Shubham Sharma

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Education

Panjab University, Chandigarh **2020 – 2024**
Bachelor of Engineering (Hons.), Department of Computer Science & Engineering CGPA : 9.23/10
Rank 1 in a class of **65** students

Publications

- N. Artham[1*], **Shubham Sharma**[1*], N. Dutta[2], X. Li, M. Xu, *"Few-Shot 3D Cryo-ET classification using self-supervised learning (SSL) and open-set environments"*, *ICCV-2025*, *Core Rank A* (Under Review)*
- A. Singh[1*], V. Gangwar[1*], **Shubham Sharma**[2], S. Saha, *"Knowing What and How: A Multi-modal Aspect-Based Framework for Complaint Detection"*, *ECIR-2023*, *Core Rank A* Paper, GitHub
- **Shubham Sharma**[1*], S. Mukherjee[1*], D. Kaplun[2], R. Sarkar, *"Pneumonia Detection in Chest X-Rays using XGBoost based Meta-learner with Deep Feature Extractors"*, *CPAMCS-2023*, *Springer, Cham* Paper, GitHub
- D. Prakash[1*], Raghvendra K[1*], **Shubham Sharma**[2], S. Saha, *"IndicBART alongside Visual Element: Multimodal Summarization in Diverse Indian Languages"*, *ICDAR-2024*, *Core Rank A* Paper, GitHub
- **Shubham Sharma**[1], G. K. Walia[2*], K. Singh[2*], V. Batra[3], A. K. Sekhon, A. Kumar, K. Rawal, D. Ghai, *"Forecasting of Crop Yield Using Various Machine Learning Approaches: A Comparison"*, *Taylor and Francis Journal: New Zealand Journal of Crop and Horticultural Science, 2024 (Accepted, Awaiting Publication)*
- S. Bamber[1], A. Katkuri[2*], **Shubham Sharma**[2*], M. Angurala, *"A Hybrid CNN-LSTM Approach for Intelligent Cyber Intrusion Detection System"*, *Elsevier Journal: Computers & Security, 2024*, *IF:4.8, Q1* Paper, GitHub

Work Experience

Language Research Analyst, Indian Institute of Technology-Kharagpur **Feb 2024 – Present**
Advisor: Prof. Pawan Goyal | LLM Based Educational Videos Question Answering System

- Developed an educational VQA dataset with 4,300 manually annotated Q&A pairs and machine-generated questions using Google Gemini 1.5 Flash.
- Conducted benchmarking of state-of-the-art multimodal LLMs, including MPlug-Owl and VideoLLama, using zero-shot and fine-tuning evaluations on the new dataset.
- Analyzed model performance using BLEU-1, ROUGE-L, METEOR, and entailment scores to evaluate effectiveness on educational video content.
- Implemented advanced techniques like frame sampling to improve contextual understanding in multimodal LLMs.

Research Experience

Carnegie Mellon University (CMU) **Sept 2023 – Oct 2024**
Advisor: Prof. Min Xu | 3D Cryo-ET classification using self-supervised learning and open-set environments

- Integrated Momentum Contrast for Unsupervised Visual Representation Learning (MoCo) with Video Vision Transformer (ViVIT) and ViT using weight inflation for 3D Cryo-ET classification.
- Proposed a novel pipeline for processing 3D data, resulting in improved performance and training efficiency for the classification task.
- Achieved an F1 score of 70.28 in open-set environments using ViVIT for classifying real Cryo-ET data and noise, setting a new benchmark in the field.
- Contributed to the manuscript for submission to ICCV 2025, including writing related works and references.
- Written a book chapter on feature semantic segmentation, including membrane, template matching, and deep segmentation (In Review).

Indian Institute of Technology-Patna (Under ACM Research Internship) **May 2023 – Sept 2023**
Advisor: Prof. Sriparna Saha | IndicBART: Multimodal Summarization in Diverse Indian Languages

- Collected a multimodal dataset (Hindi, Tamil, Bengali, Marathi) with paragraphs, summaries, and images from Large Scale Multi-Lingual Multi-Modal Summarization Dataset (M3LS).
- Extended the BART model with a visual-aware encoder to generate regionally contextualized summaries using both text and image data.
- Achieved a ROUGE-1 score of 0.266 on the Hindi dataset and 44.1% image precision using an image pointer for multi-output prediction.
- Work accepted at ICDAR 2024 based on multimodal summarization research with Indian regional languages.

