Yashika Patil

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Professional Experience

MS Thesis Researcher, University of Massachusetts Dartmouth **Sep 2024 – Aug 2025**

- Designed a novel visual reasoning framework for multimodal question answering in science, combining text and diagram understanding and RL with human feedback (RLHF).
- Fine-tuned large multimodal models (LLaVA-7B) on GPT-4–generated instruction data using QLoRA, 4-bit quantization, and hyperparameter optimization in PyTorch, improving accuracy and reducing hallucinations.
- Built end-to-end pipeline to integrate image captioning via BLIP-2 (VLM) into multimodal reasoning workflow.
- Optimized multi-GPU training on NVIDIA GPUs with CUDA mixed-precision and DeepSpeed-ZeRO, reducing compute cost while maintaining reliability.
- Implemented experiment tracking in Weights & Biases to log metrics, visualize performance trends, and compare model variants.
- Evaluated outputs with metrics such as BERTScore, achieving improved reasoning clarity and model accuracy over baseline Chain-of-Thought reasoning.

R&D Intern, New Bedford Research & Robotics – New Bedford, MA **May 2024 – Aug 2024**

- Developed and deployed vision-driven automation pipelines integrating ABB GoFa robotics and Cognex cameras, reaching 98% pick-and-place accuracy in real-time operations.
- Implemented predictive algorithms for shape recognition, centroid/edge detection, and 6-DOF manipulation, aligning with industrial automation requirements.
- Built trajectory-forecasting workflows to predict and grasp moving objects, demonstrating feasibility for conveyor-based applications.
- Prototyped custom robotic components using Rhino7 CAD and 3D printing, integrating ABB GoFa with a Cognex vision camera.
- Collaborated with industry partners on computer vision applications for quality inspection in food processing, applying ML workflows to practical production settings.
- Delivered R&D outputs under tight deadlines, presenting prototypes to cross-functional teams and external stakeholders.

Skills

Robotics & Hardware: ABB GoFa, Robotic Arms, Cognex Cameras, Lab Automation, Hardware Troubleshooting, ROS 2

Programming & Systems: Python, C++, MATLAB, SQL, Git & GitHub, Linux, CAD/3D Printing, Shell Scripting, Debugging

Data & Automation Pipelines: ETL, Data Logging, Workflow Automation, Experiment Tracking, Predictive Algorithms

Collaboration & Documentation: SOP Development, Cross-functional Teamwork, Technical Reporting

Projects

RAGNovel: LangChain for Novel Summarization & Question Answering **Jan 2024 - Aug 2024**

- Built a Retrieval-Augmented Generation system using LangChain, LLaMA2, and a vector store for literary QA.
- Combined extractive and abstractive methods to balance coherence and content fidelity in summaries.
- Focused on prompt-engineering, dynamic context handling to optimize LLM performance within token limits.
- Tested and compared the system's performance against standard techniques to ensure reliable results.

Consumer Complaints: Text Classification **Sep 2023 - Dec 2023**

- Developed NLP and ML pipeline for consumer complaints: tokenization, embedding (Word2Vec), and feature engineering.
- Cross-validated ML models (logistic regression, trees, k-means, FFN, RNN); best accuracy 85.9%.
- Trained FFN, RNN, bi-LSTM, and transformer models with hyperparameter tuning; bi-LSTM achieved 86.5% accuracy.
- Compared model performance using classification, regression, and clustering metrics to select the best architecture.

Education

University of Massachusetts Dartmouth **Dartmouth, MA**

Master of Science in Data Science *Sep 2023 - Aug 2025*

Indian Institute of Science and Research Bhopal **Bhopal, India**

Bachelor of Science in Data Science & Engineering *Aug 2019 - May 2023*