ABHISHEK RAGHUWANSHI

AI/ML Engineer | LLM Applications | Computer Vision | MLOps

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PROFESSIONAL SUMMARY

AI/ML Engineer from IIT Bombay with hands-on experience building production-grade LLM applications, computer vision systems, and scalable ML pipelines. Expertise in deploying end-to-end AI solutions from data processing to containerized deployment. Proven track record of delivering high-impact ML systems serving 10,000+ users with 99.5% uptime.

EDUCATION

Indian Institute of Technology (IIT) Bombay   **Jul 2022 - Jul 2024**

Master of Technology (M.Tech.) - Technology and Development | CPI: 8.09/10

TECHNICAL SKILLS

- **Machine Learning & AI:** Deep Learning, Computer Vision, NLP, LLMs, RAG, Transfer Learning, Model Fine-tuning
- **Frameworks & Libraries:** PyTorch, TensorFlow, Scikit-learn, LangChain, HuggingFace, Keras, XGBoost
- **LLM & NLP Tools:** LLaMA, GPT, Groq API, OpenAI API, BERT, GloVe, Transformers, Vector Databases
- **MLOps & Deployment:** Docker, CI/CD, Git, Model Monitoring, Streamlit, FastAPI, REST APIs
- **Data Engineering:** Python, SQL, PostgreSQL, Pandas, NumPy, ETL Pipelines, Chroma DB
- **Cloud & Tools:** Hugging Face Spaces, AWS (Basic), Jupyter, Linux, VS Code, Bitbucket

PROFESSIONAL EXPERIENCE

Ministry of Agriculture and Farmers Welfare | Research Associate (AI)   **Feb 2025 - Present**

LLM-Powered Agricultural Advisory Chatbot

- Architected and deployed production-ready **RAG** system processing **10,000+** queries/month for government agricultural advisories, reducing farmer response time by **85%** (24 hours → 2 minutes)
- Engineered data ingestion pipeline vectorizing **500+** PDF documents using **LangChain** and **HuggingFace embeddings**, achieving **92%** retrieval relevance through optimized chunking strategies
- Integrated **LLaMA-3.1 (8B parameters)** via **Groq API** with **conversational memory**, maintaining **context** across multi-turn dialogues and achieving **4.2/5 user satisfaction rating**
- Deployed scalable system using **Docker** containers on Hugging Face Spaces with automated **CI/CD pipeline**, handling **500+** concurrent users with **99.5%** uptime
- **Tech Stack:** Python, LangChain, LLaMA-3.1, Chroma DB, Docker, Streamlit, Groq API, Git

Soybean Disease Classification System

- Developed **CNN-based** binary classification model achieving **96% F1-score** on **10M+ low-quality** field images, enabling early disease detection for **50,000+** farmers and reducing estimated crop loss by **15%**
- Conducted **comprehensive EDA** on severely **imbalanced** dataset (1:4 class ratio), implementing **SMOTE** oversampling and stratified **k-fold** validation to improve model generalization
- Fine-tuned **EfficientNet-B0** using **transfer learning** with custom **data augmentation pipeline**, reducing training time by **60%** while maintaining accuracy on edge cases
- Optimized model for **mobile deployment** through **quantization** and **pruning**, reducing model size to **<20MB** without accuracy loss for offline **inference**
- **Tech Stack:** PyTorch, EfficientNet, OpenCV, Albumentations, Pandas, NumPy, Matplotlib

KEY PROJECTS

Customer Churn Prediction & SHAP Explainability | Personal Project   **Sep 2024 - Nov 2024**

- Built **end-to-end ML pipeline** predicting **customer churn** with **89%** precision on telecom dataset (**7,000+ customers**), enabling targeted **retention** campaigns with estimated **25%** churn reduction
- Engineered **15+ behavioral features** (usage patterns, payment velocity, support ticket sentiment) through domain analysis, improving baseline model performance by **18%**
- Compared **XGBoost**, **Random Forest**, and **Logistic Regression** using cross-validation; deployed XGBoost with hyperparameter tuning (**AUC: 0.91**) and integrated **SHAP** for model explainability
- Created **automated feature pipeline** with **outlier detection** and missing value imputation, reducing manual preprocessing time by **70%**
- **Tech Stack:** Python, XGBoost, SHAP, Scikit-learn, Pandas, Matplotlib, Seaborn

Twitter Sentiment Analysis with Deep Learning | IIT Bombay   **Apr 2023 - Jun 2023**

- Developed sentiment classifier for brand monitoring processing **99,000+** tweets with **78%** accuracy using **LSTM + GloVe** embeddings, outperforming **Multinomial Naive Bayes baseline (76.3%)**
- Implemented robust preprocessing pipeline handling emojis, hashtags, URLs, and slang, **reducing noise by 35%** and improving model **convergence speed by 40%**
- Conducted **ablation study** comparing LSTM, BiLSTM, and CNN architectures with different embedding strategies (**Word2Vec, GloVe, FastText**)
- Built real-time inference **API** using **FastAPI** serving **100+ requests/minute** with **<200ms latency** for production-ready deployment
- **Tech Stack:** Python, TensorFlow, LSTM, GloVe, NLTK, FastAPI, Pandas

Stock Price Movement Prediction using LSTM | IIT Bombay   **Jan 2023 - May 2023**

- Implemented **time-series forecasting** models comparing LSTM, SVR, Ridge Regression, and Random Forest on **NIFTY-50** historical data using **Yahoo Finance API**
- Achieved best **R^2 of 0.84** through LSTM with **hyperparameter tuning (learning rate, dropout, layers)** and walk-forward validation to prevent data leakage
- Performed feature engineering creating technical indicators (**RSI, MACD, Bollinger Bands**) and evaluated models using **MAE, RMSE, NRMSE** metrics
- **Tech Stack:** Python, TensorFlow, Keras, Scikit-learn, yFinance, Pandas

LEADERSHIP & IMPACT

Associate Placement Manager (Initiatives) | IIT Bombay Placement Team   **Sep 2022 - Dec 2022**

Led cross-functional team of 300+ members managing placements for 4,100+ students, demonstrating strong project management and stakeholder coordination:

- Achieved **14% higher Day-1 internship** selections by redesigning interview allocation model, saving **150+ man-hours**
- Deployed centralized resume verification portal **improving security** and user experience; **automated shortlist tracking**
- Designed **sector-specific** mock assessment program with **80%+ positive feedback** & **68% increase** in student participation
- Received **Certificate of Excellence** from Placement Office for outstanding contribution

ACHIEVEMENTS & INTERESTS

Certifications & Awards:

- Certificate of Excellence for Associate Placement Manager tenure - IIT Bombay Placement Office
- Gold Medal in Carrom - Hostel General Championship 2022, IIT Bombay

Areas of Interest: Large Language Models (LLMs), Generative AI, RAG Systems, Computer Vision, MLOps, Model Explainability, Agentic AI, Transformers, Production ML Systems

Hobbies: Reading AI/ML research papers, Contributing to open-source ML projects, Playing cricket and carrom