean Reversion Strategy**

**Bubble Trouble Game** *Autumn 2021*
*Guide: Prof. Parag Chaudhuri | Course Project: Computer Programming and Utilization* *IIT Bombay*

- Developed a multi-level version of the classic bubble shooter game using **SimpleCpp graphics package** of **C++**
- Used **Object Oriented Programming** to simulate the balls, shooter and bullets and interaction between them
- Implemented physical principals like **projectile motion** of balls, elastic collisions and achieved smooth gameplay

## Positions of Responsibility

**Institute Web and Coding Convener** | *Web and Coding Club, IIT Bombay* *Jun'22 - Apr'23*

- Working in a team of **8** to organise 40+ events catering to the programming interests of **10K+** Institute students
- Moderated the **Git and Github Workshop** and handled the queries and doubts of 200+ attendees for the assignment
- Introductory Host for the **Solana Developers Tour** India, Mumbai Edition attended by 250+ from the institute and outside

**Moderator** | *Learners' Space by Academic Council, IIT Bombay* *Jun'22 - Jul'22*

- Designed a course on **Introduction to Blockchain** that covered **Solidity, Smart Contracts and Brownie**
- Handled the doubts of **500+** registered students and designed and corrected the assignments for the course

## Technical Skills

| | |
|---|---|
| **Programming Languages** | Proficient in: C++, Python \| Familiar with: Java, Bash, MATLAB, Sed, AWK, Prolog |
| **Data Science** | PyTorch, Keras, TensorFlow, Matplotlib, NumPy, Pandas, Scikit-learn |
| **Miscellaneous** | HTML, Bootstrap, Javascript, CSS, Git, LaTeX, Sphinx, Solidity, PHP, PostGreSQL |

## Relevant Courses

**Computer Science** : Medical Image Computation, Decision Analysis and Game Theory, Computer Networks, Data Analysis and Interpretation, Data Structures and Algorithms, Design and Analysis of Algorithms, Logic for Computer Science, Discrete Structures, Software Systems Lab, Digital Logic and Computer Architecture, Abstractions and Paradigms for Programming
**Mathematics** : Optimisation Models, Calculus I and II, Differential Equations, Linear Algebra

## Extracurricular

- Undertook CP - newbit to Pro in Seasons of Code'23 and reached a max rating of **Expert** in **CodeForces** *(2023)*
- Ideated a Bussiness Model as a participant in **EnB Buzz** to promote adoption of **EVs** in India, and concluded that hatchback EVs are **more profitable** as Cabs than traditional vehicles when driven for more than 0.4 million kms *(2021)*
- Bagged the **Exemplary Design and Innovation** award in the RC Plane Competition by AeroModelling Club *(2022)*
- Performed in Battle of Bands as the **Lead Guitarist** in front of 400+ people conducted by Symphony, IIT Bombay *(2022)*