

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 – December 2025
<ul style="list-style-type: none">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 groundingFine-tuned an open-source language model on general news datasets, applying prompt engineering techniques including chain-of-thought reasoning to enhance interpretability and answer qualityConducted 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
<ul style="list-style-type: none">Implemented management tools for virtual server environments and oversaw file system/storage upgrades, ensuring data integrity and redundancyProvides technical direction to team of 20 technicians providing technical guidance in diagnostics, troubleshooting, installation, servicing, and acceptance testingCoordinated seamless software system installations for 600+ users, managing user accounts, data conversions, and password resetsDelivered 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
<ul style="list-style-type: none">Managed and maintained organizational records, ensuring accurate entry of beneficiary, donor, and program data into digital systemsSupported the coordination of welfare initiatives by organizing and updating information for education, nutrition, and blood donation programsCollaborated with volunteers and staff to streamline record-keeping processes, improving data accessibility and reporting efficiencyEnsured 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)