



Akash Cherukuri
Computer Science & Engineering
Indian Institute of Technology Bombay

190050009
B.Tech.
Gender: Male
DOB: 11/16/2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	TSBIE	Sri Chaithanya Narayana Junior College	2019	97.70%
Matriculation	TSBSE	Narayana Concept School	2017	10

Pursuing an **Honours in Computer Science and Engineering**
Pursuing a **Minor in Entrepreneurship** from Desai Sethi Centre for Entrepreneurship

SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 40** in **JEE-Advanced 2019** amongst 246,000 candidates 2019
- Awarded a **Gold Medal** and a **Certificate of Merit** in **NSEC-INChO** olympiads 2019
- Selected for **INChO** and **INAO** along with 300 students for each olympiad 2019
- Secured **All India Rank 192** in **JEE-Mains 2019** amongst 935,000 candidates 2019
- Secured **Rank 21** in **TS EAMCET** out of 220,000 candidates conducted by TSCHE 2019

RESEARCH PROJECTS

Chemical Catalysis using Machine Learning

Winter 2021

Prof. Raghavan B. Sunoj | Indian Institute of Technology, Bombay

- Analyzed various **NLP techniques** for use in chemical space for **evaluating performance** of a chemical reaction
- Implemented a **bi-directional transformer architecture** for gauging the performance with real-time lab data
- Researched effectiveness of algorithms with limited data to expedite the discovery of catalysts for chemical reactions

Dynamic Difficulty Adjustment via Reinforcement Learning

Fall 2021 - Spring 2022

Prof. Frank Glavin | National University of Ireland, Galway

- Developed a **novel methodology** for a reinforcement learning agent to **dynamically** change its behaviour based on the performance of its adversary utilizing the **experience catalogued** in the past
- Programmed a **SARSA Agent** with **eligibility traces** to gauge performance in a complex dynamic environment
- Fine-tuned hyper parameters and state-space definition for improving performance and the total accumulated reward

Network Security Analysis using Machine Learning

Ongoing

Prof. Virendra Singh | Indian Institute of Technology, Bombay

- Investigating various techniques used in industry to detect and **prevent network attacks** efficiently and effectively
- Examining the advantages and disadvantages of using **factor graph neural networks** to detect security breaches
- Implementing a **Time Changing Decision Tree** to infer access control behaviour changes for a general environment

KEY PROJECTS

Image Colorization using Deep Learning

Seasons of Code | Summer 2021

- Trained a **Conditional GAN** utilizing **U-Net architecture** for generator and **PatchGAN** based discriminator on the COCO Dataset by **optimizing L1 Loss** for **effective colorization** of black-and-white images
- Implemented **VGG-Net** and **ResNet** for MNIST digit classification with **99%** accuracy and a **Generative Adversarial Network** for automatic digit generation to demonstrate the importance of neural networks

Red Flag: Plagiarism Checker | Prof. Amitabha Sanyal

Academic Project | Autumn 2020

- Implemented a modified version of **Latent Semantic Analysis** along with language specific **pre-processing**
- Expanded client side functionality by integrating **Django user authentication** and Angular secure routes

Transaction Management on a toy database | Prof. Umesh Bellur

Academic Project | Ongoing

- Created a query language to interact with the ToyDB environment using **Lex and Yacc** to scan and parse inputs
- Implementing transactions with rollback capability and **concurrency** using **locking** and conditional wait

Enhanced xv6 Operating System | Prof. Mythili Vutukuru

Academic Project | Spring 2022

- Extended functionality by implementing **new system calls** and **fork** variants to better suit use cases
- Improved **memory** allocation to be **on demand** to ensure physical page allocation is done only when needed by OS

Brain Image Segmentation using GMMs | Prof. Suyash P. Awate

Academic Project | Spring 2022

- Implemented **EM algorithm** using the concept of **Gaussian Mixture Models** to segment brain MRI image
- Extended the theoretical EM framework to work when a **prior distribution** on the parameters involved is provided

Compiler for C-Like language | Prof. Uday Khedkar

Academic Project | Ongoing

- Developing a compiler and evaluator for a subset of C, supporting functions, scope levels and control sequences
- Used Lex for tokenizing, Yacc for parsing to construct the **Abstract Syntax Tree** and the **Three Address Code**

