**Ankit Kumar Jain**
**Computer Science & Engineering**
**Indian Institute of Technology Bombay**

**190050019**
**B.Tech.**
**Gender: Male**
**DOB: 11/8/2000**

| Examination | University | Institute | Year | CPI / % |
|---|---|---|---|---|
| Graduation | IIT Bombay | IIT Bombay | 2023 | |
| Intermediate | CBSE | Delhi Public School Ranchi | 2019 | 91.80% |
| Matriculation | CSBE | Delhi Public School Ranchi | 2017 | 10 |

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

## Scholastic Achievements

- Secured **Global Rank 55** in Kickstart Round A organised as part of **Google Coding** Competitions *(2021)*
- Qualified for **Round 2** of the prestigious Hacker Cup organized under **Facebook Coding** Competitions *(2020)*
- Secured **All India Rank 30** in Joint Entrance Exam, Advanced among 200,000 candidates *(2019)*
- Achieved **All India Rank 170** in Joint Entrance Exam, Main among 1.2 million candidates *(2019)*
- Secured an **Advanced Performer (AP)** grade for exceptional performance in **Discrete Structures** *(2020)*
- Active Competitive Programmer : Codechef - **2222**(max) (6 Star), Codeforces - **2236**(max) (master)

## Olympiads & Scholarships

- Recipient of the prestigious **Tower Research Capital Scholarship** awarded by TRC India *(2020-21)*
- Awarded **Gold Medal** for being among India's **top 40** in Indian National Physics Olympiad (**INPhO**) *(2019)*
- Received **KVPY** Fellowship twice securing **All India Rank 104** and **128** in SX and SA Stream respectively *(2017-18)*
- Secured **1st** rank in Jharkhand in Regional Mathematics Olympiad (**RMO**) for three consecutive years *(2016-18)*
- Awardee of National Talent Search Examination (**NTSE**) Scholarship by NCERT, Government of India *(2016)*

## Work Experience

**Privacy Preserving Explainable Hierarchical Time Series Forecasting** *Summer 2021*
*Research Internship* *IBM Research Labs India*

- Devised a setup where retailers can share their data with an **aggregator** to help in capturing the **global market demand** and integrated state of the art **univariate** time series forecasting methods to our setup
- Developed a framework to empirically investigate the advantage of using various types of **aggregate** in a collaborative forecasting setup as an **exogenous** time series for the local sales prediction at the store level
- Integrated a **differential privacy** setup and analysed the tradeoff between data privacy and forecasting accuracy
- Investigated the impact of aggregation on **Regressor Reduction** forecasting method using **TimeSHAP** algorithm

**Pluribus - No Limit Texas Hold'em Poker Superhuman AI** *Winter 2020*
*Internship | Reinforcement Learning* *Octro Inc.*

- Investigated Hand Isomorphism for lossless abstraction of information to reduce the game size and implemented **Potential Aware Imperfect Recall Abstraction** to make it feasible to run a search algorithm
- Clustered states using expected hand strength and kmeans++ unified with **Earth Mover's Distance**
- Implemented **Linear Monte Carlo Counterfactual Regret Minimisation** with pruning for an efficient traversal of the game tree and trained a blue print strategy for the information abstracted game using self play

## Key Projects

**Speaker Identification for Household Scenarios** *Spring 2021*
*Guide: Prof. Preethi Jyothi | Course Project* *IIT Bombay*

- Extracted the **global acoustic representation** of an utterance by mining correlation across frames using **Self Attention** on the utterance **spectrogram** and trained an end to end speaker identification model using GE2E loss
- Incorporated **adversarial** training by constructing adversarial perturbations using the **Fast Gradient Method** to make the model more generalizable and robust to **malicious perturbations** of the input utterance
- Trained the model and evaluated it on **VCTK 0.92 Corpus** and achieved an **EER** of **9.12** for unknown users as against **6.56** in the original **SAASI** research paper by Amazon, UCLA and ND

**Contrastive Few Shot learning with Domain Adaptation** *Ongoing*
*Guide: Prof. Biplab Banerjee | Summer Undergraduate Research Program* *IIT Bombay*

- Working on a **Contrastive Loss** based model for the **Few Shot Learning** problem trained on a synthetic domain and transferring it to real world domain with **semi-supervised fine tuning** on few shot samples
- Modifying Google Research's **SimCLR** model to account for domain adaptation by training it parallelly with an **adversarial domain adaptation network** to create a discriminative feature space for the target domain

**Intelligent Stock Trading Agent** *Summer 2020*
*Institute Technical Summer Project | Deep Reinforcement Learning* *IIT Bombay*

