

Junbo (Jacob) Lian

E-mail: jacoblian@u.northwestern.edu | Homepage: <https://junbolian.github.io>

Education

Northwestern University | United States

August 2025 – December 2026

Master of Science in *Machine learning and Data Science*

GPA: 4.0/4.0 (to date)

Core Courses: Machine Learning, Data Mining, Optimization and Heuristics, Bayesian Methods for Inference and Decision Making, Generative AI, Databases & Information Retrieval, Programming for Data Science, Deep Learning, Big Data Systems, Data Visualization & Warehousing, Generating Business Value with Data Science, Industry Practicum, Industry Capstone, etc.

Zhejiang A&F University | China

September 2021 – June 2025

Bachelor of Science in *Data Science and Big Data Technology*

GPA: 3.74/5.0 | Weighted Average Score: 87.1/100

Core Courses: Mathematical Analysis, Advanced Algebra, Data Structure and Algorithm, Probability Theory and Mathematical Statistics, Python Programming, JAVA Oriented Programming, MATLAB Programming, Principle and Applications of Big Data, Optimization, Hadoop Offline Analytics, Big Data Architecture and Techniques, Data Analysis and Data Mining, etc.

Publications

(* stands for equal contribution, # stands for Corresponding Author)

- [1] **Lian, J. J.**, Zhang, C., Teo, C. P. (2026). **Multiproduct Pricing with Reference Bands and Guardrails: Evidence from On-Demand Pharmacy Retail.** *M&SOM - Manufacturing & Service Operations Management* (In Progress)
- [2] **Lian, J. J.**, Sun, Y.*, Chen, H., Zhang, C., Teo, C. P. (2026). **ReLoop: Structured Modeling and Behavioral Verification for Reliable LLM-Based Optimization.** *NeurIPS 2026* (In Progress). arXiv:2602.15983.
- [3] **Lian, J. J.**, Ouyang, K., Zhang, Y., Zhong, R., Chen, H., & Chen, H. (2026). **Competitive Cluster Elimination (CCE): k-means-guided, evaluation-neutral plug-in for large-scale swarm optimization.** *Applied Soft Computing* (Under Review).
- [4] **Lian, J. J.**, Yu, M., Ouyang, K., Fu, S., Zhong, R., Zhang, Y., Zhang, J., & Chen, H. (2025). **OPAL: Operator-Programmed Algorithms for Landscape-Aware Black-Box Optimization.** *IEEE Transactions on Evolutionary Computation* (Under Review). arXiv:2512.12809.
- [5] **Lian, J. J.**, Chen, H., Ouyang, K., Zhang, Y., Zhong, R., & Chen, H. (2025). **Twisted Convolutional Networks (TCNs): Enhancing Feature Interactions for Non-Spatial Data Classification.** *Neural Networks*, 108451.
- [6] **Lian, J. J.** (2025). **Generative Foundation Models: A Comprehensive Beginner's Handbook.** *Amazon*.
- [7] Tang, X.*, **Lian, J. J.*#**, Ma, L., Wu, X., Zhong, R., Zhang, Y., & Chen, H. (2025). **IECO: an improved educational competition optimizer for state-of-the-art engineering optimization.** *Journal of Big Data*, 12(1), 200.
- [8] **Lian, J. J.**, Ouyang, K., Zhong, R., Zhang, Y., Luo, S., Ma, L., ... & Chen, H. (2025). **Trend-Aware Mechanism for metaheuristic algorithms.** *Applied Soft Computing*, 113505.
- [9] **Lian, J.**, Wu, P., Han, W., Xie, Y., Zheng, Y., Xu, Y., ... & Hui, G. (2025). **Discrimination of Chinese prickly ash origin place using electronic nose system and feature extraction with support vector boosting machine.** *Cogent Food & Agriculture*, 11(1), 2464939.
- [10] **Lian, J.**, Zhu, T., Ma, L., Wu, X., Heidari, A. A., Chen, Y., ... & Hui, G. (2024). **The educational competition optimizer.** *International Journal of Systems Science*, 55(15), 3185-3222. ([ESI hot paper](#))
- [11] **Lian, J.**, Hui, G., Ma, L., Zhu, T., Wu, X., Heidari, A. A., ... & Chen, H. (2024). **Parrot optimizer: Algorithm and applications to medical problems.** *Computers in Biology and Medicine*, 172, 108064. ([ESI hot paper](#))
- [12] **Lian, J.**, & Hui, G. (2024). **Human evolutionary optimization algorithm.** *Expert Systems with Applications*, 241, 122638. ([ESI hot paper](#))
- [13] **Lian, J.**, Ma, L., Wu, X., Zhu, T., Liu, Q., Sun, Y., ... & Lou, X. (2023). **Visualized pattern recognition optimization for apple mechanical damage by laser relaxation spectroscopy.** *International Journal of Food Properties*, 26(1), 1566-1578.

