Narasimha Karthik J

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Education

Northwestern University, Master of Science in Artificial Intelligence *Expected Graduation: Dec 2025*

PES University, BTech in Electronics and Communication Eng *Graduated: Sept 2022*

Skills

Languages: Python, SQL, C, Pandas, Numpy, Netlogo
Frameworks: PyTorch, OpenCV, Transformers, Sklearn, XGBoost, LangChain, FastAPI, ChromaDB, Elasticsearch, LlamaIndex,
Research Interests: **LLM Training & Inference**, **Multi-modal AI**, **Reinforcement Learning**, **NLP**, **Causal Inference**, **Mechanistic Interpretability**, **Agentic AI**

Experience

CCL Lab - Northwestern University Evanston, Illinois
Research Assistant *Sept 2024 – Present*
- Developed a framework integrating **genetic programming** with **LLMs** (**Grok, Claude, DeepSeek**) via **LangChain** and **LangGraph**, improving agent-based code generation performance by **30%**.
- Engineered verification and performance tracking systems that reduced error rates in LLM-generated models by **25%**.

The Boeing Company Bengaluru, India
Data Scientist *July 2022 – Aug 2024*
- Collaborated in a 2-member team to design dynamic cost prediction models on a dataset of **2M+ rows**, reducing experimentation time by **70%** and achieving an average r-score of **0.9** using **RandomForest** and **XGBoost**.
- Automated training and evaluation pipelines using threading/multiprocessing with **Optuna**, cutting manual intervention by **80%**.
- Fine-tuned **GPT-2**, and **Llama 3** models on Aircraft Maintenance Manuals using **SFT**, **PEFT**, and **RLHF** on **4 A100 GPUs**, enhancing text generation quality by **50%** and reaching **80%** accuracy.
- Implemented a **RAG** system with **ChromaDB** and **OpenAI API**, enabling real-time document creation and reducing manual drafting by **80%**.
- Secured **$200k** in funding by demonstrating the business value of AI-driven document automation, processing over **2,000 PDFs**.
- Developed operational automation tools including: a **BERT**-based Keyword Extraction Model (**95% accuracy**), a fine-tuned **T5** summarization model (Bleu-score of **25**), and an **NLTK**-based intent detector (**95% accuracy**).
- Led **3 technical sessions** for the NLP-LLM community and managed hiring to onboard **6 ML Engineers** from a pool of **50**.

Invento Robotics Inc Bengaluru, India
Software Engineering Intern *July 2021 – June 2022*
- Led development of the ***Invento Fleet*** iOS app using **SwiftUI**, **Swift 5**, and **UIKit**; delivered **10+ core features** and boosted remote robot control efficiency by **70%**.
- Engineered API-based video calling (**TwilioVideo/Audio**) and Socket-based command systems, reducing reliance on web portals by **90%**.
- Refined a **YOLOv5**-based Fall Detection algorithm, reducing false negatives by **95%** to ensure robust safety measures.

Projects

DeepFake Face Swap with Diffusion Models @ Northwestern University Jan 2025 – Feb 2025
- Designed and trained a Denoising Diffusion Probabilistic Model for realistic face swapping, achieving stable high-quality image synthesis
- Integrated face recognition embeddings to preserve target identity, improving overall authenticity and accuracy of generated images

AdVocate - Tartanhacks @ Carnegie Mellon University Feb 2025
- Engineered an end-to-end solution that reduced campaign creation time by **90%**, generating **25+ unique campaigns** in under 24 hours
- Designed an **Agentic system** with a microservices architecture using **LangChain** that integrates **GPT-4o on Azure** as a chat endpoint, utilizes **ChromaDB** for caching, and leverages **Stable Diffusion** to generate dynamic images, processing **100+ market queries**
- Optimized API costs with a two-tier caching system, reducing API calls by **60%** and achieving **45% faster** response times

Real-Time Options Trading Intelligence Platform @ Northwestern University Oct 2024 – Dec 2024
- Developing a predictive model for options and derivatives by integrating **statistical** and **neural network** architectures - LSTM, RNNs and Transformers
- Building an advanced trading bot that leverages real-time market data and **sentiment analysis** for strategic trade execution.

Achievements & Awards

- **Bureaucracy Crusher Award**, SoCal Gemba Fest, Nov 2023 - Boeing Research & Technology. (**Best use of GenAI**)
- **CANDI Land Hackathon**, Sept 2023 - Boeing Research & Technology.
- **GT TechFest Innovation Challenge**, Mar 2023 - Boeing Research & Technology (**Predictive Maintenance**).