



Niraj Mahajan
Computer Science & Engineering
IIT Bombay
Specialization: Computer Science

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UG Third Year
Male
DOB: 12/07/2000

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2020	9.09
Intermediate/+2	Maharashtra Board (HSC)	Alpha College of Science and Commerce	2018	94.92%
Matriculation	Indian Certificate of Secondary Education (ICSE)	Parle Tilak Vidyalaya ICSE School	2016	98.16%

Github : <https://github.com/nirajmahajan/>

SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 157** in JEE Advanced out of **231,000** candidates (2018)
- Scored **99.9 percentile** in JEE Mains out of **11,35,084** candidates (2018)
- Stood **first** pan India in **Technical Drawing**, and **Marathi** in ICSE exam for matriculation (2016)
- Bagged **first position** in **school** in the ICSE Matriculation Exam (2016)
- Ranked **first in college** in the Higher Secondary Certificate Intermediate Examination (2018)
- Awarded certificate for **top 1%** in India in **National Standard Examination for Chemistry** (2018)
- Qualified amongst **top 1%** from State in **National Standard Examination for Physics** (2018)
- Pursuing **Minors in Management** with **B.Tech. in Computer Science and Engineering**

SCHOLARSHIPS

- Secured **All India Rank 112** in the prestigious **Kishore Vaigyanik Protsahan Yojana** Scholarship conducted by Indian Institute of Science, Bengaluru (2017)
- Received **High School Scholarship** by Maharashtra State Government for Academic Excellence (2011)

INTERNSHIPS

Application to Diagnose Autism

(May '19 - July '19)

Guide: Prof. Sharat Chandran

IIT Bombay

- Developed an Android application to **backup** and **recover survey data** from the master application
- Automated the deployment of back end on **LAMP Servers**, and redefined the parameters of installation
- Web Hosted** a back end server on a **cloud based infrastructure** with an android front end
- Attempted the implementation of a **Pytorch** model for **eye-tracking** in Android with **Tensorflow**
- Created a bash script for **automated** creation of **port based Virtual Hosting** on the back end

PROJECTS

Computationally-efficient Processing of Convolution Layer Outputs in CNNs

(Ongoing)

Guide: Prof. Narendra Ahuja

UIUC, USA

- Perform class-wise statistical analysis of the final convolutional layer outputs of a pre-trained VGG16 deep CNN, to characterize the computation performed on them by the FC Layers
- Test the correctness of the computational model on CIFAR10 dataset using **Gaussian Mixture Models**
- Devise a **novel** gradient descent based method using separability of classes as determined by the activations, to find appropriate representation for fitting the Gaussians

3-D Registration of CT scan images

(Ongoing)

Guide: Prof. Mark Pickering

UNSW, Australia

- Employed ResNet in a **siamese network architecture** for improved prediction of the 3D registration parameters on synthetically generated images of the femur
- Incorporated a **half dark channel filter** algorithm for soft tissue removal in the actual knee CT images
- Train the neural network to isolate the Femur and Tibia from CT images using 3D registration parameters

Face Ageing

(Spring 2020)

Guide: Prof. Sharat Chandran

Course Project

- Designed and trained a **Conditional Generative Adversarial Network** to induce two-way facial age transformation on images using an AlexNet based age classifier on the Wiki-IMDB dataset
- Introduced an **Identity Preserving Module** into the C-GAN by enhancing the generator training with the loss between the facial features of the original and the generated image

Proof Reading Writer

(Autumn 2019)

Guide: Prof. Amitabha Sanyal

Course Project

- Developed a **Natural Language Processing** based Web Application, like **Grammarly**, to correct **spelling** and **grammatical mistakes** in sentences on the basis of various Parts of Speech, in **Django**
- Concocted a Sentence Voice Changer and a Sentence Rephraser based on **Parsing** and **Text Data Mining**, using python's **Natural Language Toolkit** library and other external libraries
- Incorporated **Optical Character Recognition** from text mining from images using python's **Tesseract OCR Toolkit**, and ran grammar checks on the same

Satisfiability Solver

(Spring 2019)

Guide: Prof. Amitabha Sanyal

Course Project

- Devised a **universal Satisfiability solver** which takes input any Boolean Formula to convert into **Conjunctive Normal Form** using **Racket** and returns a solution if it exists
- Incorporated a modification of **DPLL** algorithm, with **optimisation** for **variable selection**
- Created a Special **Graphical User Interface** to solve Sudoku, the n-Queens problem and a scheduler for Sports Tournaments by reducing the **Travelling Tournaments Problem** to SAT

Other projects

- **Kernel PCA**: Performed Kernel Principal Component Analysis on non linear data using Gaussian and polynomial kernels, and implemented a solution to obtain the inverse transform of the k-PCA model
- **Racket Language Interpreter**: Devised a program to interpret any code in Racket, and performs frame-wise execution of the same, following the **environmental model of execution**
- **Judgement Scoreboard**: Created an Android application to maintain a scoreboard of the Judgement Card Game, featured with an intuitive minimalist graphical user interface
- **Decision Trees**: Constructed a Decision Tree on a given categorical data set using the Information Gain method to calculate the Entropy Difference in successive nodes.

TECHNICAL SKILLS AND INTERESTS

Programming	Python, C, C++, Java, Racket, SQL, L ^A T _E X, (C)Make, Django, & PHP
Libraries	OpenCV, PyTorch, Keras, TensorFlow, NLTK, pyTesseract, & Scipy
Interests	Computer Vision, Medical Image Processing, AI, Competitive Coding

POSITIONS OF RESPONSIBILITY

Batch Representative

(Feb '19 - July'20)

Department of Computer Science and Engineering

IIT Bombay

- Represent B. Tech Second Year in **Department UG Council** and Department events at IIT Bombay
- Foster the **student-professor relationship**, and present the grievances of the students to the professors

KEY COURSES UNDERTAKEN

Computer Vision + Lab	Artificial Intelligence & Machine Learning*
Digital Image Processing*	Medical Image Computing**
Data Analysis and Interpretation	Design and Analysis of Algorithms
Automata Theory**	Database and Information Systems + Lab**

** to be completed by April '21 * to be completed by November '20

EXTRACURRICULARS

- Bagged the second prize in the **Energize quiz 2018-19**, conducted by the Energy Club, IIT Bombay
- Qualified for National Sports Organization's (NSO) **Kho-Kho** Team of 2018-19 in IIT Bombay
- Won **inter-department football** tournament 2018-19 organised within IIT-Bombay
- Participated in the Intra-IIT **Football General Championship** conducted in 2018-19