OTHER PROJECTS

MRI Images Analysis | Prof. Ajit Rajwade

Academic Project | Autumn 2020

- Analysed multiple magnetic resonance images by comparing **correlation coefficients**, **histograms** and **QMI**
- Interpreted the relationship between these **dependency measures** with the **relative alignment** of the images

Theory of Machine Learning

Self Project | Winter 2020

- Studied the theory of machine learning from *Understanding Machine Learning: From Theory to Algorithms*
- Covered criteria for a hypothesis class to be **PAC Learnable** and use of **VC Dimensions** for measuring complexity

Image Processing | Prof. Amitabha Sanyal

Course Project | Autumn 2020

- Explored and applied various clustering and classification algorithms such as **SVM**, **KNN** and **PCA** to images
- Implemented **Kmeans++** algorithm to images to limit number of colors and observed results with different limits

L.A.M.A. AI using Reinforcement Learning

Seasons of Code | Spring 2020

- Programmed a **Q-Learning** driven AI, which takes logical decisions after analyzing the game's current state
- Achieved a win rate of approximately **70%** against a naïve agent, demonstrating agent's effectiveness

Levitt's Metric on COVID Data | Prof. Amitabha Sanyal

Course Project | Autumn 2020

- Applied Levitt's metric on real-time COVID Data and estimated the approximate end of the pandemic in India
- Showed that it is independent of population and robust to different regions having different capacities

Tetris Agent using PyGame

Self Project | Autumn 2020

- Programmed a complete playable game of Tetris in Python3 with the official **7-Bag Algorithm**, using **PyGame**
- Implemented a bot in this environment which takes the best possible move at present state to maximize score

Network Simulations | Prof. Vinay Joseph Ribeiro

Course Project | Spring 2021

- Generated numerous environments using **ns3** to simulate **information transfer** between various pairs of nodes
- Analyzed performance in different cases to interpret the importance and drawbacks of various TCP protocols

Mastermind Solver | Prof. Ashutosh Kumar Gupta

Course Project | Spring 2021

- Implemented a SAT solver using **Python Z3 module** to make the best guess utilizing previous information
- Designed a solver to guess best possible sequence taking **unreliability of provided information** into account

Course Visualizer and Analyzer | Prof. Amitabha Sanyal

Course Project | Autumn 2020

- Programmed a **course organizer** using awk and sed to visualize semester data with a **color coded scheme**
- Provided options to efficiently organize courses semester-wise, arrange by course tag and calculate CPI and SPI

INTERNSHIPS AND RESPONSIBILITIES

Teaching Assistant - Physics

Spring 2021

- Mentored a batch of **38 freshmen students** in **PH107 - Quantum Physics and its Applications**

Summer of Science Mentor

Summer 2021

- Mentored a batch of freshmen students interested in **Data Structures and Algorithms** throughout the summer

Research Editorial Team

Ongoing

- Contributing to development of **CSE Research Website** to serve as a repository for research within the department

Academic Content Creator - Paathshala

Winter 2020

- Worked with Paathshala Education as an Academic Content Creator to curate high-quality academic content in video form for over seventy questions with detailed solutions in Physics across different chapters.

COURSES UNDERTAKEN

Machine Learning

Medical Image Computing, Artificial Intelligence and Machine Learning, Foundations of Intelligent and Learning Agents, Data Analysis and Interpretation

Computer Sciences

Data Structures and Algorithms, Design and Analysis of Algorithms, Abstractions and Paradigms for Programming, Software Systems Lab, Discrete Structures

TECHNICAL SKILLS

Web Development

HTML5, CSS, JavaScript, AngularJS, PHP, ReactJS, Django

Programming

C++, C, C#, BASH, Python, QBASIC, Java, Android-Studio

Libraries and Modules

PyTesseract, PyTorch, SkLearn, PyGame, Kivy, SciPy, NumPy, Pandas

EXTRACURRICULARS

- Awarded with a **Special Mention for Exemplary Volunteering Work** by **NSS, IIT Bombay** 2020
- Participated and completed **Hacktoberfest 2020** presented by **Digital Ocean** 2020
- Attended the science camp hosted by **KVPY** and recommended for scholarship at **IISc, Bangalore** 2018
- Participated in **Capture The Flag** tournaments hosted by **CyberSecurity Club, IIT Bombay** 2020