Rajit Subin Puzhakkarezhath

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EDUCATION

Master of Science in **Computer Science** | *University of Illinois at Chicago (UIC), Illinois* 2023
Coursework: Artificial Intelligence (AI), Cloud Computing, Advanced ML, Deep Learning for NLP, Data Mining

Bachelor of Engineering in Electronics and Telecommunication Engineering | *University of Mumbai (DJSCE), India* 2021
Relevant Coursework: Data base management system, Image Processing and Machine Vision, Big Data Analytics

EXPERIENCE

Machine Learning Engineer

Squark, MA **Oct 2023 - Current**

• Spearheaded library package update, **resolving dependency conflicts**, and ensuring stability. Enhanced code integrity by seamlessly integrating logging, model version control, debugging, error tracing, and exception handling for optimized service operation.
• Collaborating to implement **multivariate time series analysis**, employing algorithms such as Varmax and LSTM, covering preprocessing, denoising, outlier handling, automodeling, and prediction in an AWS environment with EC2 instances and S3 buckets.

Software Engineer Intern (Data Science R&D)

CCC Intelligent Solutions, Chicago **June 2022 – Apr 2023**

• Engineered a **multi-label image classification pipeline** feeding multiple images as a single tensor to a Vision Transformer (ViT) model attaining **97.8% accuracy** on 100k instances.
• Developed a **multi-modal transformer recommendation system** for predicting damaged auto parts, including **hypothesis testing** for result validation. Utilized GPU cluster model training with **Docker** and **Kubernetes**, monitoring via ClearML and Airflow.
• Created a **3D visualization** by **reducing the dimensionality** of 700+ dimensional embedding from a custom **transformer architecture** on **Tensorboard** projector to demonstrate correlation between damaged parts of a vehicle.
• Collaborated in a hackathon, leveraging a **GPT-based open source LLM** model to retrieve vehicle repair method documents, while also working cross-functionally with various back-end and front-end engineering teams.

Coding Department Co-Head

DJS Antariksh **Jan 2020 - Dec 2020**

• Built **object detection** models using **EfficientDet** and **YOLOv4 architectures** and achieved an accuracy up to 82%.
• Participated in the European Rover Challenge (ERC) and won the 'Best Science Task' award. Secured **'Third' place in the world** for all the tasks and design report in September 2020.

Data Science Intern

Aditya Birla Group, Mumbai **June 2019 - July 2019**

• Designed a **sales forecast model** for a specific plant's upcoming month's sales in a region, utilizing the past 4 years' data.
• Researched and implemented novel machine learning techniques including **LSTM Neural Network** using TensorFlow as well as Pandas and NumPy in python for data pre-processing and obtained an accuracy of 71%.

PROJECTS

MLOPs end-to-end pipeline using AWS

• Implemented end-to-end MLOps pipeline using **AWS SageMaker** to build and deploy an **XGBoost** model for detecting faulty states in wind turbines. Conducted **exploratory data analysis**, **model training**, performed model **evaluation**, and **deployed** it to an endpoint.
• Achieved **95% precision** in training and 93% in test datasets, leveraging AWS services such as **SageMaker Studio, S3 buckets, EC2 instances, CloudWatch** and prebuilt containers.

Context-Aware Question Answering System using LLM

• Implemented a **Retrieval-Augmented Generation (RAG)** model with a **data processing pipeline** involving LangChain for seamless integration with language models, extracting data from PDF documents, web scraping, and YouTube video transcripts.
• Executed **ETL** processes: split documents, transformed embeddings, and stored in a vector database using FAISS. Enabled context-aware queries with **Mixtral 8×7B**, surpassing GPT-3.5 and LLaMa 2 in metrics, excelling in performance and deployment scalability.

Amigo –Smart Voice Controlled Bot

• Engineered a bot for multiple functions: image captioning, home automation, speech recognition, **sentiment analysis** via textual, facial, and audio information using concepts of **computer vision, NLP, and deep learning**.
• Utilized the **Random Forest Classifier** for speech emotion recognition, **Xception net** architecture to recognize facial emotions, the **resnet-152** model for the encoder and **LSTM** network for the decoder network and developed a GUI using Tkinter.

SKILLS

• **Languages, Databases, Software, OS:** Python, Scala, Java, HTML | SQL | VSCode, Git, Jupyter, MATLAB | Linux, Windows
• **Data Science:** NumPy, Pandas | Data Visualization (Tensorboard, Matplotlib, Tableau) | Regression, Classification, Clustering
• **Machine Learning:** Scikit-learn, SciPy | Deep Learning (PyTorch, TensorFlow, Keras) | NLP (NLTK, Transformers, Huggingface)
• **Cloud and Big Data:** AWS (EC2, EMR, S3, Lambda, SageMaker), Docker, Kubernetes, Apache Hadoop and Spark, Map-Reduce