

# Nehal Ahmed Shaikh

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## EDUCATION

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University:	Lahore University of Management Sciences	Major:	Economics-Mathematics
Duration:	July 2020 - July 2024	Minor:	Computer Science
Degree Type:	BSc	CGPA:	3.72/4.00

## RESEARCH INTERESTS

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- Developing and improving algorithms for social and strategic interactions—using machine learning, optimization, and game theory—and exploring their applications in economics and other sciences.
- Improving large language models by studying the underlying theory and exploring their applications.

## RESEARCH EXPERIENCE

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Topic:	Unrolling Optimization Algorithm for Matrix Completion
Advisor:	<a href="#">Dr. Muhammad Tahir</a>
Expected Duration	12 months
Status:	Ongoing

*Summary:* Initially refined a deep-unfolded algorithm for vanilla matrix completion (MC) problem (see: [convmc-net](#)) and improved upon it by unrolling an existing iterative optimization algorithm into a neural network, eventually proposing a potentially faster and more accurate novel algorithm that does not only work for the standard problem, but also for cases involving GMM noise (see: [ConvHuberMC-Net](#)). The results for these two algorithms were compared against existing iterative MC algorithms by replicating their results (see: [report](#)).

## RELEVANT COURSEWORK

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Dynamic Programming and Reinforcement Learning, Machine Learning, Generative AI for Speech and Language Processing, Deep Learning, Econometrics II, Convex Optimization, Principles and Techniques of Data Science, Introduction to Artificial Intelligence, Numerical Analysis, Statistics, Probability, Introduction to Differential Equations.

## PROJECTS

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### • Panel Data and Tobit Analysis on Health Care Dataset (Stata)

*Summary:* Analyzed healthcare service utilization in Germany employing tobit, fixed effects, and random effects models on a unique panel data set spanning from 1984 to 1995 (see: [data](#)), while focusing on socio-economic disparities in healthcare access and hence contributing critical insights to health-care economics. (see: [PDF](#)).

*Skills learned:* tobit analysis, panel data analysis, policy evaluation

### • Air Pollution & Academic Performance (Python)

*Summary:* Explored the relationship between air pollution and academic performance in Pakistan to know whether there exists any relationship between the two and to predict academic performance scores based on a customized synthesis of ASER (education) and NASA (climate) data (see: [blog](#)).

*Skills learned:* data synthesis, web-scraping, deep learning for regression analysis

- **Sentiment Analysis on Audio Recordings (Python)**

*Summary:* Applied various classifiers on [CREMA-D](#) data—K-NN, logistic regression, naive Bayes, SVM, and neural network—to predict the emotion signified by an audio and performed comparative metric analysis (see: [PDF](#)).

*Skills learned:* Speech processing, classification algorithms, hyperparameter tuning, sentiment analysis

- **Regression Analysis to Estimate the Effect of Gender on Academic Performance (Stata)**

*Summary:* Utilized a multiple linear regression model, featuring a host of explanatory variables, to conclude whether there is any significant difference between the CGPA values of male and female students, using field data collected through questionnaires (see: [PDF](#)).

*Skills learned:* Assumptions validation, data cleaning, econometric modelling, questionnaire design

- **Regression Analysis on the Determinants of New York Housing Prices (R)**

*Summary:* Created a multiple linear regression model to determine the significance of factors affecting housing prices in New York and the effect of outliers by performing extensive data analysis (see: [data](#) and [PDF](#)).

*Skills learned:* Exploratory data analysis, feature selection, statistical modelling

- **Deep Learning for Computer Vision (Python)**

*Summary:* Implemented four deep learning algorithms—CNN, auto-encoder, LSTM, and ViT—for computer vision tasks (see: [repository](#)).

## EXPERIENCE

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Teaching assistant for EE 563/MATH 325: Convex Optimization (graduate-level course).

## HONORS AND AWARDS

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Placed four times on Dean's Honor List at LUMS for excellent academic performance.

## SKILLS

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- Programming: C++, MATLAB, Python, R
- Software: Canva, Microsoft 365 Suite, RStudio, Stata, Visual Studio Code
- Other: Git, LaTeX