Nehal Ahmed Shaikh

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GitHub

EDUCATION

University:	Lahore University of Management Sciences	Major:	Economics-Mathematics
Duration:	July 2020 - July 2024	Minor:	Computer Science
Degree Type:	BSc	CGPA:	3.70/4.00

RESEARCH INTERESTS

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

RESEARCH EXPERIENCE

Topic:	Unrolling Optimization Algorithm for Matrix Completion
Advisor:	Dr. Muhammad Tahir
Expected Duration	12 months
Status:	Ongoing

Summary: Initially implemented several deep learning algorithms—CNN, auto-encoder, LSTM, and ViT—for computer vision tasks (see: DeepLearning). The project evolved into studying existing matrix completion algorithms, replicating their results, and eventually accelerating them via deep unfolding to propose a novel algorithm.

GRADUATE-LEVEL COURSEWORK

CS 6314	Dynamic Programming and Reinforcement Learning
CS 535	Machine Learning
CS 5302	Generative AI for Speech and Language Processing
CS 437	Deep Learning
ECON 438	Econometrics II
MATH 325	Convex Optimization

OTHER RELEVANT COURSEWORK

CS 334	Principles and Techniques of Data Science
CS 331	Introduction to Artificial Intelligence
MATH 334	Numerical Analysis
MATH 231	Statistics
MATH 230	Probability
MATH 210	Introduction to Differential Equations

PROJECTS

- **Panel Data and Tobit Analysis on Health Care Dataset**
  Data: German Health Care Usage Data
  Software: 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, 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**
  Data: Customized synthesis of ASER and NASA data
  Language: 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 pollution data (see: blog).
  Skills learned: data synthesis, web-scraping, deep learning for regression analysis

- **Sentiment Analysis on Audio Recordings**
  Data: CREMA-D
  Language: Python

  Summary: Applied various classifiers—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**
  Data: Field data collection through questionnaires
  Software: 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 (see: PDF).
  Skills learned: Assumptions validation, data cleaning, econometric modelling, questionnaire design

- **Regression Analysis on the Determinants of New York Housing Prices**
  Data: Housing_prices
  Language: 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: PDF).
  Skills learned: Exploratory data analysis, feature selection, statistical modelling

- **Doing Economics: Implementations of Empirical Projects**
  Language: MATLAB

  Summary: Implemented 4 out of 12 projects from CORE's textbook (see: repository).

EXPERIENCE

- Teaching assistant for EE 563/MATH 325: Convex Optimization.

HONORS AND AWARDS

- Placed multiple times on Dean's Honor List at Lahore University of Management Sciences throughout the undergraduate program.

SKILLS

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