- Investigated the use of deep reinforcement learning based algorithms namely, **Deep Deterministic Policy Gradient (DDPG)** and **Deep Double Q Network (DDQN)** for developing an intelligent stock trading agent
- Proposed a **parallel double decision** architecture to subdue any bias in decision making by the agent and trained it on a self developed **stock trading environment** based on the data scrapped from the internet
- Explored the use of **recurrent layers** in the network to make it more robust to the **randomness** of the stock data

**Character Region Awareness For Text Detection** *Autumn 2020*
*Guide: Prof. Biplab Banerjee | Course Project* *IIT Bombay*

- Developed a **Weakly Supervised Learning** Framework to identify text in an image by estimating **region score** and **affinity score** circumventing the lack of character boxes in major datasets for **text detection**
- Devised a **pseudo ground truth** labelling setup for estimating the region score and affinity score in real images using the interim model and encoded the probabilities of the character center into a **Gaussian Heatmap**
- Implemented the architecture based on **CRAFT** algorithm, which is **state of the art** in scenic text detection

**OCDE : Online Competing and Development Environment** *Autumn 2020*
*Guide: Prof. Amitabha Sanyal | Course Project* *IIT Bombay*

- Developed a **programming contest platform** and integrated an **IDE**, using Django and Angular
- Created a scalable **compilation module** enabling host to add multiple language support with custom options
- Implemented a custom **tree-like** data structure on the server for **CRUD** operations on files and directories

**Reinforcement Learning in Games** *Summer 2020*
*Self Project* *IIT Bombay*

- Explored various Reinforcement Learning based Algorithms like **Actor-Critic** in conjunction with **Tile Coding** and **Model Learning** on OpenAI **Control Problems** like Cartpole, Mountain Car, Pendulum etc
- Implemented Deep Reinforcement Learning based **Duelling Network** for Atari games in **OpenAI GYM** environment
- Achieved best score of **354** against **418** reported in the literature on **Breakout** environment with Duelling Network

## Other Projects

- **Virtual Paper Keyboard -** Developed a **wireless** paper based keyboard usable on any flat surface through a PC's webcam and implemented touch detection through a camera using **OpenCV** in Python *(SoC Project)*
- **Sudoku Solver -** Used image processing in **OpenCV** for the extraction and isolation of digits from a sudoku and trained a Convolutional Neural Network in **Tensorflow** on **MNIST** data for **digit recognition** *(Self Project)*
- **Image Segmentation -** Implemented **Quad Tree** based image segmentation and analysed the applications on **hyperspectral** and **medical** images based on different modes of homogenising leaf nodes *(Course Project)*

## Technical Skills

| | |
|---|---|
| **Programming and Tools** | C++, C, Python, Bash, LaTeX, MATLAB, Git, NS3, Android Studio, Django |
| **Data Science** | Tensorflow, Pytorch, Keras, statsmodels, Numpy, OpenCV, Pandas, Matplotlib |

## Positions of Responsibility

**Institute Technical Convener** — *Web and Coding Club, IIT Bombay* *July 2020 - April 2021*

- Mentored **200+** students in Machine Learning under **Learner's Space** course offered by WnCC, IIT Bombay
- Co-created a **competitive programming** contest **Codegames** for beginners to familiarise them with this domain

**Teaching Assistant :** Data Structures and Algorithms (CS 213M)
**Summer of Science :** Guided students in understanding the realm of **Reinforcement Learning** and **NLP**
**Seasons of Code :** Co-mentored students towards accomplishment of the solving of **2048 game** using Deep RL

## Key Courses

**Computer Science :** *Learning with Graphs, *Foundations of Intelligent Agents, Automatic Speech Recognition, *Operating Systems, *Computer Architecture, AI and Machine Learning, Data Structures and Algorithms, Software Systems Lab, Discrete Structures, Logic for Computer Science, Data Analysis and Interpretation, Computer Networks
**Miscellaneous :** ML for Remote Sensing, Advanced Image Processing for Remote Sensing, Calculus, Linear Algebra
**to be completed by November 2021*

## Extracurricular

- **HackerRank** certified **Intermediate Problem Solver** in Competitive Programming *(2020)*
- Stood $4^{th}$ in **RecogniSign traffic sign detection** competition organised under Techfest, IIT Bombay *(2020)*
- Bagged $3^{rd}$ position in **Bazinga** (maths competition) organized by Maths and Physics Club, IIT Bombay *(2019)*
- Acquired proficiency in badminton under **NSO** (National Sports Academy), IIT Bombay *(2020)*
- Secured $2^{nd}$ position in badminton doubles tournament organised by CSE Department, IIT Bombay *(2019)*