SATHISH KUMAR

Machine Learning Engineer

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Profile

Highly skilled Machine Learning Engineer with expertise in training models from scratch, fine-tuning models, Large Language Models (LLMs), Deep Learning, and Transformer architectures. Proficient in PyTorch, TensorFlow, and Flask, with experience in SDK development, Docker, and database management using Neo4j and MongoDB. Adept at optimizing AI models, deploying scalable solutions, and integrating NLP pipelines. Passionate about developing innovative AI applications and solving real-world problems with advanced machine learning techniques.

Professional Experience

Machine Learning Engineer, *Custologix solutions India private Limited ,Bengaluru.* *02/2021-04/2024*

- **Model Development:** Experienced in building machine learning models from scratch and fine-tuning pre-trained models to optimize performance and accuracy.
- **Image Enhancement:** Applied machine learning models to improve low- resolution and blurred images, enhancing resolution and visual clarity.
- **Advanced Language Translation:** Translation of foreign languages to english language and indian languages translate to english with good accuracy around 95% of result
- **Optimized Deep Learning Models:** Reduced GPU consumption by 50% while enhancing performance efficiency.
- **Advanced Audio Processing:** Developed and integrated noise reduction, speaker diarization, and transcription-translation models, improving transcription accuracy by 70%.
- **RAG-Based Chatbots:** Designed and deployed chatbots with memory features, improving context-aware responses and reducing response time by 40-50%.
- **Model Quantization:** Implemented quantization techniques, reducing inference time by 40% and cutting computational costs by 50-60%.
- **OCR:** Developed scalable OCR pipelines, achieving 95% accuracy in handwritten text recognition.
- **Embedding Models:** Enhanced information retrieval efficiency by 80% using advanced embedding models.

Data Science, *IAT Solutions,Chennai,India.* *05/2024-Present*

Proficient in Deep learning, data analysis, and statistical modeling using Python, SQL, and related tools.
Skilled in data visualization with Matplotlib, and Seaborn to communicate insights effectively.
Strong understanding of EDA, feature engineering, and model evaluation techniques.

Projects

Machine Learning Engineer, *Custologix solutions India private Limited ,Bengaluru*

Multi-Functional NLP Pipeline for Automated Text Analysis

- Developed an end-to-end NLP pipeline for data extraction, summarization, topic modeling, and NER,automating text processing from collection to analysis.
- Enhanced summarization accuracy by 30% by integrating transformer-based models like BART and T5, fine-tuning them on domain-specific data.

- Utilized topic modeling with LDA and BERTopic to uncover key themes and NER to extract essential entities.

Handwritten Text Detection System Using Custom Trained Models

- Engineered an Optical Character Recognition (OCR) system for handwritten text detection, enabling accurate extraction of textual information from images.
- Fine-tuned a Hugging Face transformer model on a custom dataset, achieving 95% accuracy
- Automated data preprocessing and augmentation techniques, improving data quality and reducing

Audio Analysis and NLP-Integrated Processing System

- Designed an advanced NLP-based audio analysis framework with features like noise reduction,transcription, translation, and timestamp generation.
- Improved transcription accuracy by 25% and reduced noise interference by 30% by optimizing speech-to-text models and enhancing noise filtering techniques.

Violence Detection system using the custom finetuned model

- Colllecting the dataset from the scratch and finetune the yolo model based upon the violence pose detection.
- In this accuracy will be around 95%.Based upon the body movement violence will be detected before it happen and it will give the alert message.

Thief Identification using Custom finetune model

- Collecting of the datas from the scratch for the thief detection.extracting the body movements. In this based upon the body movements and actions thief will be identified.vehicle thief detection will be sent the alert.
- In this accuracy will be around 90% of the original live data.

Face Recoginition and Similarity in ML Model

- Developed a face recognition system that analyzes video convert to frames to detect and match individuals using advanced similarity algorithms.
- Developed a system to transform individual profiles into embeddings, store them in Qdrant, and verify identity through similarity algorithms.

Standard Development Toolkit(SDK)

- Developed multiple SDKs for ML models, including keyword search, price detection, topic modeling, zero-shot classification, template matching, aspect-based sentiment analysis, and named entity recognition(NER).
- Consolidated these functionalities into a single SDK for seamless integration, enabling users to install a wheel package and effortlessly access the library.

Object Detection using Custom Trained models

- Fine-tuned the YOLOv8n model for efficient and specific object detection in video footage, achieving high-speed performance with optimized GPU and CPU utilization.
- Designed for low computational consumption while maintaining accuracy, making it significantly faster compared to other models.

Vehicle Number Plate Extraction using custom finetuned model

- Fine-tuned the YOLOv8n model on custom data for accurate number plate detection and extraction from video footage, achieving ~98% accuracy.
- Implemented a pipeline to store detected plates in a database with timestamps. Utilized PaddleOCR or a custom extraction model to accurately extract text from images.

Face Reverse lookup

- Developed a face reverse lookup system by converting video into frames and extracting unique faces using ArcFace. Applied face cropping and clustering with K-Means, organizing results into individual folders.
- Implemented a retrieval system by storing face embeddings in Qdrant, enabling efficient reverse lookup for identifying individuals in the database.

Skills

Languages — Proficient
- python
- HTML
- CSS
- JAVA
- Fast API

NLP & Information Retrieval — Proficient
- Named Entity Recognition (NER)
- Topic Modeling
- RAG
- Text Summarization

Frameworks & Libraries — Proficient
- TensorFlow
- PyTorch
- Keras
- Hugging Face
- Scikit-learn
- SpaCy
- NumPy
- Pandas
- OpenCV
- Langflow
- ultralytics
- insightface

Machine Learning & Deep Learning: — Proficient
- Transformer Models
- LLMs
- CNNs
- RNNs
- BERT
- GPT
- LLAma 3.1
- Fine-tuning
- Propmt Engineering
- Knowldge Graph
- AI Agents.

MLOps & Model Optimization — Proficient
- Model Quantization
- GPU Optimization
- Deployment in server
- Docker
- Tmux

Database — Proficient
- Mysql

Education

Agni college of technology

Bachelor of enginner (Computer Science engineer) 06/2016 – 09/2020, chennai India

Languages

- Tamil - Native
- English - Fluent