Patents

A surface damage detection system and method for the white pear (First-named Inventor)

Patent Application No.: CN202211264437.7 | Patent Publication No.: CN115656103A

A detecting device and a method for Angelica tablets (First-named Inventor)

Patent Application No.: CN202310446979.4 | Patent Publication No.: CN116465862B

A laboratory safety monitoring method based on sensor array (First-named Inventor)

Patent Application No.: CN202210861807.9 | Patent Publication No.: CN115239130A

An equipment and method for identifying the origin of prickly ash (First-named Inventor)

Patent Application No.: CN202311647786.1 | Patent Publication No.: CN117849289A

Research Experience

Geometry-Aware Diffusion for 3D Human Generation

Research Assistant at Nanjing University

Feb 2025 – Present

Advisor: Prof. Hao Zhu & Prof. Xun Cao

I worked with Prof. Hao Zhu and Prof. Xun Cao at Nanjing University to advance SMPL-guided, projection-aware diffusion methods for high-fidelity 3D human generation, building on the TRELLIS framework.

- Wrote a book titled **Generative Foundation Models** and published it on **Amazon** [6].
- Built a geometry-conditioned, projection-aware 3D human pipeline by extending TRELLIS with SMPL/SMPL-X priors, sparse-latent DiT diffusion, and differentiable rendering.
- Designed a loss suite with perspective & weak-perspective cameras.
- Implemented SMPL-guided pose/shape conditioning and learnable kinematic offsets to improve geometric fidelity on in-the-wild poses.

An In-depth Study of Intelligent Optimization Algorithm

Research Assistant at Wenzhou University

Oct 2023 – Present

Advisor: Prof. Huiling Chen

I worked with Prof. Chen and Dr. Ali Asghar Heidari from the National University of Singapore (NUS) to explore innovative metaheuristic algorithms.

- Explored Intelligent Optimization Algorithm's applications and developed natural heuristic optimization algorithms.
- Inspired by the behavioral habits of domesticated parrots, developing a novel heuristic algorithmic framework, Parrot Optimizer, to effectively solve medical problems, including medical diagnosis and medical image segmentation.
- Proposed an Education Competition Optimizer to introduce proximity optimization and roulette optimization architectures, effectively solving real-world engineering design problems.
- Conducted the whole research, wrote the paper, and revised the manuscript for submission. Published several high-quality papers [3, 4, 7, 8, 10, 11].

Agricultural Product Quality Detection Method Research based on Algorithm Optimization

By Key Laboratory of Forestry Intelligent Monitoring and Information Technology of Zhejiang Province

Research Team Leader at Zhejiang A&F University

Oct 2021 – May 2025

Advisor: Prof. Guohua Hui

As the project leader, I designed the entire experimental procedure, using electronic nose technology and spectroscopic techniques to assess the surface texture, color, and taste of agricultural products. This approach significantly improved the quality analysis of these products. I developed an ultra-early mold detection system for Chinese herbal medicines that takes only 2 seconds and achieves 98% accuracy.