Jadavpur University **Jan 2023 – May 2023**
Advisor: Prof. Ram Sarkar | Pneumonia Detection Using Meta-learner With Deep Feature Extractors

- Compiled and preprocessed a Mendeley dataset with three classes (Covid-19, Pneumonia, Normal), applying data augmentation techniques to address overfitting.
- Extracted image features using Vision Transformer (ViT) and ResNet50 models.
- Developed an ensemble model by combining features from both ViT and ResNet50, and used XGBoost for classification, achieving 96.19% accuracy.
- Contributed to writing the results section of the paper, which was accepted at CPAMCS-2023.

Indian Institute of Technology-Patna **Aug 2022 – Jan 2023**

Advisor: Prof. Sriparna Saha | Multimodal Aspect Based Complaint Detection

- Collected a multimodal dataset of product images, customer reviews, and aspects from Amazon website.
- Utilized BERT for text data, and VGG16/ResNet models for visual embedding.
- Developed a multimodal interaction model to learn the relationship between text, image, and product aspects.
- Identified complaint eligibility by analyzing multimodal relationships, with the paper published in ECIR 2023.

Academic Projects

E-Commerce Product Recommendation System | *GitHub* **Dec 2021 - Feb 2022**

- Utilized ResNet50 to extract 2048-dimensional image features for product recommendations.
- Implemented nearest neighbor search using Euclidean distance to identify the top five similar products.

Vessel Collision and Trajectory Prediction | *Advisor: Prof. Luo Wei, NUS* *GitHub* **Sept 2022 - Nov 2022**

- Preprocessed real-world noisy AIS data and applied DBSCAN for clustering to identify vessel patterns.
- Utilized a VARMAX model for accurate trajectory prediction and collision risk assessment.

Intrusion Detection System | *Advisor: Prof. Sukhvinder Singh Bamber, Panjab University* *GitHub* **Aug 2023 - Dec 2023**

- Developed a deep learning-based IDS using the NSL-KDD dataset, optimizing feature selection with RFE and a Decision Tree classifier.
- Achieved 95% accuracy and 0.94 F1-score with the CNN-LSTM model, demonstrating superior performance in intrusion detection.

Relevant Coursework

- Machine Learning
- Deep Learning
- Database Management
- Data Structures
- Analysis & Design of Algorithms
- Operating System
- OOPS
- Probability & Statistics
- Linear Algebra
- Natural Language Processing
- Calculus
- Digital Image Processing
- Artificial Intelligence
- Computer Graphics

Scholastic Achievements

- Recipient of Medal & Prizes for consistently securing the **highest CGPA** in the department since the **first year**.
- Selected for the prestigious **ACM IKDD Uplink Research Internship 2023** (Acceptance Rate: 2%).
- Accepted to attend **IIIT Hyderabad's CVIT** and **Amazon Machine Learning Summer School** in 2023.
- Achieved **State Rank 1143** out of 1 million students in the Hindustan Olympiad.
- Received a scholarship from the **Macquarie EdX Group**, out of 35,000 applicants.
- Advanced to the Pre-Elimination Round in the **Codechef Smackdown Coding Competition 2021**.

Technical Skills

Languages: Python, C/C++, HTML, CSS, JavaScript, Matlab, Latex, SQL
Frameworks & Library: Tensorflow, PyTorch, Hugging-face, Keras, Streamlit, Numpy, Pandas, OpenCV, Seaborn, Matplolib, Scikit-learn
Environment/Tools: ROS, Linux, Git/GitHub, AWS/GCP, Jupyter, MS Office, Docker, Anaconda, Tableau, CUDA

Leadership & Extracurriculars

Google Developer Student Club | Machine Learning Lead **Jan 2022 - Dec 2023**

- Led a team of **20+ members** in organizing **10+ workshops and events** focused on **machine learning** and **AI**, benefiting **500+ students** across the university.
- Guided **10+ technical projects**, mentoring students in applying ML models to real-world problems and providing **hands-on learning** experiences.

National Service Scheme (NSS) | Volunteer **Feb 2023 - Jan 2024**

- Coordinated various **community service projects**, engaging with 100+ students to address **local societal issues** and promote social welfare.
- Organized **awareness campaigns** focused on health, education, and environmental sustainability, reaching over **200 local residents**.