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

Scholastic Achievements

- Achieved **99.81 Percentile** in **JEE-Main** out of over 1 million candidates *(2021)*
- Secured **All India Rank 1207** in **JEE-Advanced** out of over 0.14 million candidates *(2021)*
- Secured **AP(Advanced Performer) grade** for excellent performance in **PH 108-Basics of Electricity & Magnetism**, awarded to 27 out of over 1300 students taking the course *(2022)*
- One of the **17 out of 1400+** students to secure a **Change of Branch** to the department of **Computer Science and Engineering** owing to excellent academic performance in first year at IIT Bombay *(2022)*
- Secured **All India Rank 275** in the prestigious **KVPY (Kishore Vaigyanik Protsahan Yojna)** SX and awarded fellowship by the Department of Sciences, **Indian Institute of Science(IISC) Bangalore** *(2021)*

Key Projects

FastChat
(Autumn 2022)

Guide: Prof. Kavi Arya | Ongoing Course Project : Software Systems Lab *IIT Bombay*

- Developing a messaging software by building a network of clients interacting via servers acting as mediators
- Focusing on obtaining **high throughput** while using only **limited resources** dedicated for the servers
- Ensuring **low latency** of individual message deliveries and **end-to-end encryption** between clients
- Using **python socket library** to develop the network, using **open source libraries** for authentication and communication, **PostgreSQL** database to store the data and **bash** for scripting and collecting results

Lunar Lander using Deep Reinforcement Learning
(Autumn 2022)

Self Project

- Used **Pygame** and **OpenAI's Gym** to train a lunar lander game **Deep Q-Learning with Experience Replay**. Used the **Sequential API** of the Keras library to define the **Q-network** and the **target Q-network**
- Used **Tensorflow Core** to define a **custom loss function** and a **custom training loop** using **GradientTape** to train the model. Used **epsilon greedy policy** to select the action with some amount of random decisions
- Utilized a **deque** for storing the experience buffer and used **experience replay** and **soft update** of the Q targets to stabilize the learning process and improve the model's convergence towards an optimal solution
- **Tuned and optimized model hyperparameters**, including learning rate, batch size, and number of episodes, epilon, gamma, number of timesteps to achieve the best results and solved the environment within 500 episodes

Deep Learning and Neural Networks
(Autumn 2022)

Self Project

- Made a **convolutional neural network** to classify images of handwritten digits using **MNIST** dataset and also made a **GUI** to draw digits using **python Tkinter** and classify them using the model. Made three different models using **TensorFlow Core, Keras Functional API and PyTorch** and compared their performance
- Made many different types of **CNNs** to classify various types of data such as **Traffic signs recogninition, Crack detection, Smile detection, Hand sign recogninition** using **PyTorch** and **Keras Sequential API**
- Successfully implemented **transfer learning** to train a **pretrained MobileNetV2** to classify images of **alpacas** and used **data augmentation** like random rotation and flipping resulting in a highly accurate model
- Implemented **ResNet50's architecture** from scratch using **Keras Functional API** and trained it on a hand sign dataset to classify images of 6 different classes. Compared its performance to a **pretrained ResNet50 model**

Generating Representative Images from a Sample
(Autumn 2022)

Guide: Prof. Suyash Awate | Ongoing Course Project : Data Analysis and Interpretation *IIT Bombay*

- Used **MATLAB** to implement a Monte Carlo simulation of a given distribution and plotted the PDF and CDF
- Used **MATLAB** to use a data set of images of various fruits and sampled random images to generate new representative fruit images using **Principal Component Analysis (PCA)**. Also used PCA to analyse images of handwritten digits from the **MNIST Database** and optimally **reduce the dimensionality** and **reconstruct** the images

Machine Learning *(Autumn 2022)*

Self Project

- Experience in machine learning frameworks such as **scikit-learn, XGBoost, PyTorch, TensorFlow, and Keras**.
- Using Python packages such as **numpy, pandas, matplotlib and seaborn** for data manipulation and analysis. Learnt about **feature engineering** and feature selection techniques to improve the performance of the models
- Learnt about the various machine learning algorithms such as **linear and logistic regressions, clustering using K-means, K-nearest neighbors and decision trees** and implemented them from scratch using numpy and pandas
- Proficiency in using **cross-validation and hyperparameter tuning** to optimize machine learning models
- Used **scikit-learn and XGBClassifer and XGBRegressor** to implement various types of classifiers and regressors to predict and classify various types of data such as **classifying flower species and predicting house prices**

