

RUTHWIK DOVALA

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EDUCATION

University of North Carolina at Charlotte | Charlotte, NC
Master of Science in Computer Science | August 2024 – December 2025

PROFESSIONAL EXPERIENCE

- Research Assistant (Intern)** | University of North Carolina Charlotte | August 2025 – December2025
- Designed and implemented a comparative evaluation framework for large language models (GPT-4o, Claude Sonnet) to assess response quality, factual accuracy, and reasoning capabilities in the general news domain.
 - Developed a Retrieval-Augmented Generation (RAG) pipeline incorporating reranking strategies to optimize context relevance and improve model response grounding
 - Fine-tuned an open-source language model on general news datasets, applying prompt engineering techniques including chain-of-thought reasoning to enhance interpretability and answer quality
 - Conducted systematic benchmarking across multiple LLM architectures, analyzing performance metrics to identify optimal configurations for news-based question answering tasks
- System Administrator (Intern)** | Tiny Scholars High School | August 2023 – May 2024
- Implemented management tools for virtual server environments and oversaw file system/storage upgrades, ensuring data integrity and redundancy
 - Provides technical direction to team of 20 technicians providing technical guidance in diagnostics, troubleshooting, installation, servicing, and acceptance testing
 - Coordinated seamless software system installations for 600+ users, managing user accounts, data conversions, and password resets
 - Delivered training, ongoing support, and expert troubleshooting to users, promoting efficient system operation and best practices
- Volunteer** | Amma Social Welfare Association (ASWA) | October 2022 – June 2023
- Managed and maintained organizational records, ensuring accurate entry of beneficiary, donor, and program data into digital systems
 - Supported the coordination of welfare initiatives by organizing and updating information for education, nutrition, and blood donation programs
 - Collaborated with volunteers and staff to streamline record-keeping processes, improving data accessibility and reporting efficiency
 - Ensured confidentiality and accuracy of sensitive beneficiary information, enhancing organizational reliability and trust

PROJECTS

- MacroMap - Financial Analyst Copilot**
- Built a **RAG pipeline** with dual-stage retrieval (**vector search + cross-encoder reranking**), reducing noise by 66% (15→5 chunks) while maintaining citation accuracy
 - Designed pluggable **LLM provider architecture** using **factory pattern**, supporting 4 backends (**OpenAI, AWS Bedrock, Ollama, HuggingFace**) with zero-downtime switching
 - Developed async-first **FastAPI** backend with **SQLAlchemy ORM**, handling multi-tenant session management and 15+ RESTful endpoints with **JWT** authentication
 - Integrated **SEC EDGAR API** with rate limiting, async ingestion, and metadata-rich chunking to index financial filings into **ChromaDB** vector store
- TriLLM - Triple LLM Intelligence**
- TriLLM is a multi-LLM answer agent that queries **ChatGPT, Claude** in parallel using **API's** and displays the single response
 - It ranks the outputs to surface a single "Best Satisfied Answer", using a consistent server-side orchestration pipeline
 - It solves the problem of inconsistent single-model responses by reducing trail-error improving reliability, saving users time
- A Comparative Analysis of Swarm Algorithms for Enhancing Communication in Drone Networks (Publication)**
- Developed and simulated an autonomous drone swarm surveillance system using **Python, ROS, and Gazebo**, implementing path planning, obstacle avoidance, and distributed communication for efficient coverage and coordination
 - Implemented and analyzed swarm intelligence algorithms (**PSO, ACO, ABC**) to optimize drone network communication and coordination, evaluating scalability, efficiency, and robustness under dynamic conditions
 - Conducted comparative performance analysis through simulations and case studies, identified optimal and hybrid swarm strategies, and proposed future integration of **machine learning** for adaptive swarm behavior
- Unleashing power of Vision Transformers for disease prediction in Chest X ray images (Publication)**
- Employed a range of deep learning models including **Vision Transformers, ConvNext, DenseNet169, EfficientNetV2, InceptionNetV3, MobileNetV2, and NasNetMobile** for lung disease prediction from chest X-rays
 - Utilized **Python** with **TensorFlow and PyTorch** to enhance diagnostic accuracy, with a focus on pneumonia and COVID-19 detection
 - Integrated state-of-the-art techniques to optimize chest X-ray analysis, contributing to improved AI-driven healthcare diagnostics
- A Comparative Analysis of Deep Learning Models for Detection of Diabetic Foot Ulcer using Foot Thermography Images (Publication)**
- Conducted a comparative study of deep learning models (**CNNs, RNNs, transfer learning**) for detecting diabetic foot ulcers using foot thermography
 - Evaluated model performance using **AUC-ROC and F1-score**, and applied **Grad-CAM** for interpretability and transparency
 - Aimed to develop a non-invasive, real-time diagnostic tool, with future enhancements focusing on multi-modal data integration and real-world deployment

TECHNICAL SKILLS

- DevOps: Docker, Kubernetes, CI/CD Pipelines
- Frontend Development: HTML, CSS, JavaScript, React, jQuery, Bootstrap, Angular
- Programming and Query Languages: C, C++, Java, R, Python, SQL, Ruby, TypeScript
- Data Visualization: Power BI, Matplotlib, Tableau
- Cloud Technologies: AWS (S3, EC2, EKS, SNS, DynamoDB, Redshift, SageMaker, QuickSight)
- Security & Authentication: JWT, OAuth, API Security
- Tools: Jupyter Notebook, Postman, Advanced Excel (VBA, Power Query), ETL Pipelines, SQL Server, Entity Framework, CRM Systems
- Integration, E-commerce Development and Real-time KPI Dashboards
- Business & Process Optimization: Requirement Gathering, Workflow Design, Process Automation, Statistical and Operational Analysis

CERTIFICATIONS

AWS Academy Data Engineering | Google Data Analytics Professional | AI (IIT Bombay) | IoT & Embedded Systems (UC) | Cyber-Ethics (ISEA)