Haitong Lan

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EDUCATION

Beijing University of Posts and Telecommunications, Telecommunications Engineering and Management, *Undergraduate* 2022.9 - present

- **Major Courses**: Probability Theory and Stochastic Processes, Functions of Complex Variables, Methods in Mathematical Physics, Computational Methods, Signals and Systems, Digital Signal Processing
- **GPA**: 3.76/4 **Rank**: 6/308 **English Proficiency**: CET-6

Projects and Competitions

National Student Statistical Modelling Competition team captains 2024.4-2024.5

- Developed and implemented machine learning models to predict mountain fires, evaluating the performance of traditional models (e.g., Random Forest, SVM) against deep learning techniques (e.g., LSTM neural networks).
- Applied Monte Carlo simulations for hyperparameter optimization of the LSTM network, enabling adaptive tuning and significantly improving model accuracy and robustness in fire prediction scenarios.

Computational Methods course design author 2024.1-2024.2

- Designed a highly accurate numerical algorithm for solving boundary value ordinary differential equations as part of the Computational Methods course.
- Summarized classical algorithms such as the Runge-Kutta and multi-step methods. Developed a finite difference algorithm based on non-uniform nodes using Legendre polynomial zeros, and verified improved accuracy through Matlab simulations.

Research experience

Academy of Mathematics and Systems Science visiting student 2024.6-present

- Researching high-dimensional sampling theory with a focus on diffusion models, deriving convergence guarantees and optimal upper bounds for sampling errors under non-log-concave and second moments integrability conditions.
- Following Professor Junjie Ma (https://lsec.cc.ac.cn/ mjj/) to explore the Approximate Message Passing (AMP) algorithm, alongside key topics such as measure theory, random matrix theory, and high-dimensional statistics.
- Actively participated in seminar discussions, deriving and analyzing diffusion-based algorithms like DDPM, DDIM, and SMLD in detail.

School of Information and Communication Engineering lab intern 2023.11-2024.4

- Led a research project using blind source separation to enhance signal detection in hydroacoustic and electrocardiogram applications, significantly improving accuracy and efficiency.
- Simulated and compared algorithms such as Independent Component Analysis (ICA), Principal Component Analysis (PCA) and JADE, optimizing their performance to achieve superior signal separation across various conditions.

Awards

- 2023 First Prize of National University Student Mathematics Competition in Beijing
- 2024 First Prize in National Student Statistical Modelling Competition in Beijing
- 2023 Second Prize in Physics Competition for College Students in Selected Regions of China
- 2023 Second Prize in Beijing University of Posts and Telecommunications Intramural Physics Competition

Skills mastery

- Computer Languages: C Python JAVA HTML CSS
- Data Analysis Software: Matlab Mathematica SPSS Arcgis
- Thesis writing tools: Latex Word