Talha Ahmed

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EDUCATION

Lahore University of Management and Sciences — Sep. 2020 – May 2024
B.S Mathematics - Economics (Joint Major) + Minor in Computer Science — *CGPA/Minor GPA: 3.83/3.87*

Relevant Courses: *Real Analysis, Adv. Calculus, Applied Probability, Machine Learning, Convex Optimization, Data Mining, Deep Learning, Adv. Signal Processing, Reinforcement Learning, Adv. Econometrics, Generative AI, Numerical Analysis*

RESEARCH EXPERIENCE[1]

Research Assistant — Summer 2024 – Present
Dr. Hassan Mohy-ud-Din — *Lahore, Pakistan*
- Co-authored **Wave-GMS** (ICASSP 2026, under review): a lightweight multi-resolution generative segmentation model with ∼2.6M parameters that achieves state-of-the-art performance on multiple medical imaging datasets.
- Compiled notes on mathematical inequalities, e.g. Jensen's Inequality, and their applications in data science and information theory.

Senior Year Research — Summer 2023 – Summer 2024
Dr. Muhammad Tahir — *Lahore, Pakistan*
- Senior project on **Model-Based Deep Learning** for matrix completion. Proposed ConvMC-Net, a convolutional network replacing nuclear-norm updates with trainable layers, achieving faster and more accurate recovery compared to ALM and ADMM-Net.
- Extended this work with ConvHuberMC-Net, introducing a convex Huber criterion and unfolded Majorization–Minimization framework to improve robustness, eliminate explicit thresholding, and enable parallelizable computations. See Report + Presentation.

Directed Research Project — Spring 2023
Dr. Ihsan Ayub Qazi – Network Systems Group @ LUMS — *Lahore, Pakistan*
- Developed an app using *Shiny* in *R* for measuring digital literacy.
- Implemented predictions with a pre-trained Random Forest model. Source available on GitHub.

PUBLICATIONS

Wave-GMS: Lightweight Multi-Scale Generative Model for Medical Image Segmentation

Talha Ahmed, Nehal Ahmed Shaikh, and Hassan Mohy-ud-Din. *Under review at ICASSP 2026.* See Github.

Unified Perspective on Diffusion Models: Theory, Practice, and Applications in Imaging and Inverse Problems

Talha Ahmed, and Nehal Ahmed Shaikh. *Survey manuscript in preparation.* See Draft.

ACADEMIC DISTINCTIONS

- Ranked in the **top 10%** of LUMS SBASSE Batch of 2024
- Placed on **Dean's Honor List** for **2020-2021, 2021-2022, 2022-2023**
- Graduated with **Dean's Honour List** and **High Distinction**

TEACHING + WORK EXPERIENCE

EE 563/MATH 325: Convex Optimization (Spring 2025) — Professor Hassan Mohy-ud-Din
Teaching Assistant
- Held weekly office hours, made and graded assignments, and engaged in semi-formal student counseling

ACTA 6304: Advanced Machine Learning (Fall 2024) — Professor Momin Ayub Uppal
Teaching Assistant
- Held weekly office hours, made and graded assignments, and engaged in semi-formal student counseling

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[1]Further details on these research projects can be found at my website

CS 535: Machine Learning (Spring 2024) — Professor Momin Ayub Uppal
Teaching Assistant
- Held weekly office hours, invigilated quizzes and exams, held tutorials, made and graded assignments, and engaged in semi-formal student counseling

EDUX 562: Data Lab (Spring 2023) — Professor Ahmad Ayub
Teaching Assistant
- Held weekly office hours, invigilated STATA labs, graded assignments, and engaged in semi-formal student counseling

ECON 221: Intermediate Macroeconomics (Fall 2022) — Professor Usman Elahi
Teaching Assistant
- Held weekly office hours, conducted assignment tutorials, created/reviewed/invigilated/graded quizzes, created/reviewed/solved assignments, and engaged in semi-formal student counseling

STATA Workshop (Dec 2022 - Jan 2022) — Professor Usman Elahi
Teaching Assistant
- Assitant for Professor Usman Elahi (usman.elahi@lums.edu.pk) for 'Capacity Building and Training on Data Management & Analysis Using STATA' organized in collaboration with Bureau of Statistcs, Government of Punjab for Statistical Officers.

UNDERGRADUATE COURSE PROJECTS/PRESENTATIONS[2]

Speech Recognition and Translation System For Medical Communication — Spring 2024
CS 5302: Generative AI for Natural Language and Speech Processing
- We aimed to develop an application that can interpret, translate, and vocalize spoken language in real-time, and is specifically catered for patient-doctor conversations.
- We integrated various open source models of Automatic Speech Recognition, Neural Machine Translation, and Text-to-Speech synthesis etc. (Project Deliverables), (Github)

Reinforcement Learning Algorithms on Tic-Tac-Toe — Fall 2023
CS 6314: Dynamic Programming and Reinforcement Learning
- Trained a reinforcement learning agent to play 2D and 3D Tic-Tac-Toe using algorithms like Value Iteration, Temporal Difference Learning, and Deep Q Networks. (Project Report), (Github)

Panel Data and Tobit Analysis on Health Care Dataset — Fall 2023
ECON 438: Econometrics II
- Conducted panel data and Tobit analysis on a German healthcare dataset to determine factors influencing doctor or hospital visits using fixed/random effects and tobit models. (Project Report + Source Code).

Clustering, Association and Frequent Pattern Mining — Spring 2023
CS 432: Introduction to Data Mining
- Analyzed drug consumption patterns in Connecticut, USA using DBSCAN, Apriori, and Fpgrowth algorithms for clustering, association, and frequent pattern mining. (Project Report).

Sentiment Analysis on Audio Recordings — Spring 2023
CS 535: Machine Learning
- Identification and extraction of features followed by a mathematical background of some popular machine learning methods and their performance evaluation. (Project Report).

TECHNICAL SKILLS

Languages: C++, Python, STATA, MATLAB, R, HTML/CSS, Tableau
Programming Frameworks: Keras, Tensorflow, PyTorch, OpenCV, Shiny, Numpy, Pandas, Matplotlib, Seaborn
Tools: Linux, Git, Dropbox, LaTeX, Microsoft, VS Code, Google Colab

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[2]Further details on these and additional course projects can be found at my website