Hanieh Hatami

haniehatami7@gmail.com haniehtm.github.io haniehtm haniehtm

Education

Sharif University of Technology(SUT), Iran *Fall 2020 – Present*
B.S of science in Physics (Major) *(Expected February 2025)*
- GPA: 18.64/20 (Transcript)

Minor in Economics
- GPA: 19.43/20 (Transcript)

Research Experience

Data-driven method to reveal the dynamic and noise using Hermite polynomials *Sharif University of Technology*
Supervisor: Prof. M Reza Rahimi Tabar *July 2024 – Present*
- In this research, we deployed a new, yet superior method to reveal the drift, diffusion and jumps from moments of data which proves to be more accurate and faster than methods in literature. All the results, including extensive numerical simulations was generated by Python, and they were double-checked by Mathematica. This method uses Hermite Polynomials to find the best basis to approximate the function of kramers-Moyal's coefficient. We applied advanced statistical techniques to derive the theory, which helped the theory to become robust to tail perturbations.

Data-driven analysis of higher order interactions *Sharif University of Technology*
Supervisor: Prof. M Reza Rahimi Tabar *Sep 2024 – Present*
- Smooth multidimensional dynamics all can be decomposed into a network of self loops, pairwise interactions, and higher order interactions which proves to be critical in understanding behavior of systems. Our team developed a far more accurate and faster method that can reveal higher order interactions and my python codes show that out method in estimation is nearer to real parameters than other methods.

Interaction analysis of crypto-fiat exchange rate *Sharif University of Technology*
Supervisor: Prof. Shahin Rouhani *July 2024 – Present*
- Our team used enhanced numerical methods to analyze the interaction network of exchange rates. I solved the problems of fake causality detection of usual correlation detection methods with theory of Kramers-Moyal's expansions and my codes revealed the best fitting dynamics which show the interactions between Crypto-Fiats and help us to undrestand the network of them.

Stochastic Processes in Econophysics *Sharif University of Technology*
Supervisor: Prof. M Reza Rahimi Tabar *May 2024 – July 2024*
- In this paper, we explore the application of stochastic processes to economic modeling, emphasizing the intersection of physics and economics. It aims to provide a comprehensive overview of how concepts from statistical mechanics and probability theory can be utilized to analyze complex economic systems, particularly in understanding market behaviors, risk management, and forecasting. By detailing various models such as Brownian motion, Markov chains, and agent-based models, the work highlights the importance of randomness and uncertainty in economic phenomena, advocating for a more nuanced approach to economic analysis that incorporates these elements for better predictive accuracy and robustness in decision-making.

Documents: GitHub Repo

Wealth Distribution with Life-cycle *Shahid Beheshti University*
Supervisor: Prof. Ali Hosseiny *Jan 2024 – March 2024*
- In this research, we investigated the wealth distribution of a society of ten thousand people in a thousand years. Our method is nearer to the real world data than others; Because we used the life-cycle model for people which is not in the 10% reachest people in our sample data.

Teaching Assistant Experience

Econophysics *Sep 2024 - Feb 2025*
Instructor: Prof. M Reza Rahimi Tabar *Sharif University of Technology*

Contemporary Physics *Sep 2024 - Feb 2025*
Instructor: Prof. Shahin Rouhani *Sharif University of Technology*

Introductory Programming (in Python) *Sep 2021 - Feb 2022*
Instructor: Dr. Hamidreza Hosseinkhani *Sharif University of Technology*

Awards & Achievements

Ranked 6 *out of 60 students in department of Physics and department of Economics* — *2024*
Top 0.7% *in the national university entrance exam(among 155000 students)* — *2020*
Ranked 1 *graduated at Bahonar Magnet High School.* — *2020*

Course Projects

Detailed data-driven investigation of stochastic dynamic equations(— *Sharif University of Technology*
Supervisor: Prof. M Reza Rahimi Tabar/ / Codes &/or Documents: Github Repo — *Apr 2024*

Data-driven approach for higher-order interactions in high-dimensional complex systems — *Sharif University of Technology*
Supervisor: Prof. M Reza Rahimi Tabar/ Codes &/or Documents: Github Repo — *Apr 2024*

Friendship networks and educational networks and their connection — *Sharif University of Technology*
Supervisor: Prof. Saman Moghimi Araghi / Codes &/or Documents: Github Repo — *Oct 2023*

Drawing random graphs and checking the characteristics of the object — *Sharif University of Technology*
Supervisor: Prof. Saman Moghimi Araghi / Codes &/or Documents: Github Repo — *Oct 2023*

Songbird-social data analysis — *Sharif University of Technology*
Supervisor: Prof. Shahin Rouhani / Codes &/or Documents: Github Repo — *Jun 2023*

Converting Data into Goods in Banking (Saman Bank in Iran) — *Sharif University of Technology*
Supervisor: Prof. Farhad Nili / Codes &/or Documents: Github Repo — *Dec 2023*

A look at the article on the development of higher education and the gender gap in education in Iran — *Sharif University of Technology*
Supervisor: Prof. M. Javad Dashtimanesh / Codes &/or Documents: Github Repo — *Dec 2023*

The difference between the pattern of industrialization in England and America — *Sharif University of Technology*
Supervisor: Prof. Farhad Nili / Codes &/or Documents: Github Repo — *Jun 2022*

The role of government in growth — *Sharif University of Technology*
Supervisor: Prof. A. Mahmoudzadeh / Codes &/or Documents: Github Repo — *Jun 2023*

International Dimensions of Climate Change Policies — *Sharif University of Technology*
Supervisor: Prof. A. Mahmoudzadeh / Codes &/or Documents: Github Repo — *May 2023*

Labor Market (Minimum Wage Rate) — *Sharif University of Technology*
Supervisor: Dr. Tajrishy / Codes &/or Documents: Github Repo — *Nov 2022*

Selected Courses

Physics Courses:

Stochastic Processes:(Graduate/Grade: 20.0/20.0), **Complex Systems:**(Graduate/Grade: 19.5/20.0), **THERMODYN & STAT MECH1:** (Grade: 19.0/20.0), **THERMODYN & STAT MECH2:**(Grade: 20.0/20.0), **Introductory Programming(in Pyhton):**(Grade: 20.0/20.0), **Biophysics:**(Graduate/Grade: 18.0/20.0), **Network Science:**(Graduate/Grade: 18.0/20.0),

Economics Courses:

Principles of Economics: (Grade: 20.0/20.0), **Macroeconomics:**(Grade: 20.0/20.0), **Econometrics:**(Grade: 20.0/20.0), **Engineering Statistics and Probability:**(Grade: 20.0/20.0), **History of Economics:**(Grade: 19.3/20.0), **Microeconomics:**(Grade: 19.0/20.0), **Digital Economics:**(Grade: 17.7/20.0)

Technical Skills

Programming Languages: Python, STATA, R, C, C++, Julia, Java, Matlab, Mathematica
Tools & Frameworks: Adobe Indesign & Photoshop, MS Office, LaTeX, Git, Zotero, Parallel Computation, Web Scraping

Language

Persian: Native ***English:*** Fluent C2 (IELTS: TBA) ***German:*** Upper Intermediate (B2)

Community & Leaderships

Collaboration with the student scientific Journal — *Sharif University of Technology*
Member of the editorial council in ranked 1 students' scientific journal, Takaneh magazine. — *2024 – Present*

Students' Union Council — *Sharif University of Technology*
Department of Physics — *2023 – 2024*

Lecturer — *Sharif University of Technology*
Giving Several Introductory Talks at Weekly Seminars of Lambda Circle Session Series. — *2022*