Charan Kumar Reddy

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Objective

Aspiring AI & ML researcher with strong foundations in machine learning, deep learning, and NLP. Passionate about advancing real-world applications of AI through research in transformers, diffusion models, and intelligent systems. Seeking to contribute to ongoing projects at IAAIR while strengthening my research profile for higher education (MS/PhD).

Education

B.Tech in Computer Science & Engineering (AI/ML Focus)
Rajiv Gandhi University of Knowledge Technologies (RGUKT), India
3rd Year

Technical Skills

- **Programming:** Python, JavaScript, SQL
- **ML & AI:** Linear/Logistic Regression, SVM, Decision Trees, KNN, AdaBoost, Naïve Bayes, K-means
- **Deep Learning:** ANN, CNN, RNN, LSTM, Attention Mechanisms, Transformers
- **NLP:** Tokenization, Vectorization, RAG (Retrieval-Augmented Generation)
- **Advanced Topics:** Fine-tuning (LoRA, QLoRA), Diffusion Models, Latent Space, VAE
- **Frameworks & Tools:** PyTorch, TensorFlow, Flask, LangChain, LangGraph, MongoDB, SQL
- **Other:** Git, Docker, REST APIs

Projects & Research Experience

- **Supply Chain Disruption Prediction System**
  - Built an end-to-end ML system for predicting supply chain disruptions.
  - Implemented **risk factor analysis** using global news, supplier, and transportation data.
  - Designed **predictive models** integrating ERP (SAP) for automated stock adjustments.
  - Deployed a **real-time dashboard** with alerts (Slack/Email integration).
- **Transformer Attention Implementation (from scratch)**
  - Coded attention mechanism and transformer components using **PyTorch**.
  - Studied and implemented **positional encoding, decoder blocks**, and multi-head attention.

- Gained strong mathematical and conceptual understanding of **transformer-based architectures**.

🔹 **Text-to-Image Diffusion Model Exploration**

- Studying **Stable Diffusion architecture** (VAE + U-Net + text conditioning with CLIP/T5).
- Implemented **VAE and latent space experiments** to understand generative modeling.
- Explored **timestep conditioning in U-Net** for diffusion-based generation.

🔹 **Agriculture AI Applications**

- Designed a system for **cotton leaf disease detection** using YOLOv8 + classification model.
- Extended research to **pest detection and classification**.
- Demonstrated strong interest in applying AI to **sustainable farming**.

🔹 **AI-Powered Agentic Systems**

- Built experimental **LangChain & LangGraph agents** capable of multi-step reasoning.
- Designed a data analyst agent that can handle both csv and sql prompts from user
- Explored **supervisor-agent architectures** for modular task execution.

Achievements & Coursework

- Completed **Advanced AI/NLP course** by Krish Naik Academy.
- Self-studied and implemented **supervised fine-tuning** techniques (LoRA, QLoRA).
- Strong grasp of **linear algebra, probability, and statistics** for ML foundations.

Research Interests

- Generative AI (Diffusion Models, Transformers)
- Applied ML in Supply Chains & Agriculture
- Multi-Agent Systems & Robotics AI
- Real-world NLP Applications