Raksheka Rajakumar

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Machine Learning Engineer with expertise in deep learning, image processing, and algorithm optimization, specializing in designing scalable AI pipelines and implementing advanced optimization techniques to enhance performance and efficiency.

Education

University of Southern California — **Los Angeles, CA**
Master of Science in Electrical & Computer Engineering- Machine Learning & Data Science — *Aug 2023 – May 2025*
Courses: Deep Learning Systems, Distributed Systems, Information Retrieval, Cloud Computing, Spatial Data Analysis

Anna University - Coimbatore Institute of Technology — **Coimbatore, India**
Bachelor of Engineering in Electronics and Communication (GPA: 9.1/10) — *July 2019 – May 2023*

Experience

Machine Learning Engineer — **Los Angeles, CA**
WorkUp — *May 2024 – Jul 2024*

- Designed and implemented a Two-Tower retrieval model using NVIDIA Merlin and TensorFlow to efficiently match user profiles with job postings for a state-of-the-art job recommender application
- Optimized the retrieval task pipeline, improved embedding quality by 15% through enhanced embedding layers, regularization, & effective negative sampling.
- Deployed the pipeline on AWS Cloud, leveraging scalability for real-time recommendations
- Managed relational databases to optimize performance, streamline workflows, and improve data quality through automated quality checks, normalizing data, or enhancing query efficiency

Associate Trainee Intern- Software development — **Chennai, India**
Kanini software solutions — *Feb 2023 – Jun 2023*

- Developed and deployed scalable web applications using React.js, Node.js, and .NET Framework
- Utilized C# for back-end development and implemented AWS solutions for deployment
- Designed robust backend systems integrated with relational databases to support real-time analytics

Machine Learning Research intern - MITACS — **Waterloo, Canada**
Teach Digital Lab (Under Dr. Julie Mueller, in collaboration with InkSmith Technologies) — *Jun 2022 – Oct 2022*

- Contributed to a Canadian Space Agency-funded project to develop a rover prototype for K-12 education
- Worked with a team to develop a Scratch-based Micro:bit programming interface to program K8 rovers for object detection
- Developed machine learning models for time series analysis, improving forecasting accuracy for educational data trends

Technical Skills

Languages: Python, R, C++, C#, SQL, JavaScript, HTML, CSS
Frameworks & Libraries: React.js, Node.js, LLVM, TensorFlow & Keras, Pytorch, Scikit Learn, MongoDB, Matplotlib, SciPy
AI: OpenAI, Langchain, Huggingface, LlamaIndex
Domains: Deep learning, Data structures and algorithms, Operating systems, Web development
Developer Tools: Docker, Kubernetes, Git, Jenkins, FastAPI, Flask, Spark, ML Flow, JIRA, Agile/SCRUM, AWS, GCP

Projects

Federated Learning in 3D Brain-tumor segmentation | *Python, Pytorch, TransUNet, UNet, Federated Learning*

- Designed a federated learning framework for 3D brain MRI segmentation using the BraTS dataset, implementing a UNet architecture with FedPer to address data heterogeneity by centralizing the encoder and personalizing client-specific decoders
- Compared federated model with centralized counterparts like TransUnet, optimizing segmentation adaptability across clients
- Enhanced model robustness through iterative refinement, leveraging multimodal data to improve segmentation accuracy and scalability in distributed settings

Wildfire Aftermath Analysis using Satellite Imagery | *Erdas, Detectron2, Mask R-CNN, Python*

- Developed a comprehensive object detection and segmentation pipeline to assess wildfire damage from satellite images.
- Extracted RGB and Near-Infrared (NIR) values (using virtual electromagnetic shift) from satellite imagery using ERDAS.
- Leveraged Detectron2 and Mask R-CNN for object detection and segmentation, accurately identifying burnt areas.
- Applied the Burnt Index Ratio to assess the intensity of fire damage, providing a more suitable metric.

Optimization for Empathy-Driven Conversational AI (LLMs) | *Python, Hugging face, SpaCy, NLTK, TextBlob*

- Customized an emotionally adaptive chatbot with a custom state-of-mind class to analyze user conversation styles.
- Ongoing: Customizing the adaptation layer to guide users toward an optimal emotional state.

Intelligent Sensory assistive glove to aid the visually impaired | *Python, Arduino, Sensors, CNN, OpenCV, Tensorflow, Pyttsx3*

- Worked as a group to design a wearable glove system to detect (ultrasonic sensor) and identify obstacles via an ultra-sonic sensor, providing real-time speech output through optical character recognition.

Publications

Performance Analysis of CNN Architectures in Multi-label Image classification — Feb 2023
International Journal of Computer Applications 184(48):14-18, February 2023

Assessment of ML Algorithms for Predicting Campus Placements — Mar 2023
Mobile Computing and Sustainable Informatics: Proceedings of ICMCSI 2023 (pp. 221-231 Springer)