Daniyal Hussain Shah

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Education

Lahore University of Management Sciences (LUMS) **Lahore, Pakistan**
B.S. Computer Science, Specialization in Artificial Intelligence; Minor in Robotics *Expected 2028*

- Relevant Coursework: Foundations of AI/ML, Deep Learning, Advanced Topics in Machine Learning.

Research Experience

Undergraduate Research Assistant - Dr. Zubair Khalid **June 2026 – Present**
Department of Electrical Engineering, Syed Babar Ali School of Science and Engineering (SBASSE), LUMS Lahore, Pakistan

- Researching super-resolution of spatiotemporal climate data, focused on reconstructing high-resolution surface temperature fields from sparse observations.
- Implemented and trained **BLISSNet**, a DeepONet-style neural operator (SIREN trunk with Attention U-Net and transformer cross-attention branches), from the original paper specification in PyTorch; built the full data pipeline (GRIB ingestion, resampling, regional slicing, NetCDF export) for ERA5 2-metre temperature reanalysis data.
- Trained three region-specific models (South Asia, Punjab, Karnataka) using a two-stage procedure with a four-term composite loss, then ran a 3×3 cross-region evaluation (9 combinations) at 4× super-resolution to test generalization.
- Found strong in-domain reconstruction accuracy but sharp degradation under cross-region transfer, and traced the failure to the coordinate-domain dependence of SIREN trunk networks, a finding that informs the next architectural iteration of the model.

Projects

ARIA - Autonomous Radiology Intelligence Agent **CS 437: Deep Learning, LUMS**
Repository: https://github.com/syeddaniyalg/cs437-project

- Designed a neuro-symbolic pipeline for automated radiology report generation from multi-parametric brain MRI (BraTS 2021), decoupling visual perception from clinical reasoning to reduce hallucination in generative report synthesis.
- Built a full-stack system: SegResNet (MONAI) tumor segmentation → extraction of 80+ radiomic features (topographic, morphological, intensity, textural) → Neo4j knowledge graph encoding WHO CNS5, RTOG, and RANO guidelines via a 9-rule clinical rule engine → constrained LLM report generation.
- Evaluated report quality using the GREEN framework (finding-level accuracy and hallucination rate, scored by a critic LLM against reference reports) and an NLI-DeBERTa-v3 consistency score; the constrained pipeline with DeepSeek-R1 reached a GREEN score of **0.718** and Hallucination score of **0.192**, a **+105.1%** accuracy gain and **−66.2%** hallucination reduction versus the best unconstrained end-to-end VLM baseline (LLaVA-13B).
- *Tools:* Python, PyTorch, MONAI, Neo4j, PyRadiomics, SimpleITK, Transformers

Implementation and Analysis of Deep Learning Paradigms **Independent Study**
Repositories: cnn_from_scratch, autoencoders, diffusion_models, transformers_vit, cyclegan

- Implemented core deep learning architectures from first principles, in PyTorch, across five paradigms — covering architecture design, training loop, loss formulation, and empirical evaluation for each: **CNNs** (custom CNN from scratch with PCA feature-space analysis and Grad-CAM interpretability), **Autoencoders** (linear/convolutional autoencoders, U-Net), **Diffusion Models** (DDPM, DDIM, Latent

Diffusion), **Transformers & Vision Transformers** (ViT), and **GANs** (CycleGAN for unpaired image-to-image translation).

Technical Skills

- **Deep Learning:** PyTorch, CNNs, Vision Transformers (ViT), Diffusion Models, Autoencoders, U-Net, GANs, Neural Operators, Transformers, Grad-CAM, PCA
- **AI Applications:** Medical Image Segmentation, Radiomics Feature Extraction, Knowledge Graphs (Neo4j), LLM-Constrained Generation, Climate Data Modeling, Geospatial Super-Resolution
- **Programming Languages:** Python, C/C++, JavaScript
- **Web Development:** React JS, Next JS, Express, HTML/CSS/JS
- **Databases:** MongoDB, MySQL, PostgreSQL
- **Tools & Libraries:** NumPy, Pandas, scikit-learn, MONAI, SimpleITK, PyRadiomics, Jupyter, Git