M. Farrukh Mehmood
Machine Learning Engineer | Industrial AI

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Technical Skills & Tools

- **Machine Learning:** Supervised and unsupervised learning, time series forecasting, clustering, PCA, feature engineering, explainable AI
- **Computer Vision:** OpenCV, CNNs, object detection, image segmentation, image classification, feature extraction, augmentation, transfer learning
- **Agentic AI:** LangChain, LangGraph, tool calling, prompt engineering, RAG, OpenAI API, Gemini CLI
- **Deployment & MLOps:** Docker, FastAPI, ONNX, GitHub Actions, REST APIs, MLflow, CI/CD, model serialization
- **Languages & Tools:** Python, C/C++, SQL, Bash, Git
- **ML Frameworks:** PyTorch, TensorFlow, Scikit-learn, XGBoost, Hugging Face Transformers
- **Databases:** MongoDB, PostgreSQL, SQLite, vector databases (ChromaDB, Pinecone)
- **Web App Development:** Streamlit, Gradio

RELEVANT PROJECTS

Model Compression for Edge Deployment
Intel Image Classification with Knowledge Distillation

- Implemented a teacher-student distillation pipeline to compress a ResNet18-based spatial attention model into a lightweight CNN.
- Trained the student model using both ground-truth labels and soft targets from the teacher to preserve accuracy.
- Achieved 99.6% reduction in parameters and a 4× improvement in inference speed with minimal performance loss.
- Analyzed confusion matrices and output snapshots to evaluate error consistency and classification behavior.
  Tools/Techniques: PyTorch, ResNet18, Knowledge Distillation, Attention, Model Optimization

Sensor Data Processing & Time-Series Modeling
CMI - Detect Behavior with Sensor Data   Ongoing [**Kaggle**]

- Engineered statistical and domain-informed features from high-frequency motion and temperature sensor data.
- Built and optimized a LightGBM classification pipeline achieving a **CV score of 0.74** (mean of binary and macro F1).
- Applied signal segmentation, feature extraction, and gradient boosting to transform time-series into actionable tabular insights.
  Tools/Techniques: LightGBM, Pandas, scikit-learn, Time-series feature engineering

Agentic AI for Cybersecurity
Autonomous Threat Intelligence Reporter

- Developed an agent-based app that inspects API endpoints for potential threats using platforms like VirusTotal.
- Used LangGraph to orchestrate tool use and Gemini API to generate human-readable threat reports.
- Built a Streamlit interface for input submission and report visualization.
  Tools/Techniques: LangGraph, Gemini API, Streamlit, Agentic AI

Microservice-Based Digital Platform
RUL Inference Engine

- Built a predictive system for Remaining Useful Life (RUL) estimation using NASA's C-MAPSS turbofan engine dataset.
- Trained both XGBoost and LSTM models to capture degradation trends.
- Deployed preprocessing and inference modules as FastAPI microservices, exposed via REST APIs.
- Containerized the system with Docker for scalable, environment-agnostic deployment..
  Tools/Techniques: FastAPI, Docker, XGBoost, LSTM

Deployable ML Application with User Interface
Amazon Listing Optimization Tool

- Developed an LLM-powered interface enabling users to generate optimized Amazon product listings from minimal product input.
- Designed a no-code user experience where form inputs triggered a keyword extraction and content generation pipeline.
  Tools/Techniques: Streamlit, Hugging Face Transformers, RAG, Polars

WORK EXPERIENCE

Research Assistant — SMME, NUST   **Dec 2023 – Dec 2024**
Generative Modeling of Unsteady Flow Fields

- Developed a generative sequence model combining Variational Autoencoder (VAE) and LSTM for temporal flow field prediction.
- Trained on CFD simulation data to predict future flow snapshots from a few initial inputs, achieving 95% accuracy.
- Contributed to research on applying ML techniques to CFD-generated data for modeling unsteady flow dynamics.
  Tools/Techniques: VAE, LSTM, PyTorch, CFD, Time Series Modeling

WORKSHOP DELIVERED

Predicting Particle Deposition in Lung Airways Using the Discrete Phase Model (DPM)
SMME, NUST | Oct. 2024
Delivered a hands-on workshop covering theoretical and practical aspects of particle deposition modeling using DPM. Included simulation setup, live CFD demonstrations, and interpretation of health-related aerosol transport results.

Relevant Courses

- Machine Learning — SEECS, NUST
- Deep Learning — SMME, NUST
- Machine Learning in Production — Coursera
- MLOps | Machine Learning Operations Specialization — Duke University
- IT Automation with Python — Google Professional Certificate
- NLP with Classification and Vector Spaces — Coursera

EDUCATION

MS in Mechanical Engineering   2022-2024
NUST, Islamabad, Pakistan   CGPA: 3.86/4.00
Thesis Title: *Numerical Investigation of Aerosol Deposition in Lung Airways During Inhalation and Exhalation*

BSc. in Mechanical Engineering   2014-2018
UET, Taxila, Pakistan

HONORS, VOLUNTEERING & LANGUAGES

- **Awards:**
  - Best Project — Machine Learning, SEECS NUST (2023)
  - Water Rocket Champion — UET Taxila (2015)
  - PEEF Scholarship — Awarded throughout undergraduate studies (2014 – 2018)

- **Volunteering:**
  - Organizing Member – ASME UET Chapter
  - Finance Head – Umeed-e-Subh Welfare Society

- **Languages:** English, Urdu