Manan Agarwal
Computer Science & Engineering
Indian Institute of Technology Bombay

190050065
B.Tech.
Gender: Male
DOB: 10/30/2000

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	CBSE	JDKPS	2019	95.00%
Matriculation	CBSE	JDKPS	2017	10

Pursuing **Minor** in **Artificial Intelligence and Data Science** and **Honors** in **Computer Science**

Scholastic Achievements

- Secured **All India Rank 14** in **JEE Advanced** amongst 170,000 aspirants **(Haryana State Topper)** *(2019)*
- Secured **All India Rank 194** in **JEE Main** amongst 1.15 million aspirants **(99.98 percentile)** *(2019)*
- Awarded **Advanced Performer's (AP)** grade for exceptional performance in two courses: **Calculus** and **Quantum Mechanics** (awarded to **Top 1% of the class**) *(2019)*
- Qualified for **Orientation cum Selection Camp** (OCSC), for **International Physics Olympiad** *(2019)*
- Awarded **Gold Medal** in Indian National Physics Olympiad (INPhO) (among **Top 46** candidates) *(2019)*
- Awarded **Gold Medal** in Indian National Astronomy Olympiad (INAO) (among **Top 39** candidates) *(2019)*
- Recipient of the prestigious **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship *(2018)*
- Qualified **National Standard Examination** in Physics, Chemistry & Astronomy, conducted by IAPT *(2018)*
- Recipient of **National Talent Search Examination** (NTSE) Scholarship, Government of India *(2017)*
- Received **Best Academic Performance Award** (Haryana Region) by Science Olympiad Foundation *(2017)*

Key Projects and Internships

Forecasting Model for Gross Sales *Summer 2021*
Data Science Intern | Business Excellence Department *Franklin Templeton Investments*

- Developed multiple **time-series forecasting models** for prediction of Gross Sales, including Multivariate Linear Regression, Vector-Auto Regression, Autoregressive Integrated Moving Average (ARIMA), Support Vector Regression, Random Forest, and a **Recurrent Neural Network**- Long Short-term Memory (LSTM).
- Merged Morningstar Categories and established a mapping of resultant groups with suitable Forecasting model, to achieve the predictions within **20%** Mean Absolute Percentage Error and higher than **70% Correlation**.
- Developed a robust **web-scraper** to fetch mandate information from FinSearches and Money Market Directories, and perform **text-analytics** on the retrieved database, to map consultant names with their respective plans.

Edge Detection and Background Subtraction *Spring 2021*
Prof. Ajit Rajwade | Course Project *IIT Bombay*

- Developed a Difference Based Image Noise Model, using Skellam Distribution, on the **Temporal Domain**, to obtain the moving foreground after **background subtraction**, using a suitable Intensity Acceptance Range.
- Implemented an **Edge Detection algorithm**, using the model on Spatial Domain and analysed its performance with other methods like **Canny Edge**, and **RGB Gradient**, on the images captured by DSLR in RAW format.

Compressed Sensing Reconstruction *Spring 2021*
Prof. Ajit Rajwade | Course Project *IIT Bombay*

- Implemented coupled **Compressed Sensing** based **Tomographic** reconstruction of MRI images of the brain.
- Developed a solution for compressive **Temporal Imaging** that recovers a sequence of frames from a single coded-snapshot and overcomes the trade-off between Spatial and Temporal resolution, during video acquisition.
- Implemented Iterative Shrinkage-Thresholding Algorithm (**ISTA**) and Orthogonal Matching Pursuit (**OMP**) algorithm to perform patch-wise reconstruction, assuming sparsity over 2D-DCT Basis and Haar Wavelet Basis.

Fully Homomorphic Encryption *Spring 2021*
Prof. Manoj Prabhakaran | Course Project *IIT Bombay*

- Prepared a **Project Report** on Homomorphic Encryption schemes: describing Syntax and Correctness, properties such as **Strong Homomophism**, and **Compactness**, and the wide range of practical applications.
- Studied in depth, the construction of levelled Fully Homomorphic Encryption scheme: **Brakerski-Gentri-Vaikuntanathan**, based on **Ring Learning with Errors** (RLWE), and Bootstrappable van Dijk construction.
- Studied the application of Homomorphic Encryption schemes in the **Outsourcing** of **Computations**, **Private Information Retrieval**, **Zero-Knowledge Proofs**, Mix-Nets, Watermarking and Fingerprinting schemes.