Rail Planner *(Autumn 2022)*

Guide: Prof. Supratik Chakraborty | Course Project : Data Structures and Algorithms Lab *IIT Bombay*

- Designed a simplified vesrion of a railway planner using various data structures and analyzed the space & time complexity and the efficiency to demonstrate the **properties of different data structures in C++**
- Stored trains as a dictionary using **Hash Tables** and devised algorithms for fastest possible journies
- Used **BSTs and then AVL trees** for quick searching using the journey codes and used **Tries** to implement the autocompletion feature while searching for station names and added a feature to accept reviews for journies
- Used **Quicksort** to order trains by day and time, implemented the **KMP-string matching algorithm** for allowing review searches by using keywords and implemented **Heaps** to allow filtering the reviews by their rating

Multiplayer Tic-Tac-Toe *(Autumn 2022)*

Guide: Prof. Kavi Arya | Course Project : Software Systems Lab *IIT Bombay*

- Used **Java Socket Programming** for **inter process communication** using the **peer-to-peer model**
- Created the tic tac toe game using this model and handled various newtork and **IOStream exceptions**

Personal Website *(Autumn 2022)*

Guide: Prof. Kavi Arya | Course Project : Software Systems Lab *IIT Bombay*

- Made a personal website to be hosted on the CSE department server using **HTML and CSS and JavaScript**
- Added various advanced **CSS** features animations, transitions, static scroll images, modals, checkboxes and slideshows
- Used **JavaScript** to make the website interactive, gauge user-choices and render web-pages accordingly and deployed the website on an SSH server; used **BootStrap** to impelement standard navigation bars, footers and other features

Bubble Trouble *Autumn 2021*

Guide: Prof. Parag Chaudhuri | Course Project : Computer Programming and Utilization *IIT Bombay*

- Developed a video game using the **simplecpp graphics library** and object oriented programming in **C++** with a physics simulation to model the motion of bubbles along with features such as timers, health bars, levels and scores

Technical Skills

Programming Languages	C++, C, Python, MATLAB, Java, Bash, Solidity, Sed, AWK
Software & Tools	Tensorflow, Pytorch, Keras, Scikit-learn, OpenCV, Seaborn, Git, LaTeX, MySQL, NumPy, Pandas, Matplotlib, Doxygen, Sphinx
Web Development	HTML, CSS, JavaScript, BootStrap

Courses Undertaken

Mathematics	Calculus, Linear Algebra, Differential Equations, Optimization Models
Computer Science	Data Structures and Algorithms#, Discrete Structures, Data Analysis and Interpretation, Software Systems Laboratory, Computer Networks*#,, Digital Logic Design*#, Design and Analysis of Algorithms*, Logic for Computer Science*, Introduction to Blockchains Cryptocurrencies and Smart Contracts*, Computer Vision*
Miscellaneous	Game Theory and Decision Analysis*, Introduction to Electric and Electronic Circuits, Quantum Physics and Application, Basics of Electricity and Magnetism, Engineering Graphics and Drawing, Organic and Inorganic Chemistry, Physical Chemistry, Biology

(to be completed by April 2023)*
(# Theory + Lab)

Extracurricular

- Successfully completed one year under **National Sports Organization(NSO)** in **Chess** at IIT Bombay *(2022)*
- Pitched a **Business Model Canvas** for a startup in the health sector which entailed making online ambulance bookings, for the EnB Buzz competition conducted by the **Entrepreneurship cell of IIT Bombay** *(2021)*
- Participated in a team of 3 and wrote a working script and successful submission in **Google Hashcode 2021** *(2021)*
- Worked in a team of 4 to make an ESP32 **WiFi-controlled** bot for XLR8 conducted by **ERC, IITB** *(2022)*