SHREYAS JENA

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EDUCATION

Year	Degree/Certificate	Institute	CPI/%
2020 - 2025	M.Tech Dual, Computer Science & Engineering	Indian Institute of Technology, Kharagpur	9.17/10
2020	CBSE(XII)	Vidhyanjali Academy, Kota	98.2%
2018	ICSE(X)	St. Xavier's School, Durgapur	96.33%

ACTIVITIES AND SCHOLASTIC ACHIEVEMENTS

- Secured a **Top-30** Leaderboard finish in the annual **Amazon ML Challenge 2024** among **2.5k** nationwide participating teams
- Awarded the **Mitacs Globalink Fellowship 2023** from **Govt. of Canada** for pursuing a research project in **Montreal**, Canada
- Secured an **All India Rank (AIR) 441** in **JEE (Advanced) 2020** and **AIR 196** in **JEE (Mains) 2020** among **1.2 million** candidates
- Secured an **AIR 99** in **KVPY 2018** (SA) and received the Kishore Vaigyanik Protsahana Yojana Scholarship by **Govt. of India**
- Ranked within the **Top 0.67%** among **0.3 million** candidates and received the **NTSE 2018** fellowship from **NCERT, Govt. of India**

INTERNSHIPS

Undergraduate Research Intern | Indian Institute of Science, Bengaluru   **May 2024 – July 2024**
Supervisor: Prof. R. Venkatesh Babu (Vision & AI Lab, Department of Computational and Data Sciences)
- Worked on generative methods for adding custom textures to 3D representations of common objects without using 3D editing software
- Analyzed 3D representations such as 2D/3D **Gaussian Splatting**, prioritizing usability for texture transfer on standard 3D benchmarks
- Used **Huggingface Diffusers** for **Stable Diffusion**-based editing to enhance consistency of added textures from multiple view angles

MITACS Globalink Intern | École de Technologie Supérieure (ETS) Montréal, Canada   **May 2023 – July 2023**
Supervisor: Prof. Eric Granger (LIVIA Lab, Department of Systems Engineering)
- Worked on visualization approaches to enhance the **interpretability** of visual machine learning models for **image-based search** tasks
- Benchmarked SOTA **CNN** and **Transformer** networks for quality of heatmap visualizations, explored usability as noisy object detections
- Implemented novel **loss function** using image representation similarity and overlap of visualizations with ground truth detection labels
- Enhanced average **Recall@1** scores from **75.4**% to **77.2**%, **Recall@4** scores from **78.6**% to **79.8**% across image search benchmarks

PROJECTS

Spatio-Temporal Reasoning in Large Multimodal Models for Videos   **November 2023 - August 2024**
Bachelors & Masters Thesis Project (Supervisor: Prof. Somak Aditya, IIT Kharagpur)
- Worked on enhancing **Large Multimodal Models (LMMs)** to understand and reason about spatial and temporal relationships in videos
- Benchmarked the **zero-shot** performance of Video-LMM baselines on various multi-choice **video question answering** benchmarks
- Proposed novel temporal training datasets and a benchmark to enhance temporal understanding of Video-LLMs via **DPO** fine-tuning
- Achieved highest zero-shot accuracy gains of **3.4%** over state-of-the-art Video-LLM baselines on challenging VideoQA benchmarks

Distributed Database with Load-Balancing and Sharding ○   **February 2024 – March 2024**
- Designed a **scalable web server** in Python with multiple **dockerized** server instances and a **load balancer** for distributing HTTP traffic
- Designed a **consistent hashing** approach for distributing client requests among active servers, via a customizable **hash function**
- Implemented a **heartbeat thread** mechanism to detect **server crashes** and **spawn** new servers in place simultaneously as required
- Benchmarked the **consistency** of the system against **10K** query and update requests with **asynchronous** server crash commands. Achieved robust **crash fault** tolerance in the form of minimal **request drops** for different server, data shard and replica combinations

Hate Speech Detection using Multi-Shot LLM Prompting ○   **October 2023 - November 2023**
- Utilized a combination of **word embeddings** and **Transformer**-based approaches to detect hateful or offensive social media comments
- Obtained highest **Accuracy**, **Macro-F1** scores of 64.1%, 60.2% respectively through fine-tuning on **Word2Vec**, **RNN**, **BERT** baselines
- Used pre-trained **FLAN-T5** with zero and 5-shot **prompting** to achieve improved performance over baselines without model training
- Enhanced FLAN-T5 **Accuracy**, **Macro-F1** scores by 2.3%, 1.6% using **PEFT+QLoRA**, training just over **0.05%** of total parameters

Hospital Management System ○   **March 2023 – April 2023**
- Created an online application to automate a Hospital Management System that handles logistics for different types of hospital staff
- Developed user interfaces for admins, desk operators for patient records, and doctors to monitor patient status, prescribe treatments
- Designed the backend for the web app using **Django**, the frontend using **HTML/CSS** and implemented the user database using **MySQL**

COMPETITIONS

Entity-Value Extraction from Product Label Images | Amazon ML Challenge, 2024 ○   **September 2024**
- Developed a robust model pipeline for extraction of entity values from product label images hosted on the Amazon Marketplace
- Used pre-trained **PaliGemma-3B** with **zero-shot prompting** to achieve an **F1-score** of **0.62** on a held-out test set of 150k images
- Enhanced **F1-Score** to **0.661** through fine-tuning on sampled subset of 50k images, securing a **26th** position finish among **2.5k** teams

TECHNICAL SKILLS

Languages: **Proficient -** Python, C++, MySQL **Familiar -** Java, LaTeX, HTML, CSS, Scala
Libraries: Numpy, Pandas, Matplotlib, SKLearn, Tensorflow, Pytorch, HuggingFace, NLTK, Spacy, Pytorch Lightning
Tools and Frameworks: Git, Linux, bash, awk, Jupyter, Django, Flask, SLURM, Hadoop, Apache Spark, Docker, Postman

RELEVANT COURSEWORK

Computer Science: Data Structures & Algorithms, Software Engineering, Systems Programming, Operating Systems, Computer Networks, Computer Architecture, Database Systems, Distributed Systems, Object Oriented Systems
Machine Learning: Machine Learning, Deep Learning, NLP, Data Mining, Information Retrieval, Image Processing
Applied Mathematics: Probability & Statistics, Linear Algebra, Multivariate Calculus, Stochastic Processes