

MUHAMMAD HAMZA AZEEM

Data Scientist | AI/ML Engineer

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Professional Summary: AI/ML Engineer specializing in Computer Vision and Applied AI. Proven track record of developing production-ready LLM applications and achieving state-of-the-art results (+23.3% F1-score improvement) in deep learning research.

TECHNICAL SKILLS

Languages: Python, TypeScript, Java, SQL

AI & ML: PyTorch, LangChain, FAISS, Llama 3, Groq, Computer Vision, Transformers, Domain Adaptation

Web & Cloud: FastAPI, Next.js, React, Tailwind CSS, Vercel

Tools: Git, Linux, Jupyter, VS Code, Google Antigravity, Cursor AI, Claude Code, Codex

RESEARCH EXPERIENCE

Fourier Domain Adaptation & Evidential DL for Deforestation Detection

Aug 2025 – Jan 2026

Capstone Project 1, GIFT University | Technologies: PyTorch, ConvNeXt, Landsat-8, Domain Adaptation

- Developed a cross-domain deforestation detection system replacing expensive adversarial training with parameter-free Fourier Domain Adaptation (FDA).
- Integrated Evidential Deep Learning (EDL) for single-pass pixel uncertainty, eliminating the need for costly deep ensembles.
- Achieved a +23.3 percentage point F1-score improvement (59.6% vs 36.3%) on within-biome transfer using a lightweight 9.5M parameter ConvNeXt hybrid model.

Land Cover Mapping with Geospatial Foundation Models

Feb 2026 – Jun 2026

Capstone Project 2, GIFT University | Technologies: PyTorch, Prithvi-EO v2, LoRA, Sentinel-2, Next.js

- Fine-tuned the 300M parameter NASA/IBM Prithvi-EO foundation model using Low-Rank Adaptation (LoRA) on Sentinel-2 imagery of Lahore, Pakistan.
- Demonstrated superior zero-shot cross-city generalization on unseen data (Gujranwala) compared to U-Net, DeepLabV3+, and SegFormer baselines.
- Conducted bi-temporal change detection (2018-2026), quantifying +21.3% urban expansion and 28% vegetation loss, and deployed results to an interactive web dashboard.

SELECTED PROJECTS

AskDoc AI (RAG Chatbot)

2026

Technologies: FastAPI, LangChain, FAISS, Groq (Llama 3), Vercel

- Engineered a full-stack Retrieval-Augmented Generation (RAG) application allowing users to upload PDFs and query the document context in real-time.
- Developed the Python backend using FastAPI and LangChain, implementing FAISS vector databases for efficient semantic search.
- Deployed the responsive web interface and backend API to Vercel for live production use.

Next.js Professional Portfolio

2026

Technologies: Next.js 16, React, Tailwind CSS, Framer Motion

- Architected and deployed a highly optimized, dark-themed personal portfolio showcasing AI projects.
- Configured custom domain routing and SSL via Namecheap and Vercel for a professional web presence.

Market Basket Analysis & Association Rule Mining

2025

Technologies: Python, Pandas, MLxtend, Apriori, FP-Growth

- Performed comprehensive Data Mining on the UCI Online Retail Dataset (540,000+ transactions) to discover hidden purchasing patterns.
- Implemented and compared Apriori and FP-Growth algorithms to generate actionable association rules and frequent itemsets.
- Optimized algorithm performance for large-scale transactional data to derive data-driven retail strategies.

EDUCATION

BS Data Science

2022 – 2026

GIFT University, Gujranwala

Key Coursework: Deep Learning, Computer Vision, Machine Learning, Data Mining, Data Science, Software Engineering, Parallel & Distributed Computing, DSA, OOP.