Jiaqi Luo

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EDUCATION

- Ph.D in Computational Mathematics, Advisor: Zhouwang Yang
  Soochow University, 2015-2020
- B.S. in Mathematics,
  Soochow University, 2011-2015

POSITIONS

- 2025.2 - present, Assistant Professor
  School of Mathematical Sciences, Soochow University
- 2023.11 - 2024.11, Postdoctoral Fellowship, Advisor: Huaxiong Huang
  The Fields Institute for Research in Mathematical Sciences
- 2020.7-2023.10, Research Scientist, Advisor: Shixin Xu
  Data Science Research Center, Duke Kunshan University

RESEARCH INTRODUCTION

My research focuses on using nonlinear optimization techniques and machine learning methods to develop simple, user-friendly, and computationally efficient models and algorithms that can tackle complex real-world problems in industry, healthcare, and science. By combining insights from mathematics, computer science, and domain knowledge, I aim to create innovative solutions that practitioners can readily adopt and implement.

1. Nonlinear Optimization: Sparse Optimization, Numerical Optimization
2. Machine Learning: Tabular Machine Learning, Imbalanced Learning, Label-noise Learning, Deep Learning, Image processing
3. Applications: AI for Science, Healthcare, Industry

PUBLICATIONS

1. Jiaqi Luo, Hongmei Kang, and Zhouwang Yang. Knot calculation for spline fitting based on the unimodality property. *Computer Aided Geometric Design* (2019).
2. Jiaqi Luo, Hongmei Kang, and Zhouwang Yang. Knot placement for B-spline curve approximation via $l_{\infty,1}$-norm and differential evolution algorithm. *Journal of Computational Mathematics* (2021).
3. Jiaqi Luo, Zihao Wei, Junkai Man, and Shixin Xu. TRBoost: A Generic Gradient Boosting Machine based on Trust-region Method. *Applied Intelligence* (2023).
4. Zepeng Wen*, Jiaqi Luo*, and Hongmei Kang. The deep neural network solver for B-spline approximation. *Computer-Aided Design* (2024). (*: Equal Contribution)

5. Jiaqi Luo and Shixin Xu. NCART: Neural Classification and Regression Tree for Tabular Data. *Pattern Recognition* (2024).

6. Jiaqi Luo, Yuedong Quan, and Shixin Xu. Robust-GBDT: A Novel Gradient Boosting Model for Noise-Robust Classification. arXiv preprint arXiv:2310.05067, submitted.

7. Jiaqi Luo, Yuan Yuan, and Shixin Xu. Improving GBDT Performance on Imbalanced Datasets: An Empirical Study of Class-Balanced Loss Functions. arXiv preprint arXiv:2407.14381, submitted.

8. Jiaqi Luo, Yahong Yang, Yuan Yuan, Shixin Xu, and Wenrui Hao. An Imbalanced Learning-based Sampling Method for Physics-informed Neural Networks. Submitted.

TEACHING

1. 2023.9-2023.10, Linear Algebra, Recitation Lecturer, Duke Kunshan University.

2. 2023.11-2023.12, Calculus, Teaching Assistant, Duke Kunshan University.

ENGINEERING PROJECTS

1. **Express Bill Identification (2018)** Developed and implemented object detection and OCR algorithms to automatically extract recipient's name, address, and other key information from bills, significantly reducing manual processing time.

2. **Anomaly Detection System in Pipe Gallery Environment (2020)** Utilized time series analysis to predict changes in temperature, gas concentration, and other critical indicators in pipe galleries, enabling proactive maintenance and hazard prevention.

3. **DRAM Errors Detection (2021)** Employed machine learning and time series analysis to forecast the likelihood of uncorrectable errors in DIMMs, enhancing system reliability and preemptive error correction strategies.

4. **Hardware Health Monitoring (2022)** Applied machine learning and statistical algorithms to evaluate the health of hardware in high-performance computers, facilitating early detection of potential failures and ensuring product quality.

5. **Intelligent Dispensing System (2023)** Leveraged machine learning to predict optimal glue dispensing parameters, and implemented an learning-based methodology to strategically select and acquire data points.

6. **Medical Image Registration (2024)** Developed a deep learning-based framework to enhance the performance of wound image registration. This innovation significantly improved accuracy, leading to better monitoring and assessment of wound healing progress.