- Spearheaded the development of a deep learning architecture, incorporating an advanced Residual Neural Network and Temporal Convolutional Neural Network, among other cutting-edge models, to effectively tackle the challenges associated with quality detection.
- Leveraged visualization technology and a proprietary intelligent optimization algorithm, refined the neural network structure, achieving an impressive 98% accuracy rate in detecting mildew.
- Coordinated with team members to create a rapid mold detection system for Chinese herbal medicines, capable of identifying mold presence in just a few seconds.
- Contributed to the scientific community by publishing two papers in the International Journal of Food Properties [13] and Cogent Food & Agriculture [9].

Research on Risk Assessment System for Banking Investment Strategies

Research Assistant at Peking University and Peking Big Data Research Institute

July 2023 – Aug 2023

Advisor: Prof. Yunhuai Liu

I worked with the Beijing Big Data Institute to identify and analyze the management structures of China's four largest banks, as well as several smaller banks.

- Utilized enterprise risk data and developed a decision tree-based model for assessing enterprise risks, which significantly aids banks in evaluating the investment risks associated with different enterprises.
- Contributed to the examination of the effects of various assessment models and optimization strategies on outcome efficacy.

Work Experience

Kavi Global Co., Ltd, United States

AI Chatbot Intern

Sep 2025 – Present

Developed and deployed AI-powered website chatbots to improve user engagement and automate information delivery.

- Built and integrated LLM-based chatbots into client-facing websites, enabling natural language interaction for

- customer support, FAQs, and service guidance.
- Designed conversation flows and prompt structures to improve response relevance, robustness, and user experience across diverse user queries.
- Implemented retrieval-based mechanisms to ground chatbot responses in website content and internal documents, reducing hallucinations and improving accuracy.
- Collaborated with frontend and backend engineers to integrate the chatbot with existing web infrastructure, ensuring reliability and responsiveness.
- Monitored user interaction logs and feedback to iteratively refine chatbot behavior and improve overall engagement metrics.

Wenzhou Buyi Pharmacy Co., Ltd, China

Chief Analytics Officer (CAO)

Jan 2025 –Present

Leading data-driven transformation and AI integration initiatives at a **TOP 100 national pharmacy retailer**, bridging operations research, advanced analytics, and generative AI to optimize retail performance.

- Conducted in-depth field research across retail locations and internal departments, mapping operational workflows and identifying high-impact opportunities for AI-enabled efficiency gains and pricing optimization.
- Applied operations research methodologies and advanced analytics to evaluate retail performance, including pricing strategy analysis, demand pattern recognition, and customer segmentation, translating findings into actionable business insights.
- Designed and proposed LLM-powered solutions for workflow automation, including intelligent inventory monitoring, AI-assisted reporting systems, and natural language interfaces for operational decision support.
- Developed strategic recommendations integrating traditional quantitative optimization with generative AI capabilities, targeting improvements in pricing coordination, inventory management, and omnichannel customer engagement.
- Partnered with senior leadership to communicate analytical findings and AI roadmaps through executive presentations, enabling data-informed strategic planning and investment decisions.

Hangzhou Bossway Testing Technology, China

Co-Founder and General Manager

Oct 2022 – June 2024

The company's innovative Chinese herbal medicine mold monitoring system garnered significant attention, being featured in interviews by three national media outlets. On its debut day, the news reached a broad audience, with over 100,000 shares across various online platforms.

- Developed business strategies for providing testing services for assessing the quality of mildewed agricultural products.
- Founded the company and secured investment from the market, resulting in a total profit of three million RMB.
- Established the service, sales, and marketing departments, and fostered strong collaborations with research groups and agricultural companies to demonstrate our commitment to enhancing product quality across the industry.
- Acquired startup company management skills, such as taxation and data analysis for commercial purposes and improved my communication and business skills.

Shenzhen Tenfong Technology Co., Ltd, China

Software Department Intern

Aug 2023 –Sep 2023

Interned at a leading CAE software company founded by Chen Shiyi, Fellow of the American Physical Society, Member of the Chinese Academy of Sciences, and former President of Peking University. The company specializes in high-end computer-aided engineering software and digital twin technology. My work focused on integrating optimization algorithms into physical simulation platforms.

