OMKAR THORVE

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EDUCATION

M.Tech in Artificial Intelligence and Machine Learning, Symbiosis Institute of Technology 2024 - 2026
Relevant Coursework: Supervised and Unsupervised ML, Deep Learning, Machine Vision, NLP, Reinforcement Learning, Graph Neural Networks, GANs, LLMs, Agentic AI

B.Tech in Mechanical Engineering, Deogiri Institute of Engineering and Management Studies, Aurangabad 2020 - 2023
Relevant Coursework: Image Processing, Linear Algebra, Calculus, Numerical Analysis, Statistics, Control Systems, Python, Linux

SKILLS

Languages	Python, C, SQL
Libraries	Pytorch, Tensorflow, Numpy, Scipy, Flask, NLTK, OpenCV, LangGraph, LangSmith Gymnasium, Langchain, Hugging Face Transformers
Technical Skills	OOPs, NLP, LLMs, CNN, RNN, GNN, AutoEncoders, Transformers, GANs, MCP, RAG, Image Processing and Computer Vision, Git, Docker, Streamlit, Exploratory Data Analysis, Power BI, Agentic AI

EXPERIENCE

John Deere India Pvt. Ltd. - AI/ML Intern Jun 2025 – Dec 2025

- Applied **object detection and segmentation models** (YOLO, OpenCV, SAM2, DETR, ViT, Grounding DINO) to automate manual processes, reducing task time by **4+ hours** and improving efficiency.
- Fine-tuned **Large Language Models** on custom image datasets, achieving a **50% improvement in accuracy** and significantly reducing hallucinations in outputs.
- Built a **speech-to-text pipeline** using Whisper, GPT-4o Transcribe, GPT-4o Mini, with a JavaScript-based frontend and backend, cutting manual typing effort by **2 hours** and boosting transcription accuracy by **10%**.
- Designed a **multi-agent workflow** leveraging **Graph Neural Networks (Knowledge Graphs)** and deployed on **AWS (EC2, S3, DynamoDB)**, enabling authors to save **4+ hours** in document workflows.
- Implemented **cross-encoder reranker algorithms** for semantic retrieval, outperforming similarity search approaches. Used **Databricks** for large-scale data extraction (EDL) and **OpenAI embeddings + NLP** for evaluation.
- Conducted experiments on **hallucination reduction techniques** for deployed LLMs, improving reliability and robustness of outputs.

K.S.J Recruitment Pvt. Ltd. - Data Analyst Feb 2023 – Feb 2024

- Created and maintained **Power BI dashboards** for recruitment metrics, providing actionable insights to optimize hiring strategies.
- Performed **data cleaning and analysis using Excel and Python**, ensuring accurate and efficient reporting.
- Automated data workflows, improving efficiency and reducing manual effort by 20%.
- Collaborated with cross-functional teams to streamline recruitment data pipelines and enhance decision-making processes.

PROJECTS

Traffic Signal Control System (Website)

- Implemented **YOLOv5** for real-time object detection and **Vision Transformer** for classification, achieving >85% accuracy with segmented sampling.
- Applied **Reinforcement Learning (RL)**-based traffic control system using **SUMO**, where the state space included vehicle count and wait times, actions adjusted signal delays, and rewards were threshold-based.
- Optimized traffic flow with a **hybrid priority-based** and **adaptive scheduling** approach, targeting sub-19-minute travel time for a 10 km route.

Mild Steel Degradation Analysis Using Microscopic Imaging and Deep Learning (Try it here)

- Developed a deep learning-based corrosion detection framework integrating **CNNs**, color segmentation, and edge detection for real-time mild steel degradation analysis using microscopic imagery.
- Achieved a **15%** increase in F1-score and a **10%** improvement in precision over baseline models, enhancing corrosion classification accuracy.
- Carried out advanced image preprocessing, **including noise reduction, contrast enhancement,** and **edge sharpening**, improving model robustness and detection reliability.
- Built a **web-based corrosion detection application**, enabling real-time image analysis with highlighting corrosion zones, achieving 90%+ user accuracy in severity classification, and generating automated corrosion reports.

Smart Quiz Generator - AI-Powered Educational Assessment Tool (Github Link)

- Developed an AI-powered quiz generation system integrating Google Gemini API, FastAPI backend, and React frontend for automated creation of high-quality multiple-choice questions from educational content.
- Achieved high-quality question generation rate with professional explanations and Bloom's taxonomy alignment, replacing local **3.85GB** transformer models with cloud-based Gemini API for **90%** faster processing.
- Implemented comprehensive text processing pipeline including complexity analysis, subject area detection, and multi-difficulty question generation supporting easy, medium, hard, and mixed difficulty levels with contextual distractors.
- Built a full-stack web application with auto-save functionality, connection retry mechanisms, and 4 export formats (JSON, CSV, Moodle XML, GIFT), enabling seamless integration with Learning Management Systems and achieving 100% export compatibility.

Intelligent Research Assistant with Agentic RAG

- Built an autonomous research assistant leveraging open-source datasets (e.g., Common Crawl, Wikipedia dumps) and the Gemini LLM API for semantic understanding.
- Designed a multi-agent pipeline using LangChain: Planning agent to decompose queries, Retrieval agent querying Qdrant vector database, Validation agent cross-checks facts, and Synthesis agent to generate structured reports.
- Implemented semantic chunking and hybrid retrieval (dense + keyword) over **Qdrant**, boosting relevant document recall by **30%**.
- Developed an end-to-end quality pipeline with hallucination detection against source metadata and credibility scoring, reducing misinformation risk by **80%**.

ACHIEVEMENTS AND CERTIFICATIONS

- Co-authored the research paper **"GangaFlow: A Multi-Model Deep Learning Framework for Real-Time River Pollution Detection and Analysis Using Drone Imagery"** presented at the **IEEE International Conference on Intelligent and Cloud Computing (ICoICC 2025)**, Bhubaneswar, India.
- **Secured the first runner-up position at The Great Ninja Hack 2K25 (DYPCET Kolhapur)** for the Mild Steel Degradation Analysis Using Microscopic Imaging and Deep Learning Project.
- **Secured the second Runner-up position in the prestigious "Best Manager" competition (NICMAR University)**.
- **Achieved 1st Position in Smart India Hackathon (Internal at SIT)** for the Traffic Signal Control Project.
- **Served as Zonal Basketball Team Captain**, led college team to a zonal championship, and competed in State and National tournaments.
- **Generative AI Engineering with LLMs** by IBM.
- **Data Analysis and Visualization with Power BI** by Microsoft.
- **AWS Cloud Training** by Unnati Development Pvt Ltd.