RAKSHEKA RAJAKUMAR

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Machine Learning & Software Engineer skilled in code lifecycles, workflow optimization, & cross-functional collaboration to build solutions

EDUCATION

University of Southern California — **Los Angeles, CA**

Master of Science in Electrical & Computer Engineering- Machine Learning & Data Science — August 2023-May 2025

- **Courses**: Data structures and algorithms, Information Retrieval, Cloud Computing, Deep learning systems, Probability and Statistics
- **Certification**: AWS AI Practitioner- https://www.credly.com/badges/df3a3caa-075c-4d53-a212-da49fe37a62a/public_url

Anna University - Coimbatore Institute of Technology — **Coimbatore, India**

Bachelor of Engineering in Electronics and Communication – GPA: 9.1/10 — July 2019-May 2023

- **Courses**: Database management systems, Machine learning, Probability, Stochastic processes, Digital Signal Processing

EXPERIENCE

WorkUp — **Los Angeles, CA**

Machine learning Engineer — May 2024-July 2024

- Developed a two-tower retrieval model with NVIDIA Merlin for job matching in a state-of-the-art recommender system on AWS SageMaker
- Improved embedding quality by 15% and mitigated overfitting by regularization & negative sampling
- Enhanced database management by implementing indexing, automated checks, & workflow optimizations for data quality with MongoDB

Kanini software solutions — **Chennai, India**

Software Developer Intern — February 2023-June 2023

- Led a team to develop a banking app with ETL pipelines, a React dashboard, Node.js APIs, PostgreSQL, and Kafka, boosting traffic by 70%
- Built scalable web applications utilizing React for frontend, Node.js & Express.js for backend API handling, and PostgreSQL for data storage
- Deployed systems with Docker & Kubernetes on AWS EC2 for scalability and high availability
- Monitored system performances on AWS CloudWatch

MITACS — **Waterloo, Canada**

Globalink Research Intern — June 2022-October 2022

- Researched DKVMN to model knowledge retention dynamics, capturing forgetting & relearning patterns for curriculum personalization
- Managed events and conducted seminars explaining a rover prototype, for a project sponsored by Canadian Space Agency
- Functioned in a team (Under Dr. Julie Mueller and InkSmith Technologies) to program K8 rovers for object detection

Zebo.AI (Verzeo) — **Remote**

Intern — November 2021-January 2022

- Processed financial transactions for fraud detection using SQL for feature engineering, structuring categorical and numerical features
- Programmed a RESTful fraud detection system for financial transactions leveraging XGBoost for 87.3% accurate anomaly detection with TensorFlow & Scikit-Learn. Hosted model with the help of AWS Lambda with API Gateway

TECHNICAL SKILLS

Languages: Python, C++, C, C#, SQL, HTML, CSS, JavaScript
Frameworks & MLOps: TensorFlow, Keras, PyTorch, Pyspark, Scikit Learn, NumPy, Matplotlib, Langchain, LlamaIndex, ML Flow, Hadoop
Web Technologies: React, Node, Angular, FastAPI, Flask, Streamlit, MySQL, Postgres, MongoDB, LAMP, WebAPIs, Bash, Powershell
Cloud & DevOps: LINUX, AWS SageMaker, S3, Bedrock, CloudWatch, Docker, Kubernetes, Kubeflow, Git, Jenkins, JIRA, Agile (Scrum), Splunk

PROJECTS

Federated Learning in 3D Brain-tumor segmentation

- Optimized federated learning aggregation algorithms by 40%, for multimodal 3D brain tumor segmentation, training ResUNet and Transformer-encoded UNet models to achieve performance comparable to centralized learning
- Introduced a Contribution Factor, a weighting mechanism allowing more diverse and high-performing clients to have a greater influence on global model during weight averaging, and the validated approach on the BraTS 3D dataset

EDQty- Multimodal learning tool

- Created a full-stack web application using Flask (backend), React (frontend), and MongoDB (database) to deliver responsive experience
- Engineered an efficient data pipeline integrating Pinecone DB for vector storage and retrieval, boosting vector search speed by 25%
- Integrated multi-modal AI alongside Llama 3.2, enabling RAG-based retrieval, translation, summarization, and captioning for accessibility

Wildfire Aftermath Analysis - Satellite Imagery

- Designed an object detection and segmentation pipeline utilizing Detectron2 & Mask R-CNN, identifying burnt areas from satellite imagery
- Extracted RGB and Near-Infrared (NIR) values on ERDAS (through a virtual electromagnetic shift) & computed BIR to quantify fire damage

Web applications for recommendation systems

- Architected a Spotify Web App with a neomorphic UI, RESTful Node.js backend, and Spotify Web API, leveraging Docker for deployment
- Refined a Flask-based movie recommender system employing RBMs, outperforming K-means by 11.2% on IMDB data

Empathy-driven conversational AI - LLMs

- Customized emotionally adaptive chatbot adopting LLaMa 2 & NLTK, having custom state-of-mind class to analyze user conversation styles
- Ongoing: Enhancing adaptation layer to guide users toward an optimal emotional state through personalized response modeling

PUBLICATIONS

- Performance Analysis of CNN Architectures in Multi-label Image classification, Proceedings **IJCA** 184(48):14-18, February 2023
- Assessment of ML Algorithms for Predicting Campus Placements, Proceedings of **ICMCSI** 2023 (pp. 221-231 Springer)