Sayan Surya Shaw

Computer Science & Engineering
Indian Institute of Technology Bombay

M.Tech TA
Gender : Male
D.O.B: 09/09/1999

Examination	University	Institute	Year	CPI/%
Post Graduation	IIT Bombay	IIT Bombay	2022-24	8.96
Graduation (CSE)	CU	University of Calcutta	2018-22	9.12
Graduation Specialization: CSE				
Intermediate/+2	Sagarpur Sir Ashutosh High School	WBBSE	2016-18	88.2%
Matriculation	Sagarpur Sir Ashutosh High School	WBCHSE	2016	93.4%

WORK EXPERIENCE & INTERNSHIPS

- **Research Intern at Jadavpur University *(Prof. Ram Sarkar)*** *(May'20-Jul'20)*
  - Engineered and maintained code for a diverse ensemble of **Undersampling methods**, effectively mitigating class imbalance in disease datasets.
  - Implemented a hybrid meta-heuristic based on Particle Swarm Optimization (PSO) and Ring Theory based Evolutionary Algorithm (RTEA), called **RTPSO**, to select the majority class samples from the highly imbalanced datasets.

M.TECH THESIS & SEMINAR

- **Revolutionizing Crop Disease Detection and Pest Advisory System**
  *(M.Tech Project | Guide: **Prof. Suyash P. Awate**)* *(May'23-Present)*
  - Performed **data curation utilizing Pandas** encompassing data collection, cleaning, and transformation.
  - Leveraged crop images and environmental factors to accurately detect diseases and predict pest outbreaks, achieving a **notable 90.95% accuracy** in disease detection with a **simplified model**.
  - Executed **Pytorch-based** ML models including **UNet** for segmentation, **CNN-FCN** for disease detection, and exploring advanced architectures like **ResNet and Inception** for improved performance.
- **Tuberculosis Detection through Chest X-Ray Image Classification**
  *(M.Tech Project | Guide: **Prof. Suyash P. Awate**)* *(Aug'23-Present)*
  - Actively researching and preparing to experiment with cutting-edge methods for X-ray image classification, including **attention mechanisms**, semi-supervised learning, and ensemble techniques.
- **Detection of Abnormalities in Medical Images: Segmentation Methodologies**
  *(M.Tech Seminar | Guide: **Prof. Suyash P. Awate**)* *(Dec'22-May'23)*
  - Explored various variants of region-based convolutional neural networks (RCNN) & **implemented Mask RCNN.**
  - Utilized transfer learning to tailor the model for **brain tumor detection**, enhancing its performance.

COURSE PROJECTS

- **Multi-Threaded Web Server Implementation with Load Testing Optimization**,
  *(CS 744 | **Prof. Mythili Vutukuru**)* *(July'22-Dec'22)*
  - Developed a **multi-threaded** web server for handling **HTTP** requests using **TCP** sockets.
  - Facilitated concurrent processing of client requests in **multi-core** environments through **thread pooling.**
  - Conducted memory leak assessments and comprehensive **closed-loop load testing** using a **custom load generator**.
  - Successfully identified **hardware bottlenecks** through the testing process.
- **Implementation of Linux Shell Functionalities**,
  (CS 744 | Prof. Mythili Vutukuru) *(July'22-Nov'22)*
  - Implemented operational aspects of a **Linux shell,** encompassing **foreground** and **background** process handling.
  - Effectively incorporated **forking, reaping, process memory management, and signal handling** mechanisms.
  - Conducted efficient testing to ensure the robustness and reliability of the implemented features.
- **College Search Management System**,
  *(CS 699 | **Prof. Bhaskaran Raman**)* *(July'22-Nov'22)*
  - Developed an interface allowing users to **visualize** and select colleges based on **area** or **stream preferences**.
  - Portal enables students to explore colleges based on courses, states, and **view** the courses offered by each college.
  - Furthermore, the platform offers administrative capabilities for enrolling **new colleges and students.**
- **Prompt-based Solution for Toxic Comment Classification for Multiple Languages**,
  *(CS 772 | **Prof. Pushpak Bhattacharyya**)* *(Jan'23-May'23)*
  - Designed a **T5-based** multilingual toxic comment classification solution using automatic prompt generation.
  - Compared performance of **mBERT and XLM-Roberta** models with **Prompt-based and Prompt-less** finetuning.
  - Mitigated highly imbalanced datasets, enhancing model robustness via translation and **Code-switching** strategies

