RUKESH K

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Summary

Aspiring AI/ML Engineer with hands-on experience in Artificial Intelligence (AI), Machine Learning (ML), Generative AI (GenAI), Natural Language Processing (NLP), Computer Vision (CV), and Deep Learning (DL). Skilled in building end-to-end ML solutions, including Large Language Models (LLMs) with Retrieval-Augmented Generation (RAG) and Explainable AI (XAI). Published 1 research paper in an IEEE conference, with 2 additional papers currently under review in Elsevier journals. Strong foundation in model fine-tuning and deployment. Passionate about creating real-world AI solutions for sustainability, automation, and data-driven decision-making.

Education

Madras Institute of Technology, Anna University **2023 – 2025**
Master of Engineering in Computer Science and Engineering *CGPA: 8.77 / 10*

Annai Mira College of Engineering and Technology **2019 – 2023**
Bachelor of Engineering in Computer Science and Engineering *CGPA: 8.91 / 10*

Projects

AI-Driven Aquaculture Management System with AquaGPT for Smart Aquaculture **2025**
- Deployed AquaGPT as a virtual assistant to empower fish farmers with AI-powered support for disease detection and farm guidance, reducing dependency on manual expert intervention.
- Achieved 99.14% fish disease classification accuracy using majority voting ensemble of CNNs.
- **Tech Stack:** Python, MistralAI-7B, HuggingFace Transformers, RAG, FAISS, Flask, OpenCV, CNNs (MobileNetV2, DenseNet121, VGG16), TensorFlow, PyTorch, Scikit-learn

Explainable AI-Enhanced Intrusion Detection System for Smart Farming **2024**
- Built a cybersecurity solution that allowed smart farm owners to interpret AI predictions and respond to anomalies, improving threat transparency and control.
- Achieved 99.95% accuracy in identifying attacks with an interpretable CNN-BiGRU architecture and Integrated Gradients(IG) Explainable AI(XAI).
- **Tech Stack:** Python, TensorFlow, Scikit-learn, Recurrent Neural Network (RNN), Convolutional Neural Network (CNN), Bidirectional Gated Recurrent Unit (Bi-GRU), Integrated Gradients, Google Colab, ToN-IoT Dataset

Precision Agriculture System for Crop Recommendation, Fertilizer Suggestion & Early Disease Prediction2023
- Developed a decision support platform used by farmers to enhance yield by receiving crop recommendation, fertilizer suggestion, and disease prediction strategies.
- Reduced disease outbreaks and fertilizer waste through early predictions.
- **Tech Stack:** Python, OpenCV, Scikit-learn, Pandas, NumPy, CNN, ResNet, Random Forest, Jupyter Notebook

Visualizing and Predicting Heart Diseases with an Interactive Dashboard (IBM Project) **2023**
- Delivered an end-to-end health monitoring tool to assist patients in self-assessing heart disease risk through user-friendly dashboards and risk zone classification.
- Achieved prediction accuracy of 95.78% (Random Forest), 89.89% (KNN), 85.78% (Decision Tree), and 83.67% (Naive Bayes), aiding clinical awareness.
- **Tech Stack:** Python, Dash, Random Forest, K-Nearest Neighbor (KNN), Decision Tree (DT), Naive Bayes, Scikit-learn, Pandas, Seaborn, Jupyter Notebook

Crime Rate Prediction and Analysis Using Machine Learning **2023**
- Designed a tool to help government agencies forecast and map crime intensity in cities, aiding law enforcement resource planning.
- Enabled crime hotspot identification using unsupervised clustering and regional crime statistics.
- **Tech Stack:** Python, Scikit-learn, Pandas, Matplotlib, Seaborn, K-Means Clustering, Jupyter Notebook

Online Student Admission System Using Python and Django **2022**
- Deployed a digital admission portal used by academic staff and applicants to simplify the end-to-end enrollment process.
- Reduced manual paperwork and increased transparency in student tracking via a secure web interface.
- **Tech Stack:** Python, Django, HTML/CSS, JavaScript, SQLite, Bootstrap

List of Publications

1. **2025 IEEE International Conference on Research Methodologies in Knowledge Management, Artificial Intelligence and Telecommunication Engineering (Published)**
   Title: Multi-Architecture Deep Learning Framework for Plant Disease Detection and Classification in Smart Agriculture
   Link: https://ieeexplore.ieee.org/document/11042598

2. **Elsevier Aquaculture Journal (Under Review)**
   Title: AI-Driven Aquaculture Management System with AquaGPT for Smart Aquaculture
   Link: https://dx.doi.org/10.2139/ssrn.5270856

3. **Elsevier Engineering Applications of Artificial Intelligence Journal (Under Review)**
   Title: Explainable AI-Enhanced Intrusion Detection System for Smart Agriculture

Technical Skills

- **Languages**: Python, C, Structured Query Language (SQL)
- **Machine Learning Models & Techniques**: Linear Regression, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines (SVM), K-Means Clustering, Principal Component Analysis (PCA), Adaptive Boosting (AdaBoost), Extreme Gradient Boosting (XGBoost), Ensembling, Synthetic Minority Oversampling Technique (SMOTE), Adaptive Synthetic (ADASYN), Feature Engineering, Data Preprocessing (Missing Value Handling, Outlier Detection, Encoding, Normalization/Standardization), Model Evaluation Metrics (Accuracy, Precision, Recall, F1-Score)
- **Deep Learning Models**: Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), Long Short-Term Memory Networks (LSTM), Gated Recurrent Units (GRU), Bidirectional GRU (Bi-GRU), Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs)
- **Transformers & Transfer Learning**: Transformers, HuggingFace, Bidirectional Encoder Representations from Transformers (BERT), Sentence Transformers (SBERT), Large Language Model Meta AI (LLaMA), Mistral AI, Qwen AI, OpenAI, Generative Pre-trained Transformer (GPT), Text to Text Transfer Transformer (T5), Low-Rank Adaptation (LoRA), Parameter Efficient Fine Tuning (PEFT)
- **Generative AI & Natural Language Processing**: Natural Language Tool Kit (NLTK), Retrieval-Augmented Generation (RAG), LangChain, Prompt Engineering, Few Shot Learning, Zero Shot Learning, Evaluation Metrics (ROUGE, BLEU, Perplexity)
- **Vector Search/Retrieval**: Facebook AI Similarity Search (FAISS)
- **Explainable AI**: SHapley Additive exPlanations (SHAP), Local Interpretable Model-agnostic Explanations (LIME), Integrated Gradients (IG)
- **Computer Vision**: Image Classification, Object Detection, Image Segmentation, You Only Look Once (YOLO), Open Source Computer Vision Library (OpenCV), Pre-trained Models (MobileNetV2, DenseNet121, VGG16 via TensorFlow/Keras Applications), Image Augmentation
- **Frameworks & Libraries**: TensorFlow, Keras, PyTorch, CUDA, Scikit-learn, HuggingFace Transformers, Pandas, NumPy, Matplotlib, Seaborn, pdfplumber, Weights & Biases (W&B)
- **Web & Deployment**: Flask, Streamlit, Django, Docker (basic)
- **Databases**: MySQL, SQLite
- **Tools & Platforms**: Jupyter Notebook, VS Code, Google Colab, Git (Version Control), GitHub, Microsoft Word, PowerPoint, Excel
- **Development Practices**: Agile Methodologies
- **Operating Systems**: Windows, Linux (basic)