ZHENGTAO GUI

Email: gzt9775@mail.ustc.edu.cn
Mobile: +86-18305722652

Education

- **University of Science and Technology of China** *Minor:finance*
  B.S. in Statistics; Overall GPA: 3.55 (Sophomore year: 3.73) September 2020 - June 2024(expected)
  Selected Courses: Data Structures and Database(95/100), Data Structure (92/100), Fundamentals of Statistical Algorithm (93/100), Stochastic Process (91/100), Probability Theory (90/100), Applied Statistical Software (88/100), Machine Learning (88/100), Mathematical Analysis (88/100), Introduction to Computing Systems (88/100)

Academic Papers

- A Nonlinear method for time series forecasting using VMD-GARCH-LSTM model
  Zhengtao Gui, Haoyuan Li, Sijie Xu, Yu Chen
  Submitted to **Physica A: Statistical Mechanics and its Applications**

Research Experience

- **Time series forecasting using VMD-GARCH-LSTM model.** *December 2022 - July 2023*
  Supervisor: Yu Chen, University of Science and Technology of China USTC, China
  - Researched recent popular time series forecasting algorithms such as ANN–GARCH, RNN–GARCH, etc.
  - Proposed a novel time series forecasting model VMD-GARCH-LSTM combining traditional statistical models and LSTM.
  - Implement different time series forecasting algorithms and observed each model's predictive performance on the German Consumer Price Index dataset.
  - Compared the experimental results using MAE, RMSE and MAPE indicators, the experimental results showed that our model performs better than other compared models (as evidenced by significant declines in MAE, RMSE and MAPE).
  - Wrote an academic paper and submitted it to Physica A: Statistical Mechanics and its Applications.

- **M-SCORE: SCORE for multi-layer network community detection** *March 2023 - Augest 2023*
  Supervisor: Yu Chen, University of Science and Technology of China USTC, China
  - Proposed a novel multi-layer degree-corrected block model and the MSCORE algorithm to model the Multi-layer network clustering problem.
  - Compared the performance of different algorithms (ISC, SCME, MSCORE, ASC, Mean adj) in various situations using ARI indicator.
  - Illustrated the superiority of the MSCORE algorithm by the performance of ARI in different simulation experiments, explained the core principles of the algorithm and drew conclusions of our research.
  - Worked on manuscript preparation.

- **Community Detection via Network Embeddings in Heterogeneous Networks** *July 2023 - Present*
  Supervisor: Yu Chen, University of Science and Technology of China USTC, China
  - Researched the NEM classic model that uses network embedding to model the network.
  - Extended the NEM algorithm so that it can be applied to heterogeneous networks, and studied the impact of different types of penalty functions and different clustering algorithms on the vector alpha on the effect of the NEM algorithm.
  - Compared our method with different clustering algorithms, including SCORE, NEM, spectral clustering, etc.

Projects

- **Vehicle Data Analysis And Driver Behavior Prediction** *April 2022 - June 2022*
  Supervisor: Canhong Wen, University of Science and Technology of China USTC, China
  - Corrected the measurement error of some experimental data and performed basic data processing.
  - Carried out a detailed analysis of vehicle networking data using statistical methods, including: box plot analysis, fitting error analysis, quantile regression analysis, time series analysis, cluster analysis, etc.
  - Researched the relationship between the speed change rate of the car and the wheel speed, drew the time series diagram of the car gear according to it.
  - Analyzed the driver's behavior habits and inferred whether the road section the car passed was open and whether there were traffic lights.

- **A Small Von Neumann Machine Prototype** *December 2021 - February 2022*
  Supervisor: Yeqi Huang, University of Science and Technology of China USTC, China
  - Explored the relevant theories of and principles of von Neumann machines.
  - Realized the simulator and assembler of Von Neumann Machine (LC3), and ran all the test programs on LC3.
  - Achieved the basic functions of LC3: accept the assembly program and convert it into machine instructions, use the principle of bit operation to run the converted machine code and get the program output result.

- **Time-series forecasting using ARIMA-GARCH And Neural Network** *December 2022 - January 2023*
  Supervisor: Yu Chen, University of Science and Technology of China USTC, China
  - Explored the decomposition-ensemble paradigm using VMD-GARCH/LSTM-LSTM model
  - Extended VMD-GARCH/LSTM-LSTM model to more diverse neural network GRU and RNN, as a way to explore the effectiveness of different neural networks for volatile data.
  - Used different extended models to predict the German consumer price index dataset.
  - Used MAE and RMSE indicators to compare our experimental results, found that replacing the LSTM neural network with RNN will significantly improve the prediction effect on this dataset (as evidenced by the MAE from 0.649 to 0.193 and RMSE from 2.194 to 0.803).

Industrial Internship

- **Codia Intelligent Diagnosis Development Team of BDAA Laboratory** *July 2022 - January 2023*
  Supervisor: Qi Liu, University of Science and Technology of China Remote Internship
  - Used the vue framework to build a web page for similar exercise recommendations and user cognitive diagnosis.
  - Investigated literatures related to intelligent diagnosis and implemented related APIs.
  - Developed and launched the website Codia with our team members. Coida website link

- **Huawei AI Training Experience** *Augest 2022*
  Huawei In Person
  - Explored a new AI framework MindSpore similar to pytorch and understood its core mechanics.
  - Used Neural network (Resnet) in AI framework for intelligent diagnosis of medical images, improved the model accuracy increased from 0.86 to 0.99.

Skills

- Programming Python, R, C++, Matlab, Html, JavaScript, Java
- Tools Latex, Markdown, MySQL, Vue
- Soft Skills Leadership, Teaching Assistant Experience, Academic Writing, Public Speaking

Honors and Awards

- The USTC Rose Endeavor Scholarship (Top 8% Awarded) 2022
- USTC Outstanding Students Award (Top 30% Awarded) 2022
- National Mathematics Competition For College Students (Second prize) 2022
- USTC Outstanding Student Union Cadre (Top 40% Awarded) 2022
- National Mathematics Competition For College Students (Second prize) 2021
- USTC Outstanding freshman scholarship (Top 40% Awarded) 2020

EXTRACURRICULAR

- **Minister Of Culture And Sports Department Of The Student Union** *September 2021 - Present*
  Organized more than 10 large-scale school activities impacting over 3000 students. USTC
- **School Safety Councilor** *September 2020 - Present*
  Responsible for ensuring the safety of students. USTC
- **Teaching Assistant For Stochastic Processes** *February 2023 - July 2023*
  Served as teaching assistant for stochastic process course (Grades for this course this semester: 10/10). USTC
- **Participants of the first Joint Conference on Statistics and Data Science** *July 2023*
  Participated in the first Joint Conference on Statistics and Data Science. Beijing