- **Retinal Vessel Segmentation Utilizing U-Net and U-Net++**,
  *(CS 736 | **Prof. Suyash P. Awate**)* *(Jan'23-May'23)*
  - Conducted architectural comparison between **U-Net and Nested U-Net** for medical image segmentation task.
  - Evaluated efficiency of **semantic segmentation** on the basis of accuracy, training resources, model complexity.
- **Disease Classification on Potato And Tomato Crop**,
  *(CS 725 | **Prof. Preethi Jyothi**)* *(Aug'22-Dec'22)*
  - Implemented **2.9M lightweight model (85% reduced)** by adapting the InceptionV3 for **crop disease detection**.
  - Attained a test accuracy of **93.08%**, marking **6%** enhancement over models such as **InceptionV3 and Xception.**
- **Building Neural Network from Scratch for Regression and Classification on Timbre Audio Dataset**,
  *(CS 725 | **Prof. Preethi Jyothi**)* *(Aug'22-Oct'22)*
  - Developed a Python-based Feedforward Neural Network, utilizing **ADAM optimization** using audio features.
  - Explored strategies like **feature scaling**, **PCA**-based selection, and batch normalization for enhanced performance.
- **Generating Context-based Word Vectors using CBoW-Skipgram**,
  *(CS 772 | **Prof. Pushpak Bhattacharyya**)* *(Jan'23-May'23)*
  - Preprocessed **Gutenberg corpus**, employed **Gradient Clipping**, and evaluated **CBoW** vs. **Skipgram** embeddings.

PUBLICATIONS

- **Hybridization of Ring Theory-based Evolutionary Algorithm and Particle Swarm Optimization to solve Class Imbalance Problem** *(2020-2021)*
  - Received acceptance from Springer publication Journal of **Complex and Intelligent Systems**, impact factor of **5.8**.
  - Proposed a **hybrid model RTPSO** constituting Particle Swarm Optimization (PSO), a popular swarm intelligence-based meta-heuristic algorithm, and Ring Theory (RT)-based Evolutionary Algorithm (**RTEA**).
- **An Ensemble Approach for Handling Class Imbalanced Disease Datasets** *(2020-2021)*
  - Accepted and Recieved **"Best paper Award"** at **MIDAS 2020, International Conference,** in **Springer** publication.
  - Improved Accuracy by ensembling various undersampling methods like CNN, NearMiss-1 & NearMiss-3.

OTHER RELEVANT PROJECTS

- **Underground Economy and Corruption**,
  *(CS 752 | **Prof. Om Damani**)* *(Jan'23-May'23)*
  - Simulated a vensim model to show the correlation between societal factors and a country's economy.
- **Dynamic Personalized News Recommendation System**, *(2022)*
  - Explored diverse recommendation methods: Collaborative, Content-based, and Hybrid recommendation systems.

TECHNICAL SKILLS

- **Programming and Scripting Languages**: C, C++, Bash, Python, Java, Swift, SwiftUI
- **Tools & Libraries**: Git, LaTeX, Vensim, Pytorch, Scikit-learn, Numpy, Pandas
- **Web Development**: HTML, CSS, Spring-Boot, PostgreSQL

COURSES UNDERTAKEN

- CS 736: Medical Image Computing
- CS 772: Deep Learning and NLP
- CS 744: Design and Engineering of Computing Systems
- CS 725: Foundation of Machine Learning
- CS 699: Software Lab
- CS 601: Algorithms and Complexity
- CS 752: System Dynamics: Modeling & Simulation
- CS 618: Program Analysis

POSITION OF RESPONSIBILITY

- **Interview Coordinator 2022-23, Institute Placement Team, IIT Bombay** *(Oct'22-Dec'22)*
  - Coordinated with a team of **250+ members** for interviews of **2000+ students**.
  - Assisted in conducting tests for **20+ firms** and handling student queries.
- **Class Representative, CSE Department, IIT Bombay** *(Nov'22-May'23)*
  - Represented & Mentored **120+ PG CSE** students of first year and guided them in matters concerning Academics.
  - Point of contact between students and the Professors to handle all the academic and non-academic issues.
- **Teaching Assistantship for CS 101 Computer Programming and Utilization :** *(Autumn'22, Spring'23, Autumn'23)*
  - Assisted professor in creating programming questions with solutions, exam proctoring, and paper grading.
  - Guided **15 BTech freshers**, aiding them in resolving laboratory challenges, and associated concerns.

ACHIEVEMENTS & EXTRA-CURRICULARS

- Secured **All India Rank 15** out of 77257 students in **GATE 2022 CSE** paper.
- Recieved **"Best Paper Award"** at **International Conference** on Machine Intelligence and Data Science Applications.
- **Hobbies:** Cricket, Painting, Recitation, Photography