Mani Bayani

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EDUCATION

The Graduate Center of the City University of New York **2016 - present**

Ph.D. Economics

Fields: Econometrics and Machine Learning, Microeconomics, High-Dimensional Models, Policy Analysis
Dissertation: "Essays on Machine Learning Methods in Economics"

Columbia University in the City of New York **2020 - present**

M.Sc. Applied Mathematics

Georgia Institute of Technology **2018 - 2021**

M.Sc. Analytics

Computational Data Analytics Track

University of Illinois at Urbana-Champaign **2018 - 2021**

M.Sc. Computer Science

Concentration: Machine Learning

University of Tehran **2011 - 2014**

M.A. Economics

Thesis: "The Implementation of Hidden Markov Models for Estimating CO2 Emissions"

Sheikh Bahaei University **2006 - 2010**

B.Sc. Computer Science

WORKING PAPERS

- **Robust PCA Synthetic Control Model [Under Review]**
  https://arxiv.org/abs/2108.12542
- **The Contribution of the Minimum Wage to US Wage Inequality: A Penalized Spline Approach**
  https://mbayani.github.io/The-Contribution-of-the-Minimum-Wage-to-US-Wage-Inequality

WORK IN PROGRESS

- **Improving Time Series Extrinsic Regression**

RESEARCH EXPERIENCE

Baruch College **2020 - present**

Data Science Fellow

Analysis of Baruch students' academic performance with Professor Sonali Hazarika

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The Graduate Center of the City University of New York **2020 - present**

Research Assistant

Research on using artificial intelligence to analyze complex and highly dimensional economic models with Professor Lilia Maliar

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Columbia University in the City of New York **2020 - 2021**

Data Science Institute Scholar

Research on broadband funding with Professor Henning Schulzrinne

TEACHING EXPERIENCE

The Brooklyn College of the City University of New York **2017 - present**

Adjunct Instructor

Mathematical Economics (Econ 3410)

The Gabelli School of Business, Fordham University **2018 - present**

Adjunct Instructor

Statistical Decision Making (Econ 2142)
Statisitcs 1 (Econ 2140)

Georgia Institute of Technology **2019 - present**

Teaching Assistant

High-Dimensional Data Analytics (Graduate), for Professor Kamran Paynabar

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The Graduate Center of the City University of New York **2020 - present**

Teaching Assistant

Machine Learning for Economists (Graduate), for Professor Lilia Maliar

PROJECTS

- **A Collaborative Filtering Recommender System App**

  https://github.com/mbayani/A-Collaborative-Filtering-Recommender-System-App

- **Search on Video**

  https://github.com/mbayani/Search-on-video

- **Company Specific Disruptive News and Continuity Detector**

  https://github.com/mbayani/Company-Specific-Disruptive-News-and-Continuity-Detector

SCHOLARSHIPS AND AWARDS

The Graduate Center of the City University of New York **2016 - 2020**

Graduate Center Fellowship

The Graduate Center of the City University of New York **2018 - 2019**

The Advanced Research Collaborative Fellowship

The Graduate Center of the City University of New York **2020 - 2021**

Doctoral Student Research Grant

SKILLS

Python

Proficient

R

Proficient

Matlab

Proficient

SQL

Familiar

Tableau

Familiar

Julia

Familiar

LANGUAGES

Persian

Native

English

Fluent

REFERENCES

- **Lilia Maliar, Professor of Economics**

  The Graduate Center of the City University of New York

  Email: lmaliar@gc.cuny.edu

- **Wim Vijverberg, Professor of Economics**

  The Graduate Center of the City University of New York

  Email: wvijverberg@gc.cuny.edu

- **Kamran Paynabar, Associate Professor of Industrial and System Engineering**

  Georgia Institute of Technology

  Email: kamran.paynabar@isye.gatech.edu

- **Sonali Hazarika, Associate Professor of Economics**

  Baruch College

  Email: sonali.hazarika@baruch.cuny.edu

- **Paul Goldberg, Associate Professor of Economics**

  Brooklyn College

  Email: paulg@brooklyn.cuny.edu

THESIS ABSTRACT

Paper 1: "Robust PCA Synthetic Control"

In this study, I propose an algorithm for comparative studies called robust PCA synthetic control. My algorithm builds on the synthetic control model of Abadie et al. (2015) and the robust synthetic control model of Amjad et al. (2018). I apply all three methods (robust PCA synthetic control, synthetic control, and robust synthetic control) to answer the hypothetical question, what would have been the per capita GDP of West Germany if it had not reunified with East Germany in 1990?

I then apply all three algorithms in two placebo studies. Finally, I test the outcome of each method for robustness. This paper demonstrates that my method can outperform the robust synthetic control model of Amjad et al. (2018) in placebo studies and is less sensitive to the weights of synthetic members than the model of Abadie et al. (2015).

Paper 2: "Improving Time Series Extrinsic Regression"

Time series extrinsic regression, or scalar-on-function regression, is a method to estimate a scalar dependent variable based on time series observations. The common methods of time series estimation (like ARIMA) are not suitable for these types of data sets since time series estimations put higher weight on the most recent data point in the time series, while in time series extrinsic regression, all data points in the time series could be equally important for the estimation of the scalar dependent variable. In this study, I suggest implementing smooth-sparse decomposition method to improve the prediction accuracy of deep learning models like ROCKET (exceptionally fast and accurate time series classification using random convolutional kernels), InceptionTime and Resnet on time series extrinsic regression.

Paper 3: "The Contribution of the Minimum Wage to US Wage Inequality: A Penalized Spline Approach"

I reassess the effect of minimum wage on US earnings inequality using data from 1979 to 2012 and a penalized spline technique that addresses potential biases in parametric estimation in prior works. I find that, in contrast with the initial study of Lee (1999) and based on the Current Population Survey, the spillover effect of minimum wage on upper tail and lower tail of wage distribution, where the minimum is nominally nonbinding, is small and not significant.