MADHUMITHA KOLKAR

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PROFESSIONAL EXPERIENCE

STEALTH AI **Remote**
Machine Learning Engineer **2024-Present**

- **Speech Emotion Detection for Agentic Chatbots**: Orchestrated an end-to-end classifier from scratch, achieving **0.86** F1-score using Conv1D / BiLSTM / GRU on TESS, RAVDESS, CREMA-D, and Surrey AV datasets.
- Spearheaded data preprocessing and augmentation strategies, leveraging spectral analysis and pitch shifting to expand datasets by **300%**; enabled robust model training with limited real-world data.
- **Engineered and deployed** a high-performance vector search system on AWS utilizing dense OpenAI LLM embeddings, achieving a **40%** improvement in accuracy and an 80% increase in search speed.
- **AI-Generated Vanity Shots with Stable Diffusion**: Optimized Stable Diffusion for automated product background integration, streamlining marketing content generation and reducing manual efforts by 80%.
- Streamlined **LlamaParse** integration into the **RAG** based ESG analysis workflow, yielding a **25%** increase in data accuracy through refined semantic chunking, directly improving decision-making processes for LLM retrieval.
- Applied **prompt engineering techniques**, including few-shot inferencing with Chain of Thought (CoT), to build **3** custom GPTs , improving the efficiency of compliance reviews by **70%** while increasing accuracy.

MERCEDES BENZ RESEARCH AND DEVELOPMENT **Bengaluru**
Machine Learning Engineer **2021-2024**

- **Pioneered Conversational AI for Service Assistance**: Created a Seq2Seq LSTM chatbot for intent classification and response generation, achieving an accuracy of 93%.
- **Enhanced Predictive Maintenance** (HVAC & Battery Systems) by applying XGBoost & Random Forest, increasing fault prediction accuracy by **20%** and reducing unplanned breakdowns.
- **Spearheaded In-Car HU Testing**: Led development of a YOLOv5 powered image classification system for Mercedes-Benz, reducing in-car HU testing time by **70%** and achieving an F1 score of **0.88** for UI element recognition.
- **Led Mercedes-Benz Infotainment Data Parsing**: Devised a custom Python parser , boosting UDC processing efficiency by 80% showcasing strong skills in data structures and algorithms.
- **Advanced Research Initiatives** including fine-tuning BERT on custom data (94% accuracy) and design of RAG-based team support system using FAISS/OpenAI embeddings (potential 60% ad hoc issue reduction).

DELOITTE **Remote**
Data Scientist **2020-2021**

- Enhanced legal transcription accuracy by **20%** by fine-tuning DeepSpeech ASR using MFCC and noise reduction, translating **40%** reduction in post-processing time.
- **Formulated Transcript Clarity with Speaker Diarization**: Introduced speaker diarization as a potential solution to differentiate between speakers; projected to improve transcript clarity by up to 30%.

EDUCATION

SDMCET **Dharwad, KA**
Bachelor Of Engineering - Computer Science **2016-2020**

SKILLS

- **Programming Languages**: Python (NumPy, Pandas, Matplotlib, Scikit-learn, TensorFlow, Keras, PyTorch, OpenCV, MediaPipe, DeepFace), Kotlin, Git, MCP.
- **Model Deployment**: Flask, FastAPI, Streamlit
- **Databases**: MySQL, PostgreSQL (pg_trgm), FAISS, Pinecone
- **Cloud & ML Ops**: AWS (Lambda, S3, EC2), Docker , Hugging Face, Airflow .
- **Machine Learning Techniques**: LLMs, Transformers, LSTMs, CNNs, XGBoost, Diffusion Models,Semantic Search, RAG, Few-shot Learning, Prompt Engineering, AI Agents, word2vec, GloVe, wav2vec, YOLO, ResNet, Stable Diffusion.

PROJECTS

- **Moodmap - Multimodal Emotion Aware AI | NLP | Open-CV | LLM** :
  Engineered a novel Multimodal AI system (speech-to-text, DeepFace, Conv1D-BiLSTM-GRU) for real-time emotion analysis, achieving 82% accuracy.
- **SigSafe -**
  Implemented a Siamese network architecture integrated with a CNN model for signature verification, resulting in a 20% improvement in fraud detection accuracy and a 5% reduction in manual reviews.
- **SayWhatNow - LSTM | Text generation | Deep Learning :**
  Developed a deep learning-based custom next-word predictor utilizing LSTMs, resulting in a **96%** accuracy rate, showcasing strong text generation capabilities.
- **PaperScribe - Retrieval | RAG :**
  Architected and implemented PaperScribe, a Retrieval-Augmented Generation (RAG) AI system powered by GPT-3, achieving a **92%** accuracy rate in document retrieval for interactive exploration of PDFs and articles.

ACHIEVEMENTS

- Garnered 'Star Performer' award for surpassing key performance indicators by 40% through innovative idea implementations.
- Cultivated the professional growth of 15+ individuals through dedicated mentorship, fostering technical skills and career advancement.
- Presented expertise and insights on **AI Safety at the Google Dev Conference in Bangalore** (2023) hosting 700 attendees, thus contributing to the broader AI community's understanding of responsible development practices.