Meng'en Qin

Kaifeng, Henan, China

(+86) 176-3384-6509 | mengenching@gmail.com | mason-ching.github.io | mason-ching | mason-ching | Mason Ching

"Though the road is endless where it winds and wends, I will seek my way up and down, to the journey's end."

Summary

Hi, I'm Meng'en Qin, a statistics graduate from Henan University. My research journey began at Henan Engineering Research Center for Artificial Intelligence Theory and Algorithms (AITA), where I was fortunate to work with Prof. Xiaohui Yang and discovered a strong interest in 2D vision tasks, diffusion models, and multi-modal LLMs.

Courrently, I'm focusing on the isotropic issue in Gaussian angle representation of oriented 2D/3D objects, self-evolution and self-distillation in the diffusion sampling, masked diffusion models for long video reasoning. For more information, please visit my homepage.

I am now looking for research internships, and also strongly determined to apply for a PhD program in Spring/Fall 2026.

Education

Henan University (HENU) *Kaifeng, China*

B.S. in Mathematics and Statistics *Sep 2021 - Jun 2025*

- Undergraduate thesis: Significance and Stability Analysis of Gene-Environment Interaction

Experience

Henan Engineering Research Center for Artificial Intelligence Theory and Algorithms *Henan, China*

Research Intern *Nov 2023 - Jun 2025*

- Deep learning and its interdisciplinary applications.

Honors & Awards

Nov 2023	**First Prize**, China Undergraduate Mathematical Contest in Modeling	*Henan, China*
Aug 2023	**Second Prize (Top 0.5% nationwide)**, National College Student Statistical Modeling Competition	*China*
Aug 2023	**Third Prize**, National College Students Social Practice and Science Contest on Energy Saving & Emission Reduction	*China*
Mar 2023	**Third Prize**, The Chinese Mathematics Competitions for College Students (Mathematics Category)	*Henan, China*

Publications

Journal

A^3-FPN: Asymptotic Content-Aware Pyramid Attention Network for Dense Visual Prediction *Under review in TCSVT*

Meng'en Qin, Yu Song, Quanling Zhao, Yinchen Liu, Mingxuan Cui, Zihao Liu, Xiaohui Yang† *2025*

- In this work, we identify three critical issues: information loss, context-agnostic sampling, and pattern inconsistency in existing multi-scale feature fusion networks and operations. To tackle these issues, this paper proposes Asymptotic Content-Aware Pyramid Attention Network (A^3-FPN) for dense visual prediction tasks.
- Additionally, I am now extending this method to fuse hierarchical vision and language features in vision-language models.

StomaD²: An All-in-One System for Intelligent Stomatal Phenotype Analysis via Diffusion-Based Restoration Detection Network *Under review in New Phytol.*

Quanling Zhao*, Meng'en Qin*, Yanfeng Sun*, Jiahang Zhang, Lichao Peng, Han Qiao, Chenyang Du, Yuankai Chang, Yuan Miao†, Xiaohui Yang† *2025*

- StomaD² is a user-friendly and easy-to-operate all-in-one system that supports nondestructive, in-field large-scale stomatal imaging and enables real-time dynamic analysis of stomatal phenotypes (density, conductance, etc.).

OS-MSWGBM: Intelligent Analysis of Organic Synthesis Based on Multiscale Subtraction Weighted Network and LightGBM *MATCH Commun. Math. Comput. Chem.*

Lanfeng Wang*, Yanhui Guo*, Zelin Zhang, Meng'en Qin, Zixin Li, Xiaoli Sun, Xiaohui Yang† *2025*

- In this paper, we explore the three-dimensional and topological descriptors of cross-coupling reactions based on the molecular stick-and-ball model and persistent homology analysis, respectively. On this basis, a weighted light CNN with multi-scale subtraction (OS-MSW) is proposed to extract the deep abstract features of the input descriptors, and the extracted features are applied to LightGBM for yield prediction, thus constructing a highly efficient hybrid model, OS-MSWGBM.

