Rohit Kumar Salla

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Education

SRM Institute of Science and Technology, Chennai, India
Bachelor of Technology in Computer Science   **Aug 2021 – May 2025**
GPA: 3.8/4.0

Research Experience

Indian Institute of Science (IISc), — *Computer Vision Intern*   **Mar 2025 – Present**
Advisor: Prof. Suresh Sundaram

- Developing and optimizing perception modules for autonomous ground vehicles (AGVs) using LiDAR, radar, and camera inputs.

- Designed object detection, segmentation, tracking, and 3D reconstruction pipelines.

- Integrated deep learning models into embedded systems using PyTorch, OpenCV, and ROS.

Carnegie Mellon University (CMU) — *Research Intern*   **Mar 2024 – Jun 2024**
Advisor: Dr. Xiangrui "Taylor" Zeng

- Developed unsupervised and weakly supervised methods to automate the analysis of in situ cryo-electron tomography data, enhancing the detection and recovery of macromolecular structures.

- Implemented an end-to-end robust framework for joint unsupervised image alignment and clustering, as detailed in the paper "End-to-end robust joint unsupervised image alignment and clustering."

- Addressed challenges in noisy cryo-ET data by aligning images and clustering similar structural features without extensive manual intervention.

- Enabled efficient, automated processing of cryo-ET data, facilitating deeper insights into macromolecular structures.

National Chung Cheng University, Taiwan — *Research Intern*   **Dec 2024 – Mar 2025**
Advisor: Prof. Chih-Yi Chiu

- Developed a Diversity-Aware Recommendation System (Image + Text) under TEEP@AsiaPlusProgram.

- Integrated ViT for image and BERT for text feature extraction, enhancing multi-modal recommendations.

- Utilized FAISS for fast similarity retrieval and implemented diversity fairness metrics to improve recommendation quality.

- Applied re-ranking techniques to ensure diverse, novel, and unbiased food item suggestions.

- Challenges Overcome: Addressed data alignment issues between image and text features, and fine-tuned model parameters for optimal diversity in recommendations.

Taiwan–India Big Data Analytics Lab, SRM University — *Research Intern*   **Aug 2023 – Sep 2024**

- Implemented a CLIP-based multimodal patent retrieval system linking patent drawings to abstracts.

- Integrated long-tail optimization, novelty, and fairness metrics for high-precision patent search.

- Researched techniques like "LLM Patent Retrieval," "PatentGPT," and "DeepPatent2" to improve patent retrieval by linking drawings with abstracts for better contextual understanding.

Unify AI — *Research Intern*   **Jun 2023 – Mar 2024**

- Led a project on LLM routing for optimal model selection balancing latency, cost, and accuracy.

- Collaborated on an LLM optimization project that led to securing $8M in venture funding..

CrossGL — *Machine Learning Intern*   **Sep 2024 – Nov 2024**

- Enhanced AI-based hardware optimization models for CrossGL's Dyson platform.

Selected Projects

Backprop NEAT with Increased Network Complexity

- Integrated NEAT with backpropagation using JAX, enabling simultaneous evolution of network architectures and weight training.

- Validated on three 2D classification tasks (XOR, Circle, Spiral), demonstrating robust performance across diverse data distributions.

- Employed advanced mutation operators to incrementally add nodes and connections, increasing network complexity while effectively managing overfitting.

- Leveraged JAX for high-performance numerical computing, facilitating rapid experimentation and prototyping of evolving neural architectures.

- Documented improved decision boundaries and enhanced classification accuracy across various datasets.

- Achieved perfect classification on the XOR dataset and notable performance gains on the Circle and Spiral tasks, illustrating the evolved networks' optimal balance between complexity and predictive accuracy.

Multiagent Debate for Visual Reasoning

- Adapted the multiagent debate strategy for vision models to improve factual accuracy and reasoning in visual tasks.The Idea is inspired by the paper "Improving Factuality and Reasoning in Language Models through Multiagent Debate"

- Deployed multiple instances of state-of-the-art vision models (e.g., Vision Transformers/CLIP) to debate image interpretations.

- Designed a multi-round debate protocol that aggregates diverse perspectives to converge on the most consistent and accurate visual prediction.

- Validated the approach on visual reasoning datasets (e.g., VQA/GQA), achieving significant improvements over single-agent baselines.

- Delivered enhanced visual reasoning and factual consistency, outperforming standard models by a substantial margin.

Ancient Egyptian Hieroglyph Generation

- Fine-tuned CompVis/stable-diffusion-v1-4 with LoRA (targeting U-Net attention layers) and the CLIP tokenizer to map modern English prompts to historical hieroglyph aesthetics.

- Curated and standardized a dataset from historical repositories paired with English definitions for consistent training.

- Best Result: Generated hieroglyphs with exceptional visual fidelity and cultural authenticity, highly rated in qualitative evaluations.

NeuroEvolution Slime Volleyball AI

- Developed a NEAT algorithm using NUMPY/JAX, evolving network structure through mutation, crossover, speciation, and selection.

- Engineered a feed-forward neural network that dynamically adjusts weights for optimal gameplay.

- Trained via internal AI challenges and self-play to ensure adaptive strategy refinement.

- Achieved an agent that consistently outperformed the baseline AI, demonstrating superior real-time decision-making and high win rates in competitive matches.

Skills

Languages: Python, C++, Bash, JavaScript
Frameworks: PyTorch, TensorFlow, JAX
Vision Tools: OpenCV, Open3D
Systems: Git, Docker, MLflow, DVC
Cloud/Compute: AWS, Google Colab, NVIDIA Jetson

Awards & Activities

– Selected for Summer School on AI by IIIT Hyderabad (2024)

– Qualified Round 2 of Google Code Jam (2022)

– Top 8% at GOA Institute of Management Hackathon – Big Data Track (2024)