Tayyaba Arooj

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EDUCATION

Bachelor of Science in Computer Science Sep. 2020 - June 2024
Hamdard University, Islamabad Campus
3.54/4.0 | Ranked 2nd in my Batch | Awarded with Merit Certificate and Scholarship
Thesis: AI based Skin Cancer Detection Algorithms: Opportunities, Challenges, and Way Forward
Thesis secured First Position in the FEST open house held at Hamdard University. *October 2025*

Relevant Coursework: Artificial Intelligence, Natural Language Processing, Cryptography & Network Security, Data Science, Information Security, Human Computer Interaction, Calculus I & II, Linear Algebra, Differential Equations, Probability & Statistics

RESEARCH EXPERIENCE

AI for Healthcare

- Finetuned and evaluated ten CNN variants including VGG-16, DenseNet, MobileNet for systematic comparison of widely used CNN architectures for skin cancer detection.
- VGG-16 achieved the highest accuracy of 97% on the International Skin Imaging Collaboration (ISIC) dataset.
- MobileNet-V2 and EfficientNet demonstrate low computational complexity requiring 0.3 and 0.39 GFLOPs while VGG-19 requires approximately 19.6 GFLOPs.
- Synthesized these findings into a qualitative and quantitative analysis for a research paper published in Asian Journal of Science, Engineering and Technology (AJEST).
- This project secured first position in the FEST Open House held at Hamdard University.

Privacy Preserving Contextual Aware Well-being Meter .

- Implemented Logistic Regression, SVM and LSTM models to compare their performance on a corpus of 336,029 text records curated from public and clinical sources.
- LSTM achieved the highest performance of 99.41% accuracy in sentiment classification and 99.75% in capital classification.
- Developed FedBiLSTM-Net by implementing LSTM model into federated learning settings using the FedAvg algorithm in Flower for a privacy-preserving well-being meter.
- Trained the model across 20 non-IID clients in 9 rounds and achieved a centralized evaluation accuracy of 80.17%.
- Research paper for this project is published in International Journal of Social Sciences Bulletin.

PROFESSIONAL EXPERIENCE

R&D Engineer | *U tech Innovative Solutions and Consultancy* April 2024 – Present

- Led a team of 3 researchers to develop MelanoDetect AI, a handheld melanoma detection device with app integration leveraging VGG-16, DenseNet-201 and ResNet-50 for melanoma classification.
- Secured 100,000 HKD in funding from the Hong Kong Science and Technology Park incubation program and analyzed healthcare professional survey data to improve usability and clinical relevance.

AI Research Intern | *Medical Imaging & Diagnostic Lab, National Center of AI* July 2025 – Sep. 2025

- Developed a two-stage pipeline for automated radiology report generation using the Indiana University-Chest X-Rays dataset.
- Implemented Qwen-VL to extract structured clinical reasoning in the form of chain-of-thought outputs and employed MedGemma-27B to convert findings from chest X-ray images into radiologist style reports, improving factual accuracy through prompt design.

AI Engineer - Intern | *WebRange Solutions* April 2025 – May 2025

- Developed chatbot systems using retrieval augmented generation and large language model integration
- Implemented MCP based workflows to improve response accuracy and contextual relevance

Software Developer | *Skillhat* Sep. 2024 – Nov. 2024
- Developed an MVP, CoFundEstate, web app on Bubble.io, integrating AI-driven features.

Front-End Developer - Intern | *Alberuni Tech* July 2023 – Sep. 2023
- Developed a YouTube clone and other interfaces using HTML, CSS, JavaScript, and React.

CERTIFICATIONS

- IELTS (English Proficiency, Overall Bands: 8.0) Sep. 2024
- Exploratory Data Analysis for Machine Learning – Coursera – IBM March 2024
- Introduction to Computer Vision and Image Processing – Coursera – IBM March 2024
- HTML, CSS, and Javascript for Web Developers – Coursera – IBM August 2022

LEADERSHIP & EXTRACURRICULAR ACTIVITIES

MIMIC-Based Clinical Reasoning with Chain-of-Thought LLM MIDL, NCAI
- Led a team of 4 researchers

MelanoDetect AI UTech Innovative Solutions & Consultancy
- Led a team of 3 researchers

Volunteer Usher Hamdard University, Islamabad
Seniors' Convocation 2023
- Assisted in event coordination.

Seminars Compere Hamdard University, Islamabad
- Seminar Title: "Can Digital Transformation Succeed Without Analytics"
- Seminar Title: "Research Rainbow in Data Science: Open Issues and Challenges"

CodeWar
Participant, Coding Competition (Python) HiTech University, Taxila
- Demonstrated coding proficiency and problem-solving skills under competitive conditions

VisioSpark
Participant, Quiz Competition Comsats University, Wah Cantt
- Competed in a computer science-focused quiz, showcasing knowledge in core topics and quick problem-solving skills.

The Youth Trust Islamabad, Pakistan
Volunteer - Social Media Team Member Sep. 2023 – July 2024
- Created social media posts and banners for campaigns.
- Fundraising for “Bait-ul-Barkat” vocational center.

Alkhidmat Foundation Pakistan Remote
Volunteer - Digital Volunteer June 2023 – July 2024
- Content writing for social media posts

TECHNICAL SKILLS

Languages & Frameworks: Python, SQL, HTML/CSS, FastAPI, Flower

Libraries: Pandas, NumPy, Matplotlib, TensorFlow, PyTorch, Keras, transformers, Streamlit

Databases: MySQL, PostgreSQL, MongoDB, Pinecone, ChromaDB

PUBLICATIONS

[1] Shaheer Muhammad, Abroo Nazar, **Tayyaba Arooj,** et al., “Well-being meter based on federated learning powered sentiment analysis.” International Journal of Social Sciences Bulletin 4(2), 104-126.
[2] Shaheer Muhammad, **Tayyaba Arooj,** et al., "AI-based skin cancer detection algorithms: opportunities, challenges and a way forward." Asian Journal of Science, Engineering and Technology (AJSET) 4, no. 1 (2025): 87-109.