PushpakRaj SenthilKumaran

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Professional Summary

AI/ML Specialist with 2+ years of experience in architecting scalable data pipelines, ML systems, and streaming architectures using AWS, Kafka, Spark, and Docker. Demonstrated expertise in ETL design, deep learning, real-time analytics, and socket programming. Passionate about solving real-world challenges with intelligent systems and driving innovation in machine learning operations (MLOps).

Professional Experience

Big Data/Programmer analyst | Cognizant Technology Solutions, India **Jul 2022 – Aug 2024**

EMR Job Orchestration with Docker and Airflow

- Designed a scalable workflow to trigger EMR jobs from EC2 using Airflow BashOperators.
- Packaged Python Spark scripts in Docker containers to ensure reproducible environments across jobs.
- Leveraged Airflow DAGs to orchestrate job execution, ensuring sequential dependencies and reliable completion.
- Managed data outputs in S3, enabling downstream analytics and integration with dbt transformations.

Real-time Data Pipeline with Kafka and Spark

- Built scalable pipelines with Kafka, Apache Spark, and PostgreSQL; reduced reporting latency by 40%.
- Facilitated near-real-time ingestion and transformation for dynamic business intelligence.
- Implemented CI/CD workflows using github actions to automate pipeline deployment and monitoring.

Dockerized Ingestion and Orchestration System

- Created modular Docker Compose system with Airflow DAGs for automating public data extraction and S3 upload.
- Integrated PostgreSQL ingestion container; cut data processing time by 15+ hours weekly.
- Implemented CI/CD workflows using Jenkins to automate pipeline deployment and monitoring.

Cloud Computing Intern | Cognizant Technology Solutions, India **Jan 2022 – Jun 2022**

- Developed Azure-based ETL pipelines routing APIs to ADLS; enhanced Synapse query performance by 30%.

Key Academic Projects

Real-Time ECG Signal Prediction Platform

- Built a real-time ECG anomaly detection system using a hybrid 1D-CNN + Transformer architecture.
- Used Apache Kafka to stream ECG signals and Apache Spark for low-latency model inference.
- Stored processed outputs in Snowflake cloud data warehouse for scalable analytics.
- Created interactive dashboards using Power BI for clinical stakeholders.

Deep Reinforcement Learning for Atari Game (Air Raid)

- Built DQN agent in TensorFlow using CNNs, frame stacking, experience replay, and target networks.
- Tuned hyperparameters to improve average reward and convergence behavior.

GPU-Accelerated CUDA Programs

- Developed CUDA kernels for:
- 1D Convolution using constant memory,Parallelized Vector Addition with threads ,Matrix Multiplication with 2D thread blocks Achieved 3-5x acceleration over CPU baselines.

Multithreaded Socket Programming in C++

- Implemented a multithreaded socket server using POSIX threads in C++ to manage multiple client connections concurrently.
- Designed custom request-response logic to simulate real-time communication similar to basic chat or command-line interfaces.
- Enhanced system robustness with error handling, graceful shutdowns, and lightweight protocol parsing.

Education

University of Limerick, Ireland *Sept 2024 – Aug 2025*
MSc in Artificial Intelligence and Machine Learning QCA: 3.58/4.00
Modules: AI, Deep Learning, Data Pipelines, Reinforcement Learning

St. Joseph's College of Engineering, Chennai, India *Aug 2018 – Jun 2022*
BE in Electronics and Communication Engineering GPA: 8.10/10

Technical Skills

Languages: Python, C++, SQL, Bash
Frameworks: PyTorch, TensorFlow, CUDA , langchain , langgraph,ONNX
Big Data: Apache Spark, Kafka, Airflow, Cassandra, PostgreSQL
Cloud: AWS (S3, Lambda, Glue, SageMaker, Athena), Azure (ADLS, Synapse)
CI/CD Tools: Docker, Git,Jenkins
Systems: Socket Programming (POSIX/C++)

Cerfications

AWS Machine Learning Foundations
AWS Cloud Foundations
Microsoft Azure Fundamentals