

# Talha Ahmed

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## EDUCATION

### Lahore University of Management and Sciences

BS. ECON - MATH (Joint Major)

Sep. 2020 – Present

CGPA/Percentage: 3.80

### The Lahore Alma

A Level, Cambridge International Examinations

Aug. 2018 – May 2020

Grades: 4 A\*s

## RESEARCH EXPERIENCE

### Research Assistant

Networks Systems Group @ LUMS

Jan. 2023 – May. 2022

Lahore, Pakistan

- As a directed research project, developed an app for measuring 'Digital Literacy' under supervision of Dr. Ihsan Ayub Qazi - [Linkedin](#).
- App can be found here: ([Github Link](#))

### Research Assistant

Dr. Muhammad Tahir - [Linkedin](#)

Summer. 2023 – Present

Lahore, Pakistan

- Currently working on "Model Based Deep Learning" as a Senior Project.

### Research Assistant

Dr. Hassan Mohy-ud-Din - [Website](#)

Sep. 2023 – Present

Lahore, Pakistan

- Currently working on a long term project on compiling detailed, concise notes on prominent mathematical inequalities and their applications to fields of data science, information theory etc. Details of the progress so far can be found here: [Dropbox](#)

## RESEARCH PROJECTS

### Gamifying Media Literacy Interventions for Low Digital Literacy Populations

Networks Systems Group @ LUMS

Jan. 2023 – May 2023

- The digital literacy app posed as a sequel to the paper ([link](#))
- Self-taught the inner workings of *shiny* framework in **R**
- Explored model deployment techniques withing shiny and deployed a *Random Forest* machine learning algorithm
- The app evaluates a person's digital literacy score (between 0 and 1) given a set of answers to a questionnaire

### Unrolled Optimization & Matrix Completion

Dr. Muhammad Tahir

Summer. 2023 – Present

- Self-taught methods and techniques in *Advanced Signal Processing*
- Implemented some popular Deep Learning Algorithms ([Github Link](#))
- Currently doing a reading course on High Dimensional Data Analysis and Compressed Sensing. Primary text being followed is ([Book Link](#)) by John Wright and Yi Ma.
- Self-taught preliminaries like *Duality Theory* and optimization techniques like *Augmented Lagrange Multiplier - ALM* etc to understand the problem formulation and solve Matrix Completion.
- Replicated results of following papers **1** and **2**
- Completed and refined a proposed algorithm *ConvMC-Net* for standard matrix completion problems. ([Github Link](#))
- To handle robust matrix completion, currently drawing inspiration from Deep Learning techniques and applying it to the proposed *M-estimation* algorithm in paper **3**

### Mathematical Inequalities with Applications to Data Science

Dr. Hassan Mohy-ud-Din

Sep. 2023 – Present

- Currently doing readings on various prominent mathematical inequalities to field of data science and information theory
- Compiling reading materials from YouTube videos, journals, conference papers etc
- Each inequality is accompanied by essential background information, a proof, some intriguing considerations, practical applications, and a demonstration in Python/MATLAB.
- Example: **Jensen's Inequality**

## ACADEMICS RELATED

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- Ranked in the **top 16%** of LUMS SBASSE Batch of 2024
- Placed on Dean's Honor List for **2020-2021, 2021-2022, 2022-2023, 2023-2024**
- Finished a minor in Computer Science at LUMS, with subject CGPA 3.85

## GRADUATE COURSEWORK

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- **MATH 439 (Applied Probability):** A-
- **CS 432 (Introduction to Data Mining):** A+
- **CS 535 (Machine Learning):** A+
- **MATH 325 (Convex Optimization):** A
- **CS 437 (Deep Learning):** Grade Pending
- **CS 6314 (Dynamic Programming and Reinforcement Learning):** Grade Pending
- **ECON 438 (Econometrics II):** Grade Pending

## TEACHING + WORK EXPERIENCE

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### STATA Workshop

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 Statistics, Government of Punjab for Statistical Officers.

### 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

### 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

## UNDERGRADUATE RESEARCH PROJECTS/PRESENTATIONS

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### Analyzing Music Trend in the Last Century

Fall 2023

#### *CS 334: Principles and Techniques of Data Science*

- Wrote a blog post on *Medium* covering Explatory Data Analysis (**EDA**), Statistical Inference and Predictive Modelling on *Spotify* dataset to answer research questions pertaining to the trend of music in the last century. (**Blog Link**)

### Econometric and Regression Analysis

Fall 2023

#### *ECON 330: Econometrics I*

- Carried out Econometric and Regression Analysis on a demographic dataset gathered from primary sources like survey questionnaire.
- The analysis focused on tackling the research question: "Does Gender have an effect on Academic Performance"
- Careful attention was paid to whether the standard *OLS* assumptions hold true for our model (**PDF link**).

### Clustering, Association and Frequent Pattern Mining

Spring 2023

#### *CS 432: Introduction to Data Mining*

- Wrote a detailed report on data analysis of a drugs consumption related dataset (**PDF link**).
- The report focused on the various factors affecting drug consumption in Connecticut, USA
- State of the art algorithms for clustering like **DBSCAN**, **Apriori** and **Fpgrowth** for Association and Frequent Pattern Mining were employed to make data driven-inference regarding drug consumption in Connecticut, USA

## 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 (**PDF Link**).

## Course Group Project on Arrhythmia Detection through ECG

Fall 2020

*EE 100: Engineering Laboratory*

- Implemented software capable of detecting different arrhythmia types through ECG data (**Project Video**).

## Course Project on ISS Tracking and Velocity Measurment

Spring 2021

*PHY 100: Experimental Physics Lab I*

- Using real-time captured instances, and tools like Tracker and ImageJ, the velocity of ISS was predicted (**Lab Project Presentation**).

## TECHNICAL SKILLS

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**Languages:** C++, Python, STATA, MATLAB, R, HTML/CSS, Tableau

**Programming Frameworks:** Keras, Tensorflow, PyTorch, Shiny, Numpy, Pandas, Matplotlib, Seaborn

**Tools:** Linux, Git, Dropbox, Latex, Microsoft, VS Code, Google Colab