Red Plag: Plagiarism Checker *Autumn 2020*
Prof. Amitabha Sanyal | Course Project *IIT Bombay*

- Developed **Red Plag, a plagiarism checker** to measure the pairwise similarity between a collection of files.
- Designed a **website with authentication system**, to grant access to certified users and clients of the Red Plag application, with **built-in front end features** such as data visualisation, using graphs and surface plots.
- Integrated a **professional version for C++ Language**, which can remove the declarations, comments, the basic template and replace the functional calls with actual implementation, to **detect attempts of cover-up**.

IITB Proc: Multi-Cycle Processor *Spring 2021*
Prof. Virendra Singh | Course Project *IIT Bombay*

- Designed a **16-bit** computer system with 8 general purpose registers, which can execute 15 different instructions.
- Implemented an ALU, to carry out Addition and Subtraction operations using 16 bit **Kogge Stone Adder**.
- The architecture allows predicated instruction execution like **Jump, BEQ**, and **multiple Load** and **Store**.

Dhwani: A Stammer Friendly Voice Assistant *Summer 2020*
Institute Technical Summer Project *IIT Bombay*

- Developed **Dhwani**, an Android voice assistant that could understand both Hindi and English Voice commands
- Integrated **Neural Machine Translation Model** for Voice Polynomial Calculator, using **TensorFlow Lite**
- Integrated **Text Classifier Models** with **Word Embeddings**, for using Google Maps, or setting up an Alarm

Advanced Data Structures *Autumn 2020*
Prof. Ajit A. Diwan | Course Project *IIT Bombay*

- **Quadtree:** Implemented an efficient Data Structure for **Image Compression**, with operations to set or get pixels, **overlap** or **intersect** two images, **extract** a portion, or **resize the image** to a smaller or larger size.
- **Permutation:** Visualised permutation as a union of disjoint cycles and implemented the **exponent**, **square root** and **logarithm** function in linear time complexity, using the **Extended Chinese Remainder Theorem**.

Competitive Coding *Summer 2020*
Season of Code *Web and Coding Club, IIT Bombay*

- Participated in multiple **Competitive Coding contests**, conducted by Season of Code, Web & Coding Club.
- Studied multiple Problem Solving techniques such as **Convex Hull Trick** and **Square Root Decomposition**.

Positions of Responsibility

Class Representative, UG Second Year *Aug 2020 - April 2021*
Computer Science and Engineering Association

- Assisted the CSE Department in ensuring that **no student** faces any problem during an **Online Semester**.
- Collected **regular feedback** from the batch regarding the courses, and shared them with the faculty members.

Class Representative, UG First Year *Aug 2019 - April 2020*
Computer Science and Engineering Association

- Ensured **proper scheduling of various academic events** such as quizzes, crib sessions, and extra lectures.
- Conducted a **Faculty-Advisor meeting** every month, to bring forth and discuss various concerns of our batch.

Teaching Assistant *Nov 2020 - Feb 2021*
Prof Bhaskaran Raman | CS101

- Assisted Professor in the course CS101: Computer Programming and Utilisation, which introduces freshmen to the basics of computer language, and **proctored** weekly **lab assignments** and **exams**, across the semester.
- Provided guidance to a batch of twelve students, by **conducting** regular **theory doubt sessions**, and **labs**.

Technical Skills

Programming	C++, C, Python, Bash, Java, Kotlin, MySQL, Prolog, Matlab, VHDL
Development	HTML5, CSS, JavaScript, Django, Angular, Android Studio, LaTeX
Data Science	Tensorflow, Numpy, Scipy, Pandas, Scikit-Learn, StatsModels, Matplotlib
Software & Tools	Git, Jupyter, Quartus, BS4, Selenium, AutoCAD, SolidWorks, Wireshark

Extracurriculars

- Authored and Published a novel: **A Blank Invitation**, through Partridge India, in the 8th Standard *(2015)*
- Completed year long course of **Social Sustainable Development** under **National Service Scheme** (NSS) IIT Bombay, which involved **teaching** the **students** of BMC Schools, about Environmental Ethics *(2020)*
- Represented my school for a **Science Presentation** on the topic: **Life Beyond Earth** during **Tryst** (Technical Fest of IIT Delhi) and received a position amongst the **Top 50 schools** in Northern Region *(2017)*
- Secured **first position in District Science Quiz**, conducted by CBSE, in the 11th and 12th Standard *(2018)*
- Participated in the **Remote-Controlled Plane Competition**, conducted by Aeromodelling Club IITB *(2019)*