

JOEL SUSHANTH MARKAPUDI

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EDUCATION

Northeastern University

M.S. in Artificial Intelligence (G.P.A - 3.9)

Relevant Coursework: MLOps, Deep Learning, Computer Vision, Machine Learning.

Boston, MA.

Jan 2024 – Present

KL University

Bachelor's in Computer Science

Vijayawada, India.

Jun 2016 – Jun 2020

SKILLS

Programming & ML/AI: Python (PyTorch, Pandas, Polars, Scikit-learn, Gensim, OpenCV), Java, SQL.

MLOps & Cloud: Docker, Airflow, FastAPI, Streamlit, AWS (Bedrock, S3 Vectors, Lambda), DuckDB.

Data & BI Tools: Power BI, Talend, PostgreSQL, Parquet, ETL Architecture, Data Modeling.

ACADEMIC PROJECTS

FinSights: LLM RAG Financial Data Intelligence System

Sep 2025 – Dec 2025

- Built E2E **RAG system** for analyst-style queries over SEC Form 10-K data with **hybrid retrieval architecture**. Combines structured KPI tables and sentence-level vector search. Implemented fuzzy NLP entity adapters and multi-stage context assembly pipeline, and provenance tracking.
- Tested citation header generation using 60+ exports, generating **92%** accuracy in source traceability.
- Structured a retrieval pipeline with **query variant generation** to improve recall, **S3 Vectors** store with metadata filtering, triple retrieval regimes, context neighbor expansion followed by de-duplication and assembly orchestration.
- Deployed **3-tier production system** (ML orchestrator, FastAPI + Streamlit) with cost modeling that achieves **\$0.017/query** through S3 Vectors. Derived scaling formulas and example scenarios for cost analysis.
- Implemented an offline evaluation pipeline validating retrieval quality with **automated anchor tests, curated gold sets** tested with metrics (ROUGE-L/BERTScore/BLEURT), and manual analysis achieving 80%+ factual accuracy.

Pose Synthesis With Cross-Modal Diffusion Architecture (PyTorch, CLIP)

Jan 2025 – Apr 2025

- Devised Conditioned UNet diffusion architecture processing 23.3K+ training samples with **8-head cross-attention & 4 resolution levels**, generating 3D poses from 66-dimensional skeletal representations.
- Modeled **hierarchical cross-attention** with first-action syntactic segmentation and cluster-aware sampling, obtaining body-part and action-aware semantic conditioning. Achieved **0.69 final loss** through 3-phase progressive training.
- Enforced biomechanical structure awareness, anatomy validation, forward kinematics constraints, tanh-bounded outputs (1.5x scaling) and CFG guidance scale of 7.0. These achieved 70% visual alignment and topological consistency.

SocrAItic Circle: Multi-Agent LLM Debate & Evaluation Framework

Jan 2025 – Apr 2025

- Created a multi-agent **LLM debate system** with structured preparation phases, iterative refinement, and adversarial critique. Integrated specialized judge framework achieving 35% improvement in argument coherence scores.
- Engineered a **persistent memory architecture** with 25+ YAML-based prompt templates, prompt orchestration, auto-tuning, experiment configurations, and local deployment using Ollama.

Multi-View Image Analysis for 3D Reconstruction (Computer Vision)

Sep 2024 – Dec 2024

- Engineered a **pose-guided feature correspondence system** processing **360K+ 2D observations** (24MP) across 38 high-resolution views, integrating camera pose estimation and view overlap analysis for multi-view matching.
- Orchestrated a **6-stage adaptive pipeline** integrating scene-type classification, RANSAC geometric validation, and dual-layer **occlusion handling**. Reduced false matches by **42%** while improving feature track stability to **3.56-frame persistence**. Achieved **38.5% 2D-3D correspondence rate** generating 33K+ 3D points.
- Implemented a GPU-accelerated preprocessing pipeline with LAB color space transformations, CLAHE enhancement, and bilateral filtering using PyTorch. Attained a 0.93 quality score with 56K+ features per image, and 28% spatial coverage.

Late-interaction Image–Text Model: (ViT+CLIP, MaxSim retrieval, LoRA)

Nov 2025 – Dec 2025

Protein Secondary Structure Prediction (HMM, CRF, BiLSTM, SVM)

Sep 2024 – Dec 2024

Stock Trading Platform (Java MVC client–server application).

Jan 2024 – Apr 2024

EXPERIENCE

Innova Solutions, Hyderabad

Data Engineer — Business Intelligence

Dec 2019 – Nov 2023

Accomplishments

- Architected and led development of scalable data solutions for FP&A teams, serving as a lead dev. Automated **ETL in Talend** for boosted data integration, optimized **PL-SQL procedures**, and crafted several **PowerBI data models**.
- Led migrations and upgrades of ETL systems with CI/CD pipelines that reduced deployment time by over 50%. Guided cross-functional teams of size 3-6 and mentored new junior developers, boosting team productivity by over 25%.
- Created **25+ dashboards** encompassing **500+ metrics**, providing comprehensive business insights.
- Partnered with in-company teams to help refine data modeling. Conducted **35+ interviews** to assist recruitment.
- Earned Star Awards and **Innova Idol Award** for exceptional contributions to team projects and efficiency.

FP&A and SG&A Reporting

Mar 2020 – Nov 2023

- Orchestrated multiple workspaces with tailored FP&A reports for diverse team needs including Quarterly Business Reviews (QBRs), Producer Reports, Hiring Metrics, and specialized reports for different business units and divisions.
- Forecasted revenue and hiring metrics, integrating an adaptive awards system aligned with dynamic business rules.
- Standardized revenue trends and eligibility criteria to enhance the accuracy and relevance across multiple reports.
- Developed SG&A reporting models, custom hierarchies to streamline financial data and executive decision-making.
- Automated margin and audit processes, reducing manual Excel-based tasks by over 70 hours and enhancing process reliability. Deployed automated systems for searches, exclusions, remarks, and data verifications.
- Oversaw and personally executed across **11+ projects**, including the Producer Commission Report, Reconciliation Report, Daily Sales and Outstanding Report, and CSM Dashboard, contributing to crucial operational efficiency and data transparency.

Operational Reporting

May 2022 – Nov 2023

- Developed end-to-end data models integrating multi-source financial data and custom-prepared lookups, enhancing data accessibility and accuracy.
- Collaborated with cross-functional teams to align performance indicators with strategic business goals, engineering over 200 high-impact KPIs.
- Drove the project across two phases, optimized code and data loaders to accelerate report generation by 60%. Established in-depth data view for key metrics and detailed presentations, boosting data exploration capabilities by over 80%. Innovated a data integration solution, achieving over **70% accuracy** in correlating disparate system data.