- Investigated the theoretical interface between physics-based simulation models and optimization algorithms, enabling the integration of optimization modules into the company's CAE platform to support efficient engineering design workflows.
- Developed and implemented optimization algorithms that empower engineers and developers to automate and accelerate model design and parameter tuning within simulation environments.
- Co-authored a research paper published in Expert Systems with Applications [12], recognized as an ESI Top 0.1% Hot Paper, demonstrating novel applications of optimization methodologies in simulation-driven engineering design.

Research Fund

1. National College Students Innovation and Entrepreneurship Training, 2023-2024, Completed

Grant No: 202310341080X

Topic: Research on early mold detection method of Chinese herbal medicine based on the algorithm optimization of multi-AI collaborative model

2. College Student Research Programme of Zhejiang Province, 2023-2024, Completed

Grant No.2023R412012

Topic: Construction of visualized AI technology system and its application in quality inspection of Chinese herbal medicines

Reviewer for Scientific Journals

1. ISPRS Journal of Photogrammetry and Remote Sensing (IF=12.2)	2026.02
2. BioData Mining (IF=6.1)	2026.02
3. Swarm and Evolutionary Computation (IF=8.5)	2025.11
4. Knowledge-Based Systems (IF=7.6)	2025.11
5. Journal of Advanced Research (IF=13.0)	2025.10
6. Applied Soft Computing (IF=7.2)	2025.10
7. Smart agricultural technology (IF=5.7)	2025.09
8. Signal, Image and Video Processing (IF=2.1)	2025.09
9. Engineering Applications of Artificial Intelligence (IF=8.0)	2025.09
10. Automated Software Engineering (IF=3.1)	2025.08
11. Annals of Mathematics and Artificial Intelligence (IF=1.0)	2025.03
12. Computers in Biology and Medicine (IF=6.3)	2025.02
13. The Journal of Big Data (IF=6.4)	2024.12
14. The Journal of Computation Design and Engineering (IF=6.1)	2024.12
15. Journal of Supercomputing (IF=2.7)	2024.11
16. Cluster Computing (IF=4.1)	2023.12

Honors & Awards

- **Outstanding Undergraduate Thesis**, Zhejiang A&F University 2025
- **Gold Medal**, 19th "Challenge Cup" Extracurricular Academic Science and Technology Works Competition of College Students in Zhejiang Province 2025
- **TOP 0.2% in China**, National Scholarship 2024
- **Outstanding advisor**, "Huashu Cup" International Mathematical Contest in Modeling 2024
- **Top Prize**, Zhejiang A&F University "Donghu Cup" Extracurricular Academic Science and Technology Works Competition 2023/24
- **Academic advisor**, United States (International) Collegiate Mathematical Contest in Modeling 2023/24
- **Second Prize**, 2023 National Service Outsourcing Venture Competition 2023
- **Silver Medal**, 18th "Challenge Cup" Extracurricular Academic Science and Technology Works Competition of College Students in Zhejiang Province 2023
- **Honorable Mention**, United States (International) Collegiate Mathematical Contest in Modeling 2022/23
- **First Prize**, Zhejiang A&F University Mathematical Contest in Modeling 2022/23
- **Silver Medal**, 13th "Challenge Cup" Business Plan Competition of College Students in Zhejiang Province 2022
- **First prize**, The Second National Big Data Challenge Competition of College Students 2022
- **Silver Medal**, The first National University Students Olympic Mathematics Competition (mathematics) 2022

Skills

Programming Languages: Python, MATLAB, C/C++, SQL, R, SPSS, Docker, Gurobi, Hadoop, LaTeX.

Certificates: National Ministry of Industry and Information Technology mathematical modeling talent pool member, Intermediate Chinese Cook, Red Cross Ambulance Member

Interests: Cooking, Fitness, Free Combat, Basketball, Hosting, Speeches, Operating short video platforms, Operating AI science popularization public accounts (with over tens of thousands of followers)