Raj Pulapakura

Machine Learning Engineer

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Technical Skills

Machine Learning and Data Science	Python, TensorFlow, TensorFlow JS, TensorFlow Lite, Keras, PyTorch, Scikit-learn, OpenCV, Hugging Face, NumPy, Pandas, Matplotlib, Plotly, Seaborn, ChromaDB, Langchain, OpenAI API
Database	SQL, MySQL, PostgreSQL, MongoDB, AWS DynamoDB, Firebase Firestore, Firebase Realtime Database
Cloud and Infrastructure	AWS (ECR, EKS, EC2, S3, API Gateway, IAM, DynamoDB, Lambda, Athena, Glue), GCP (Vertex AI), BentoML, Terraform, Firebase, Git, GitHub, Docker, Kubernetes, Shell, Modal
Frontend + Backend Development	TypeScript, React.js, Next.js, Vercel, JavaScript, HTML, CSS, Tailwind, Material UI, Redux, Zustand, Node.js, REST APIs, Express.js, GraphQL, ApolloGraphQL, Redis, TypeORM
Mobile App Development	Flutter, Dart

Certifications

- **Database and SQL for Data Science with Python**, IBM — Dec 2023
- **Deep Learning Specialization**, DeepLearning.AI — Dec 2023
- **Advanced Machine Learning on Google Cloud**, Google Cloud — Nov 2023
- **IBM Professional Machine Learning Certificate**, IBM — Sep 2023
- **TensorFlow Developer Certificate**, TensorFlow — Aug 2023

Work Experience

A.I.GORITHM, Melbourne — Jan 2024 – Feb 2024

Software Engineer

- Developed and deployed a Property Report Generation Tool which enables farmers to get detailed agricultural reports on their geographical AOI (area of interest).
- Pooled and organized geospatial data from several APIs and data sources to provide agricultural analytics to farmers.
- Employed a microservices architecture to develop APIs/services and a user-facing website.
- Automated deployment via GitHub Actions CI/CD pipeline and Terraform IaC (Infrastructure as Code), to provision AWS resources.
- Software Technologies: *Next.JS, TypeScript, Tailwind CSS, Python, NumPy, Pandas, GeoPandas*
- Infrastructure: *Terraform, Docker, Microservices Architecture, AWS ECR, AWS ECS, AWS EC2, Fargate*
- Data Management: *AWS S3, AWS Athena, AWS Glue, AWS IAM, SendGrid*

Project Work

***ClarityScan*: Deep Learning for Tumour Diagnosis,** code, web, video
Project Overview: ClarityScan is an app that enables radiologists to enhance brain MRI scans and automatically identify glioma tumours in the scans.

- Developed 2 Deep Learning models using TensorFlow for Noise Removal and Tumour segmentation, reaching a Dice Coefficient of up to 91%.
- Deployed models to HTTP endpoints with GPUs using Modal serverless functions, ensuring inference time during production was in the range of 5 to 30 seconds.
- Built a web interface so that radiologists can upload their MRI scans, denoise them, and automatically identify glioma tumours.
- Technologies: *Python, TensorFlow, NumPy, Modal, AWS ECS & LB, Git, GitHub, Next.JS, Tailwind CSS*

Real-Time Object Detection: Chrome Dino Game, code, video
Project Overview: A replica of the Chrome dinosaur game built with Python, except the jump action is controlled through hand gestures captured via the webcam in real time.

- Employed OpenCV and NumPy for real-time image processing.
- Curated a custom dataset by collecting images from my webcam via an automated Python script.
- Developed a real-time object detection model using TensorFlow, reaching precision of up to 97%.
- Improved inference time by 70% of baseline through iterative model optimization, while balancing detection accuracy and FPS through periodic detections, to ensure a smooth playing experience.
- Technologies: *Python, TensorFlow, TensorFlow Model Zoo, OpenCV, NumPy, Git, GitHub*

Computer Vision-Powered Search Engine, code, web, video
Project Overview: An app that enables users to find similar images based on images they already have.

- Used a pre-trained MobileNetV3 neural network in PyTorch to compute image embeddings.
- Deployed the model through a REST API backend built with BentoML and hosted using automated Terraform infrastructure through AWS API Gateway and AWS Lambda.
- Developed a web interface with drag-and-drop functionality enabling users to find similar images.
- Technologies: *Python, PyTorch, REST API, BentoML, TerraForm, AWS API Gateway, AWS Lambda, Next.JS, TypeScript, Vercel, Tailwind CSS, Git, GitHub*

Natural Language Processing (NLP) Text Toxicity Checker, code, web, model
Project Overview: An app that enables users to check their text for toxicity across 6 toxicity categories (toxic, severe toxic, obscene, threat, insult, identity hate).

- Employed TensorFlow to train a text classification model using LSTMs, on 60 MB of textual data.
- Quantized the model using TensorFlow Lite and TensorFlow JS for efficient edge-device inference and stored the model shards in a GitHub repo.
- Developed a web interface using Next.js (deployed with Vercel), TypeScript and Tailwind CSS, which enables users to enter their text and analyse the toxicity of their text.
- Technologies: *Python*, *TensorFlow, TensorFlow Lite, TensorFlow JS, Kaggle, Next.js, TypeScript, Vercel, Tailwind CSS, Git, GitHub*

Other

- Contribute to the open-source packages TensorFlow and Scikit-learn on GitHub.
- Write a technical blog on Medium, sharing content on machine learning, deep learning, computer vision, and software development.
- Post videos on my YouTube channel, demonstrating my projects and sharing knowledge on machine learning, data science, and web/mobile development.