Neeraj Balkrishna Jadhav | **200050086**
Computer Science & Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 1/9/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	Maharashtra State Board	Deogiri College	2020	90.65%
Matriculation	ICSE	Ryan International School	2018	96.00%

Pursuing **Honors** in **CSE** and **Minor** in **Artificial Intelligence & Data Science**.

Scholastic Achievements

- Achieved **All India Rank 46** in Joint Entrance Examination Advanced amongst 150,000 candidates *('20)*
- Secured **All India Rank 186** in Joint Entrance Examination Main amongst 870,000 candidates *('20)*
- Secured a perfect **SPI** of **10** with **AA** grade in all courses in **Autumn semester** of freshman year *('20)*
- Amongst National **Top 1%** candidates in National Standard Exams in **Physics** and **Chemistry** *('19)*
- Selected in **top 300** candidates for Indian National **Physics** and **Chemistry** Olympiads *('19)*
- Awardee of the prestigious **National Talent Search Examination (NTSE)** scholarship, NCERT. *('18)*

Work Experience

Automated Orchestration | *IBM research internship* *(May '22 - Jul '22)*
Guide: Dr. Kushal Mukherjee, Research Scientist @ IBM, IRL

- Worked on **end-to-end orchestration** of business tasks from the **goal-oriented conversation** traces
- Studied **process mining** from tabular data extending it using **deep learning** for unstructured purposes
- Trained **transformer models** on open-source conversational datasets for future **ChatOps** applications

Key Projects

Joint Audio-Visual Deepfake detection | *Course Project* *(Mar '22 - Apr '22)*
Guide: Prof. Preethi Jyothi, Dept. of Computer Science & Engineering

- Extensively studied, implemented and **parallely trained** the model from **Facebook's ICCV '21** paper
- Implemented **Late fusion** and **2+1 Stream fusion** algorithms on visual and audio stream features
- Exploited out of sync visual and audio **Mel spectrograms** to accurately detect the fakes after passing through **inter, intra and joint attention** blocks of the 2+1 stream network

Multilingual Speech Recognition Application | *Course Project* *(Mar '22 - Apr '22)*
Guide: Prof. Preethi Jyothi, Dept. of Computer Science & Engineering

- Trained **tied-state triphone HMMs** using **Kaldi** toolkit to transcribe speech samples in **Wolof** language
- Implemented **text-to-speech** synthesizer with **SoX CLI** using **concatenative synthesis** on transcripts
- Fine-tuned a **multilingual end-to-end ASR neural network pipeline** for **speech-to-text and text-to-speech** applications on **Marathi and Kannada** languages using the **Coqui** Python library

Image Generative Pre-Trained Transformer | *Course Project* *(Sept '21 - Nov '21)*
Guide: Prof. Biplab Banerjee, Dept. of CSRE

- Created a novel **Generative Transformer** model capable of generating images **autoregressively**
- Enhanced the efficiency **3 times** by converting traditional **24-bit RGB** color palette to **9-bit** space using **k-means clustering** and further adjusted it by reducing dimension to 32×32 to preprocess the dataset
- Utilised a pre-trained **GPT-2** model (**ImageNet** dataset) then **linear probe** evaluation on **CIFAR-10** dataset and performed domain agnostic **fine-tuning & representational learning** eventually

Host-to-Host File Sharing Application | *Course Project* *(Mar '22 - Apr '22)*
Guide: Prof. Kameswari Chebrolu, Dept. of Computer Science & Engineering

- Created a **100% reliable peer-to-peer** network software using **C++ socket programming libraries**
- Designed and implemented several protocols for **internode communication** utilising the **TCP backbone**
- Devised multiple **error handling** strategies ensuring smooth sharing with **zero data loss** at the receiver

Rush Hour Algorithmic Solution | *Course Project* *(Jan '22 - Feb '22)*

Guide: Prof. Ashutosh Gupta, Dept. of Computer Science & Engineering

- Figured out **arithmetic and boolean** encodings for the puzzle and solved them using **z3py** library
- Compared efficiencies of different methods of SAT solving and learnt about the implementation subtleties
- Obtained the solution trace from the **parse tree** using **Conflict Driven Clause Learning** algorithm

Object Detector and Tracker | *Open source contribution* *(Sept '21 - Oct '21)*

- Developed a **monoclass bounding box regressor** to detect objects within a given sample image
- Used **transfer learning** with **VGG16** trained on **ImageNet** dataset as **classification-stem** model
- Supervised the architecture to include **multiclass classification** branch to enhance regression results
- **Fined-tuned** the model eventually on **CALTECH101** dataset resulting in lower **regression losses**

Visual Sudoku Solver *(Aug '21 - Sept '21)*

Web & Coding Club

- Implemented a 3-layered **Neural Network** for handwritten digit classification on **MNIST** data-set
- Used **OpenCV** based processing algorithms to isolate the sudoku which is then fed into the neural network
- Improved the **test accuracy** by **more than 5%** in **digit classification** task using **data augmentation**
- Created **convolutional neural network** in **PyTorch** to improve accuracy of the recognising model

Modular Object-Oriented Dynamic-Learning Environment | *Course Project (Sept '21 - Nov '21)*

Guide: Prof. Amitabha Sanyal, Dept. of Computer Science & Engineering

- Made a **web app** to facilitate and enhance remote learning providing quick access to educational resources
- Used Python's **Django REST API** framework as a back-end layer and **SQLite** for database management
- Utilised **React.js** to divide front-end into components leading to rapid rendering during testing on **Node.js**
- Created a **Bash CLI** tool as an alternative for all **HTTP & TCP** requests via browser front-end

The Scotland Yard Game | *Course Project* *(Sept '21 - Oct '21)*

Guide: Prof. Amitabha Sanyal, Dept. of Computer Science & Engineering

- Familiarised self with concepts of **concurrency & multithreading** within the realm of process execution
- Implemented the game making use of **socket communication** and **client-server model** in **Java**
- Organised the structure by **synchronizing** the execution and protecting (hindering unwanted entrance to) **critical sections** using **mutexes and semaphores** with the help of in-built barriers
- Stress tested it on **multicore CPUs** running it on **multiple concurrent random threads**

Position of Responsibility

Teaching Assistant | *Calculus* *(Dec '21 - Jan '21)*

- Academically mentored **42** students, solved their doubts and finely **monitored** their progress every week

Relevant Courses

Theoretical CS	Data Structures and Algorithms, Discrete Structures, Data Analysis and Interpretation, Computer Networks, Logic for Computer Science, Extremal Combinatorics, Automata Theory*, Operating Systems*, AI & ML*, Computer Graphics*, Foundations of Intelligent and Learning Agents*
Artificial Intelligence	Automatic Speech Recognition, Machine Learning for Remote Sensing II

** - To be completed by December 2022*

Technical Skills

Languages	C/C++, Java, Python, HTML, CSS, JavaScript, SQL, Bash, Awk, Sed
Softwares	Git, LaTeX, MATLAB, GNU Prolog, GNU Octave, ROS, Wireshark, SoX
Data Science	Huggingface, OpenCV, Tensorflow, PyTorch, Keras, NumPy, MatPlotLib
Development	Bootstrap, PostgreSQL, Django, React.js, Node.js, Android Studio

Extracurricular Activities

- Qualified for the **Table Tennis Quarter Finals** at IBM's Annual tourney
- Completed a year long **NSO** programme of **swimming** at IIT Bombay
- Amongst top 10 teams in **Algorithmic Trading** contest **CodeWars V2** organised by WnCC, IITB
- Selected for coding round of **Halliburton's Landmark DS365.ai AI/ML Innovation Challenge**