Xu Hu

Senior Undergraduate @ AHU / Visiting Student @ NCSU

Research Gate Github

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https://ise.ncsu.edu/fuzzy-neural/people/hu-han

Research Interest

- Data Augmentation & Generation
- Time Series Forecasting & Implementation
- Diffusion Model & Multi-Modal
- Brain Imaging/MRI & Mental Illness

Reference

- Prof. Xiaolei Fang (NCSU)- Advisor of Research Intern xfang8@ncsu.edu
- Prof.Shu-Cherng Fang (NCSU)- Advisor of Research Intern fang@ncsu.edu
- Prof.Vince D. Calhoun (TReNDS;GSU&GAtech&Emory)- Collaborator vcalhoun@gatech.edu
- Prof.Zhengyang Zhou (USTC)- Advisor of the Summer Research zzy0929@ustc.edu.cn
- Prof.Zhifu Tao (AHU)- Undergraduate Tutor jeff.tao@ahu.edu.cn

Education Background

Anhui University (Project "211"), Hefei, China 2021-2025

- B.E.c Economic Statistics, Department of Big Data and Statistics
- GPA: 4.27/5.00 WES: TBD Major Rank: 1/103 (Top 0.95%)
- **Main Courses:** Mathematics Analysis 1&2 (90&94), Advanced Algebra(87), Probability&Mathematical Statistics(89), Operation Research(97), Statistics(94), Bayesian Statistics(100), R Programming(95), Python Programming(95), Data Mining(93), Applied Statistical Analysis(95), Statistical Forecasting&Decision(96), Econometrics(Intermediate) (96), Time Series(91)

Publications

[1] **Hu Xu,** Yu Jianwen, Xu Qin, Tao Zhifu, "Volatility information in high-frequency financial interval-valued time series: A direct modeling pattern". the Fluctuation and Noise Letters 2024, SCI: Q4.
[2] TBD (2024) in TReNDS
[3] TBD (2024) in NCSU

Research Experience

ISE, Edward P. FITTS Department, North Carolina State University Raleigh, USA
Student Intern, under the supervision of Prof. Shu-Cherng Fang and Prof. Xiaolei Fang 08/2024–12/2024

Adaptive Diffusion Models for Industrial Irregular Time Series Analysis

- Applied conditional diffusion models to sparse/irregular/missing time series data in industrial settings.
- Implemented domain adaptation, replacing Gaussian noise with Brownian motion-based noise to match real-world sensor data characteristics.

TReNDS lab, ECE, GSU&Georgia Tech&Emory Atlanta, USA
Research Intern, under the supervision of Prof. Vince D.Calhoun 05/2024–07/2024

Functional-to-structural MRI Image Translation based on Conditional Latent Diffusion: Biomarker Identification for Schizophrenia

- Utilizing an improved Diffusion Transformer (DiT) to achieve reverse generation from Functional

Network Connectivity (FNC) to Gray Matter (GM).

- Introducing FNC matrix as a condition in the DiT model to guide the GM generation process.
- Revealing Subject-specific Biomarkers for Schizophrenia by Functional and Structural MRI Data.

Data Science and Analytic Thrust, HK University of Science and Technology Guangzhou, China

Research Intern, under the supervision of Prof. Yuxuan Liang and Prof.Zhenyang Zhou 07/2024–08/2024

Spatial-Temporal Selective State Space(ST-Mamba) Model for Traffic Flow Prediction

- Be the first model without using graph modeling in the space-temporal model.
- Effectively capture the long-range dependency for traffic flow data.
- Employ the Mamba block to improve computational efficiency and accuracy.
- By ablation experiments, find some new conclusions of the SSM.

Department of Big Data and Statistics, Anhui University Hefei, China

Undergraduate's Research Project,under the supervision of Prof. Zhifu Tao 03/2024-09/2024

Volatility Information in High-Frequency Financial Interval-Valued Time Series: A Direct Modeling Pattern

- Developed a novel VAR-NN forecasting model combining Vector Auto-regressive process, volatility information, and neural networks.
- Introduced four types of interval-valued data volatility information for more accurate predictions.
- Outperformed traditional methods in forecasting high-frequency financial data.

College of Computing and Data Science, NTU Singapore

AI Summer School & Award Best Project&Award Excellence Leadership 07/2023-08/2023

Location-based Demand Prediction & Resource Optimization System for California Bike-Sharing

- Real-time prediction and optimization of dynamic demand for bike-sharing systems
- Maximizing resource allocation efficiency and enhancing user experience
- Data-driven decision support for smart urban transport management using multidimensional data

Competition Awards

2023 ICM - American Undergraduate Mathematical Modeling Competition - Finalist 02/2023

*Propose a solution about the network science and **operation research***

Award Global Grand Prize Nomination (top 0.17%)

- Applied Canonical Correlation Analysis to the United Nations' 17 Sustainable Development Goals.
- Use some advanced econometrics methods to analyse the factors influencing the progress.
- Utilized an LSTM to predict achievable goals over the next decade.
- Concluded with a sensitivity analysis, affirming the robustness of the model.

Honorary & Service & Leadership

- **The Student Assistant of the President in Anhui University**

The first junior undergraduate selected 06/2022-06/2023

- **The Member of a Startup Company "Empower Planet"**

Presentation for investment & Field visit to agricultural aid bases 04/2023-08/2023

- **National Scholarship, Outstanding Student Award, Academic Excellence Award** etc.

Skills

Professional Qualification: ACCA (2022): Pass the exam of BA,MA,FA; BEC Medium pass
Computer Skills: Python, R, PyTorch, LaTeX
Language: IELTS 7(6.5) ; GRE: TBD