MUHAMMAD SALMAN

✉ salmanuom04@gmail.com ☎ (+92) 0316-5806974 | ⚲ Buner, Pakistan

○ @Salman7292   in muhammad-salman

PROFILE SUMMARY

AI Researcher and Software Engineer with strong expertise in Machine Learning, Deep Learning, Python development, and AI-based medical imaging solutions. Experienced in building end-to-end AI applications using Flask, Streamlit, and modern deep learning architectures. Passionate about interpretable AI, medical diagnostics, and research-driven development.

Currently working on advanced explainable AI (XAI) systems, with multiple research publications under reputable journals and conferences.

EDUCATION

B.S Software Engineering | University of Malakand (in progress)   CGPA: 3.94 | 7th semester

FSc Pre-Engineering| Govt. degree collage dagger buner

EXPERIENCE

❖ **AI & Python Developer — Code Crush Technologies**   (*Dec 2024 – Feb 2025)*

  o Developed AI-driven applications using Python, Flask, and Streamlit.
  o Built and deployed ML/DL models for classification, regression, and prediction tasks.
  o Integrated AI models into full-stack applications with REST API support.
  o Improved AI model performance through hyperparameter tuning and dataset optimization.

❖ **AI & Machine Learning Intern — CodeAlpha**   (*Feb 2025 – apr 2025)*

  o Assisted in designing Machine Learning pipelines for real-world applications.
  o Conducted research on modern deep learning architectures, XAI, and model interpretability.
  o Contributed to model optimization, experimentation, and deployment workflows.
  o Worked on automation scripts for data preprocessing and dataset augmentation.

RESEARCH PUBLICATIONS

1. High Cost, Low Trust? MSA-PNet Fixes Both for Medical Imaging

Proceedings of the Second Workshop on Explainable Artificial Intelligence for the Medical Domain, 2025

- Introduced **MSA-PNet**, a multi-scale attention-enhanced prototype network for explainable ultrasound disease prediction.
- Achieved **Dice: 79.92%, Jaccard: 81.07**, outperforming EfficientNetB7 & VGG19.
- Improved inference speed by **5×**, enabling clinically viable real-time diagnostics.
- Integrated FPN, spatial attention, ROI segmentation, and prototype-based XAI.

2. Cracking the Clinical Code: A Scoping Review on Mechanistic Interpretability in Medical Report Generation

Computational and Structural Biotechnology Reports (Elsevier), 2025

- Conducted a comprehensive survey on **mechanistic interpretability** in medical report generation.
- Reviewed techniques like activation patching, causal tracing, concept bottlenecks, and circuit analysis.
- Proposed a new taxonomy covering interpretability methods, modalities, and clinical evaluation strategies.
- Identified challenges including lack of ground-truth internal benchmarks and cross-modal entanglement.

3. ALL Diagnosis: Can Efficiency and Transparency Coexist? An Explainable Deep Learning Approach

Scientific Reports, 2025

- Proposed an XAI-enhanced EfficientNet-B7 diagnostic framework for Acute Lymphoblastic Leukemia (ALL).
- Achieved 96%+ accuracy on Taleqani Hospital dataset & 95.5%+ on C-NMC-19 and Multi-Cancer datasets.
- Showcased improved performance over VGG-19, DenseNet50, ResNet50, and InceptionResNetV2.
- Integrated Grad-CAM, CAM, LIME, and Integrated Gradients for transparent insights.
- Reduced inference time by 40%, increasing clinical adoption potential.

ACADEMIC PROJECT

❖ **Brain Tumor Detection App**

DL-based medical diagnosis system with real-time classification & visualization.

❖ **Skin Cancer Detection App**

CNN-based lesion classification with Grad-CAM heatmaps using Flask API.

❖ **Data Preprocessing Automation Tool**

GUI app for cleaning, labeling, and augmenting medical datasets.

❖ **E-commerce Recommendation Engine**

Hybrid filtering model for personalized product recommendations.

❖ **Code Debugging Assistant**

Python-based debugging automation tool for ML workflows.

❖ **Digital Face Attendance System**

Face recognition–based automated attendance with real-time detection.

SKILLS

❖ **AI & Machine Learning:**
Deep Learning, Explainable AI (XAI), CNNs, Attention Models, Prototype Networks, Computer Vision, Medical Imaging (Ultrasound, MRI, Dermoscopy)

❖ **Programming & Development:**
Python, Flask, Streamlit, Machine Learning Pipelines, API Development & Integration, Data Preprocessing & Feature Engineering

❖ **Tools & Technologies:**
TensorFlow, PyTorch, NumPy, Pandas, OpenCV, Git, GitHub, Jupyter Notebook, Visual Studio Code,Langchain

❖ **Languages:**
English (Fluent), Urdu (Fluent), Pashto (Native)