Computer Science & Engineering **M.Tech**
Indian Institute of Technology Bombay

Examination	University	Institute	Year	CPI/%
M.Tech (CSE)	IIT Bombay	IIT Bombay	2024	

M.TECH PROJECT & SEMINAR

- **Image Quality Enhancement**
  *(Foreign Industry Project | Guide: **Prof. Suyash Awate**)* *(July'23-Present)*
  - Working with a top **U.S.-Based Oil Company** to develop custom deep learning algorithms, aimed at improving the company's dataset.
  - Targeting **Image Degradation Issues** such as low resolution, blur, and compression artifacts.
- **Deep Learning for Image Super-Resolution**
  *(M.Tech Project & Seminar | Guide: **Prof. Suyash Awate**)* *(Jan'23-Present)*
  - Created a **Super-Resolution Dataset** by simulating **Low-Resolution** and **Blur Effects**, extracting patches, and applying **Augmentation** methods.
  - Implemented advanced deep learning techniques such as **UNet**, **ResNet**, **GANs**, and **Conditional Normalising Flows** to achieve high-quality super-resolution for **4x** and **8x Upscaling** tasks.
  - Developed and applied **Custom Perceptual Loss Metrics** to train and evaluate models, resulting in a **significant improvement** of more than **2 times** in **Perceptual Similarity Scores**.

COURSE PROJECTS

- **Neural Style Transfer**, *(Aug'22-November'22)*
  *(CS 725: Foundations of Machine Learning, Instructor: **Prof. Preethi Jyothi**)*
  - **CNN with VGG19**: Extracted feature maps using VGG19, and plotted **Loss Curves** for various subsets of feature maps to analyze **Content** and **Style Reconstruction**.
  - Used **Parameter Tuning** to find the best style and content-weighted image.
  - Used **Cycle GAN** architecture for neural style transfer, enabling **Bidirectional Style Transfer** between different image domains with **Unpaired Data**.
- **Deep Learning Techniques for NLP**, *(Jan'23-April'23)*
  *(CS 772: Deep Learning for Natural Language Processing, Instructor: **Prof. Pushpak Bhattacharyya**)*
  - Implemented and trained **Word2vec** models from **scratch** for extracting **Word Embeddings** for the analogy task.
  - Implemented **encoder-decoder** architecture using **bidirectional LSTM** for POS (Part of Speech) tagging task, with an accuracy of 98%.
- **Web Scraping for Dynamic Price Analysis**, *(Aug'22-November'22)*
  *(CS 699: Software Lab, Instructor: **Prof. Bhaskaran Raman**)*
  - **Scraped** product information using **Selenium** and **Beautiful Soup** for trending electronic items from top E-commerce websites for a period of one month and performed **Data Visualization**.
  - Created a full stack **Web App** to search for products to show **real-time** prices and review comparisons between the top E-commerce websites, store user history and display the latest trends and visualizations.
- **Neural Network from Scratch**, *(Aug'22-November'22)*
  *(CS 725: Foundations of Machine Learning, Instructor: **Prof. Preethi Jyothi**)*
  - Implemented **Regression** & **Classification** tasks using **Backpropagation**, optimizing the process with **Adam Optimizer**, all from **scratch** in Python.
  - Implemented **PCA** for efficient dimensionality reduction, enhancing model performance.
  - Secured **Rank 1** out of 26 teams on **Kaggle** Leaderboard for Classification task, and **Rank 7** out of 49 teams for Regression task.
- **PET Image Enhancement**, *(Jan'23-April'23)*
  *(CS 736: Medical Image Computing, Instructor: **Prof. Suyash Awate**)*
  - Developed a custom **Auto-Encoder**, trained on **Full Dose PET Images**, resulting in an average validation SSIM score of **0.98**.

