Gopi Krishna Mahankali

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Education

Indian Institute of Technology, Bombay, B.Tech in Electrical Engineering 2018 – 2022

Experience

Data Scientist, Bosch - Bangalore Sept 2022 – Present

GROW: Digital Twin Platform

- Led a team of five in a condition monitoring project for 56+ turbomachinery assets (compressors, gas turbines, heat exchangers, pumps), employing physics-driven **signal processing** (FFT, wavelets, kurtogram) and **machine learning** models. Achieved >90% accuracy in real-time condition monitoring for clients like JSW and ADNOC, reducing downtime costs by diagnosing structural fatigue and performance issues proactively.
- Researched causal graph-based fault diagnosis systems leveraging PC, SVAR and RCD algorithms, using sensor data and domain knowledge to do **root cause analysis** and optimize turbomachinery maintenance strategies.
- Trained an **LSTM Autoencoder** for **unsupervised anomaly detection** in industrial machinery, leveraging sensor data to model healthy operational patterns. The system identifies anomalies by computing reconstruction errors and furthermore using temporal aggregated RE to generate RUL degradation model.
- Implemented an **LLM-powered chatbot** within the Digital Twin, enabling **function calling to backend APIs** for asset health insights and vector database queries for fault remedies, delivering comprehensive, context-aware responses.

Knowledge Nexus

- Built a Generative AI **RAG chatbot** using Mistral with a custom section-based chunking pipeline and Qdrant as the vector database for embeddings to process PDFs and Docupedia content.
- Designed a **hybrid retrieval system** combining BM25, BGE, and ColBERT for optimal balance between exact term matching and semantic search, with cross-encoder re-ranking.
- Integrated **agentic workflows** via Hugging Face Agents, equipping the chatbot with tools like internet search,retrieval, table of contents navigation, and query transformation.

POC's

- Designed and implemented a **knowledge graph-based chatbot** using **LangChain** and Neo4j, leveraging structured hospital data with LLMs to deliver accurate, hallucination-free responses.
- Improved email processing efficiency and accuracy by developing an ML-based solution using **NLP** techniques like TF-IDF and word2vec. Delivered a high-performing model that met client expectations for accurate email classification.

Projects

Neural Machine Translation 2023

- Implemented a small seq2seq model using transformer structure from scratch for the task of machine translation.
- Trained the model on parallel corpus of English to French text and evaluated using BLEU metric.

Technologies

Frameworks & Tools & Libraries: PyTorch, scikit-learn, Docker, Azure, git, LangChain, SQL, transformers

Knowledge & Skills: Python, Machine Learning, Natural Language Processing, Computer Vision, Signal Processing, Deep Learning, Generative AI, Time Series Analysis, Predictive Modelling.

Achievements

FitFest - Bosch 24: 1st Prize in Cryptography Competition and 2nd Prize in Code Generation using GenAI Competition

JEE Advanced: All India Rank 249 among 150,000+ candidates

JEE Mains: All India Rank 115 among 1,200,000+ candidates