Rishit Saxena

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https://github.com/RishitSaxena55

SKILLS

Languages — Python, C++, C, Java, SQL, **Frameworks & Libraries** — PyTorch, TensorFlow, Scikit-learn, Pandas, NumPy, Matplotlib, Seaborn, FastAPI, CrewAI, LangChain, LangGraph, Streamlit, Weights & Biases, Git, Github, Gemini, OpenAI , Vector Databases, **Core AI/ML Concepts** — Differentiable Rendering, Computational Graphs, Transformers & Attention, Variational Inference, LLMs, Agentic AI, RAG, Model Quantization, LoRA/PEFT, Spherical Harmonics, GANs, Early Exit Networks

EDUCATION

B.Tech Computer Science and Engineering 08/2024 – Present
Indian Institute of Information Technology, Guwahati Guwahati, Assam
CPI: 9.2/10

PROFESSIONAL EXPERIENCE

Research Intern 05/2025 – Present
IIIT Guwahati
- Conducted in-depth research on Early Exit Networks (EENs), developing novel architectures to monitor human body states and reduce computational overhead.
- Investigated and applied quantization techniques to large-scale machine learning models to decrease model size and inference latency.
- Collaborated with faculty on experimental design, data analysis, and the preparation of research findings.

Machine Learning Club Coordinator 08/2025 – Present
Maverics, IIIT Guwahati
- Led a community of students, fostering a collaborative environment for learning and innovation in AI and ML.
- Organized and conducted technical workshops, guest lectures, and coding competitions on topics including Deep Learning, NLP, and Computer Vision.
- Mentored junior members on their personal and academic projects, providing technical guidance and support.

PROJECTS

TorchiFy-v1

Made a framework for deep learning models from scratch

- **Architected a modular deep learning framework** from first principles in PyTorch, implementing custom forward/backward passes for Transformer components (Multi-Head Attention, LayerNorm) without high-level abstractions.
- **Engineered a flexible model builder** capable of constructing Decoder-only (GPT) and Encoder-Decoder (Whisper) architectures, focusing on transparency in gradient flow and weight initialization.
- Designed a clear, modular API mirroring standard libraries to facilitate research experimentation and understanding of the underlying computational graph.

3D Gaussian Splatting: Pure PyTorch Implementation

Novel View Synthesis using Differentiable Gaussian Rendering

- **Engineered a fully differentiable Gaussian rasterizer from scratch in pure PyTorch**, bypassing standard CUDA kernels to implement the full forward and backward passes for 3D scene reconstruction.
- Implemented **3D-to-2D projection math** manually, handling the viewing transformation of **3D covariance matrices** and optimizing Spherical Harmonics (SH) coefficients for view-dependent color.
- Developed an **adaptive density control algorithm** (Clone/Split/Prune) based on gradient thresholds to dynamically densify the point cloud from 50k to 300k+ Gaussians during training.
- Achieved functional scene reconstruction on NeRF Synthetic datasets, validating the correctness of the custom differentiable rendering pipeline and optimization logic.

AlphaEvolve

An LLM-driven Agent for Algorithmic Discovery

- This project is a hands-on exploration into the world of AI-driven scientific discovery, inspired by landmark papers like Google DeepMind's AlphaEvolve.
- It features a custom-built evolutionary agent that leverages the power of Large Language Models (LLMs) to discover, optimize, and invent computer algorithms from scratch.

AI Hedge Fund Agent

An autonomous multi-agent system that mimics institutional trading teams to perform deep-dive stock analysis, risk assessment, and intrinsic valuation.

· **Multi-Agent Architecture**: A team of 8 specialized agents working sequentially and collaboratively.
· **Real-Time Data Ingestion**:
· **Market Data**: Live price, volume, and historical data via yfinance.
· **Technical Analysis**: RSI, MACD, SMA, and Bollinger Bands via Alpha Vantage.
· **Fundamental Analysis**: Balance sheets, P/E ratios, and growth metrics.
· **Dual-Layer Sentiment Analysis**:
· **News**: Global news search and sentiment scoring via Serper (Google News).
· **Social**: Retail trader psychology and "hype" analysis via StockTwits.
·Institutional Risk Management: Automated position sizing, Stop-Loss calculation, and VaR (Value at Risk) assessment.
· **Interactive Dashboard**: A clean Streamlit UI to input capital, tickers, and view real-time agent thought processes.

NeRF: Neural Radiance Fields

3D Scene Reconstruction from scratch using Deep Learning

- Engineered a fully differentiable rendering pipeline using **multivariable calculus**, optimizing scene representation via photometric reconstruction loss.
- Implemented positional encoding to enable the network to learn high-frequency scene details and fine geometric structures

- Applied hierarchical volume sampling strategy to improve rendering efficiency and reduce computational overhead
- Successfully reconstructed photo-realistic 3D scenes with accurate lighting, shadows, and view-dependent effects

WhisprNet
An Encoder-Decoder based Transformer Model for Automatic Speech Recognition System
- WhisprNet employs a Transformer-based encoder-decoder architecture for ASR tasks.
- The system utilizes multi-head self-attention and cross-attention mechanisms to process and transcribe audio input effectively.

Medisyn (Medical + Synthesis)
A RAG based system for medical research
- In the convergence of artificial intelligence and biomedical research lies the future of human health.
- Medisyn transforms the vast ocean of medical literature into actionable insights, making rare disease research accessible to every researcher, clinician, and curious mind.

EENets
Early Exit Convolutional Neural Networks
- Built Early Exit Networks with ResNet Backbone for resource efficient training without compromising efficiency.
- The models can be trained and tested with MNIST, CIFAR10, SVHN, Tiny-ImageNet and ImageNet datasets.

Face Generation using Variational AutoEncoders
Implemented Face Generation Using AE and VAE on LFW Dataset
- **Generative AI Development:** Engineered Variational Autoencoder (VAE) and Autoencoder architectures to synthesize human faces, utilizing the reparameterization trick to enable effective backpropagation through stochastic latent variables.
- **Data Pipeline Optimization:** Integrated MTCNN for automated facial detection and alignment, establishing a robust preprocessing pipeline that ensured consistent input distribution for model training.
- **Model Analysis:** Conducted comparative analysis via Latent Space Interpolation and PCA visualization to demonstrate the superior manifold continuity and generalization capabilities of VAEs over standard Autoencoders.

Face Detection and Recognition
Face Recognition System using Keras FaceNet
- A robust deep learning-based face recognition system built using **Keras**, **FaceNet**, and **OpenCV**. This system detects faces in images and identifies individuals by comparing their facial embeddings to a known database.