



EDUCATION

Year	Degree/Exam	Institute	CGPA/Marks
2025	M.TECH Dual Degree 5Y	IIT Kharagpur	8.10 / 10
2019	BSEAP	Sri Venkateswara Junior College	9.86 / 10
2017	Central Board of Secondary Education	Timpany Senior Secondary school	10 / 10

INTERNSHIPS AND PROJECTS

Joint Deep Learning Pipeline for Reconstruction and End-Task | Masters Thesis Project | Prof. Subhadip Mukherjee | [Aug 24 - Present]

- Leveraged hyperparameter optimization with approximate gradient (**HOAG**), combining image reconstruction and task-specific loss.
- Implemented HOAG by integrating Smoothed Total Variation and Field of Experts regularizers for reconstruction aligned with upper loss.
- Designed a **Bilevel Optimization** to joint learning, setting the groundwork for future task-specific fine-tuning of pretrained models.

Accelerating Deep Unrolling Networks for X-ray CT scans | Bachelor Thesis Project | Prof. Subhadip Mukherjee | [Jan 24 - Present]

- Built deep unrolling networks for 2D CT image reconstruction using **Learned Primal-Dual** (LPD), enhancing efficiency on Mayo-Clinic data.
- Implemented **Sketched Learned Stochastic** Primal Dual, cutting inference by **35.5%** with a trade-off in **PSNR** of 1.65dB compared to LPD.
- Demonstrated noise robustness in CT image reconstruction using sketched unrolling networks on **low dose**, sparse-view datasets.
- Experimenting with expanding LPD variant networks to **3D CT** datasets, targeting efficiency and scalability in high-dimensional tasks.

Deployable end-to-end optimized DNN framework | Summer Internship | Prof. Indrajit Chakrabarti | [May 24 - Jul 24]

- Developed a pipeline for **Pruning** and **Quantizing** deep neural networks using torch-pruning and optimum-quanto, enhancing efficiency.
- Experimented with pruning hyperparameters for each model, achieving 2-bit, 4-bit, and 8-bit quantization for optimal compression.
- Fine-tuned MobileNet_v2 on MNIST, achieving compression by **75 percent**, maintaining performance with minimal accuracy loss.
- Deployed optimized MobileNet_v2 on **Raspberry Pi 4** Model B, effectively demonstrating MNIST classification on low-power hardware.

PROJECTS

Motion Estimation | Intelligent System Design Lab | Prof Saumik Bhattacharya

- Implemented **Lucas-Kanade** optical flow algorithm for motion estimation, comparing mean squared error for different window sizes.
- Developed exhaustive and three-step **Block-Matching Algorithms** for dense optical flow estimation achieving accurate motion detection.
- Compared MSE estimates of pre-trained networks FlowNetC and FlowNetS with the Lucas-Kanade estimator for optical flow.

Semantic Segmentation | UNet | Self Project

- Developed UNet models, including ResNet50 **Backbone** and **Attention** variants, achieving a **0.878** dice coefficient on Cityscapes dataset.
- Optimized segmentation by integrating weighted cross-entropy, dice loss, and log-cosh dice loss, significantly enhancing model accuracy.
- Compared **IOU** and dice coefficient of multiple UNet architectures, experimenting with losses to optimize segmentation performance.

Viterbi Algorithm | Course project

- Applied Viterbi Coding on a random binary data stream by performing convolution to generate convolutional code of the data stream.
- Developed a **Trellis** model to decode received data after inducing noise through a binary symmetric channel, incorporating noise effects.
- Implemented the Viterbi decoding algorithm using **dynamic programming** and advanced concepts like bitmasks and hamming distance.

COMPETITION/CONFERENCE

Open IIT Data Analytics 2023 Silver

- Forecasted tourist arrivals to Tirupati using Google Trends search indexes and historical pilgrimage data scraped from the TTD website.
- Tested statistical and ML models, including **SARIMA**, and an ensemble of **LSTM** and XGBoost, achieving a best **MAPE** score of **4.6**.
- Built a dashboard and presented the model's predictions to a panel of judges from IIT Kharagpur, showcasing its impact.

Kshitij Convo Bot IIT KGP 2024 Gold

- Developed a **RAG**-based LLM chatbot for pensioners to streamline document navigation and ensure accurate, hallucination-free answers.
- Integrated Mistral-7B model with the Chroma Database via LangChain and performed a cost analysis to create a cost-efficient **chatbot**.

SKILLS AND EXPERTISE

Languages: Python, C++, C, matlab | **Skills and Frameworks:** Pytorch, NumPy, Pandas, Matplotlib, STL, MySQL, OOPS, OpenCv, HuggingFace, Pillow, Langchain, Llamaindex | **Certifications:** Machine Learning Specialization and Deep Learning Specialization(Coursera)

COURSEWORK INFORMATION

Data Structures | Linear Algebra and Numerical analysis | Operating Systems | Algorithms | Digital Image processing | Learning Theory | Pattern Recognition | Computer Organization and Architecture | Reinforcement Learning | Statistics | Deep Learning | Vision and Visualization

AWARDS AND ACHIEVEMENTS

- Ranked in top 0.5% in JEE Mains 2020 and top 3% in JEE Advanced 2020.
- Selected in **Amazon ML Summer School** 2023 inculcating knowledge about key ML concepts along with industrial applications.
- Secured All India Rank **1666** in **GATE 2024** for Electronics and Communication Engineering with a GATE score of 529.

EXTRA CURRICULAR ACTIVITIES

- Competed in Open-IIT product design competition by TSG, IIT Kharagpur, as part of a 7-member team, showcasing collaboration skills.
- Served as a teaching assistant for basic electronics lab at IIT Kharagpur, guiding second-year students through hands-on lab tasks.