- Utilized the custom auto-encoder as a part of the loss function, trained 6 **UNet Models** for each dose type, ranging from **1-2** to **1-100 doses**.
- Achieved substantial improvements in **SSIM, PSNR, and LPIPS** values. Specifically, the performance increased as the level of dose decreased, reaching **> 0.9** average SSIM for all low doses, with LPIPS value improving more than **two-fold**.

- **Implementing Functional Dependency in PostgreSQL**, *(Aug'22-November'22)*
  *(CS 631: Implementation Techniques for Relational Database Systems, Instructor: **Prof. S. Sudarshan**)*
  - **Modified** the source code of **PostgreSQL** to support **Functional Dependencies** across different columns of a database.
  - Enhanced PostgreSQL by checking the stored functional dependencies on every new **insert** and **update** .

INTERNSHIPS

- **Software Developer** | ***ConnectWise*** *(June'21-August'21)*
  - Developed **Elasticsearch Query Generator**, incorporating advanced filtering, sorting, and pagination functionalities to reduce the query execution time.
  - Developed utilities for connection between Go and Elasticsearch, facilitating features such as **Bulk Insertion** and **Search API**.
  - Conducted comprehensive **Unit Tests** for all developed modules, ensuring functionality and stability.
- **Software Developer** | ***Software Development Cell, KJSCE*** *(Aug'20-Jan'21)*
  - Developed a **Dynamic Timetable Generator** and **Staff and Activity Monitoring System** with distinct roles and functionalities tailored to 5 different staff levels.
  - Leveraged a robust technology stack including **Django** for backend development, **SQLite** as the database, and **HTML, CSS, JavaScript, Bootstrap**, and **Jinja** templates for creating an engaging and responsive frontend.
- **Web Developer** | ***Kohli Media*** *(June'20-July'20)*
  - Prototyped **Web Pages** for the company portal and created user-friendly and **responsive UI** for the company's digital verification system.

OTHER PROJECTS

- **Mental Health Support ChatBot**, | ***Mercor Hackathon*** *(July'23)*
  - Designed an intelligent chatbot using **OpenAI's GPT-3.5** and **Dynamic Prompting**, featuring sentiment analysis to understand the user's mood, leading to more contextually appropriate responses.
  - Integrated **external APIs** to fetch positive quotes and jokes, enhancing user engagement.
  - Employed **guided prompting, sentiment analysis, and sensitive keyword detection**, within the chatbot's architecture to ensure that its responses are never negative or detrimental, thus eliminating the risk of providing harmful advice to users.
- **Smart Safety App**, | ***B.Tech Project*** *(April'22)*
  - Developed a safety application for smartphones in **Flutter**, enabling users to **store emergency contacts** and **initiate alerts** through key presses, **voice commands**, or **shake detection**.
  - Implemented post-alert actions such as **location tracking**, starting **video recording** for evidence gathering, and providing immediate access to the nearest helpline numbers and locations.

TECHNICAL SKILLS

- **Programming & Scripting Languages**: C, C++, Python, Java, Bash, GO, Flutter, Javascript, PHP, HTML, CSS
- **Tools & Libraries**: OpenCV, SQL, Django, Flask, PyTorch, TensorFlow, Keras, MATLAB, Bootstrap, Latex, Inkscape

POR, ACHIEVEMENTS & EXTRA-CURRICULARS

- Secured **All India Rank 10** amongst 77257 students in GATE CS 2022.
- **Teaching Assistant** for the course, **CS 302 & CS 316 : Implementation of Programming Languages**, supervised the labs for the course, evaluated their lab assignments, quizzes and examination papers
- Secured **Rank 1** in Chefpreneur'19 (Cooking and Entrepreneurship competition)
- Created an Ethereum-based (ERC-20) **Crypto Token** MIKO (Deployed on Ropstein Test Network) to incentivize users of the **Food Donation web application** made in collaboration with 2 teammates for **KJSCE Hack 6.0 Hackathon**.
- **Hobbies**: Music, Dancing, Cooking, Baking, Reading and Watching Anime.