OCS-TGBM: Intelligent Analysis of Organic Chemical Synthesis Based on Topological Data Analysis and LightGBM *MATCH Commun. Math. Comput. Chem.*

Yanhui Guo*, Lichao Peng*, Zixin Li, Meng'en Qin, Xue Jiao, Yun Chai and Xiaohui Yang† *2024*

- This work proposes OCS-TGBM, an intelligent organic chemical synthesis analysis model, which combines topological data analysis (TDA) and Light Gradient Boosting Machine (LightGBM). OCS-TGBM aims at deeply exploring the internal relationship between reaction conditions and yield, and obtaining high-yield reaction conditions and combinations.

Preprint

IB-AdCSCNet: Adaptive Convolutional Sparse Coding Network Driven by Information Bottleneck *arXiv:2405.14192*

He Zou, Meng'en Qin, Yu Song, Xiaohui Yang† *2024*

- IB-AdCSCNet integrates the information bottleneck trade-off strategy into deep networks, and dynamically adjusts the trade-off hyperparameter λ by FISTA algorithm. By optimizing the compressive excitation loss induced by IB principle, IB-AdCSCNet achieves an optimal balance between compression and fitting at a global level, approximating the globally optimal representation feature.

Patents

Coal and Gangue Intelligent Recognition Based on Selective State Space Equation *CN119048740A*

Xiaohui Yang, Meng'en Qin, Yanni Zhang, Zheng Ge, Yunfei Bai *2025*

- In the invention, we present an intelligent gangue recognition method based on the selective state space modeling, implemented within a lightweight deep learning network.

Intelligent Analysis Method of Stomatal Phenotype of Crop Non-destructive Leaves Based on HDIoU *CN118691972A*

Lichao Peng, Meng'en Qin, Xiaohui Yang, Chen Miao, Yanfeng Sun *2024*

- In this invention, we design a triphasic Hellinger Distance based Intersection over Union (HDIoU) for oriented bounding boxes, and apply it to train YOLOv8-OBB on non-destructive leaf stomatal image dataset. HDIoU models each oriented bounding box as a 2D normal distribution and computes the triphasic Hellinger distance between predicted and ground-truth distributions as the box regression loss.

Multi-modal Data Integration Based on Convolutional Sparse Coding and Optimal Transport *CN117763499B*

Xiaohui Yang, Jingjing Li, Yuan Feng, Lichao Peng, Yu Song, Meng'en Qin *2024*

- We utilize convolutional sparse coding to collaboratively learn the latent representations of two multi-modal features, thereby addressing the interpretability issues commonly associated with neural networks. To better capture the data distribution when generating the latent space, optimal transport theory is employed to mitigate the issue of non-overlapping between the real and generated distributions.

Software

RGxEStat *R*

Meng'en Qin, Xiaohui Yang, Yanfeng Sun, Chen Miao *2024*

- RGxEStat is a user-friendly R GUI package designed for statistical analysis of genotype-by-environment (G×E) interaction. Additionally, RGxEStat has been packaged as a standalone desktop application using Electron, and you can conveniently download the Windows release here.

Vehicle Trajectory Analysis Based on Path Planning *Matlab*

Meng'en Qin *2022*

- This software integrates functionalities such as speed calculation, road travel time analysis, traffic flow estimation, congestion visualization and so on, which are suitable for urban traffic management, intelligent transportation systems, and autonomous driving path research. It also serves as my final coursework for MATLAB Course at School of Mathematics and Statistics, Henan University.

Projects

Development and Deployment of Audit Large Language Model *Henan, China*

AITA and Henan Provincial Audit Department *Dec 2024 - Apr 2025*

- In this project, I worked with Lutong Zhang and Haonan Zhang to finish the audit knowledge base construction for RAG and training data curation for PEFT.

Investigation of Key Regulatory Factors and Molecular Mechanisms of Peanut Stomatal Phenotypes *China*

AITA and State Key Laboratory of Crop Stress Adaptation and Improvement *Apr 2024 - Nov 2024*

- This project aims to collect and quantify stomatal phenotypes from live field-grown peanut plants using an intelligent recognition system. By integrating phenotypic, genotypic and environmental data, we can perform Genome-Wide Association Study (GWAS) and Genotype-by-Environment Interaction Analysis (G×E) to identify key and high-stable regulatory genes.
- In this project, I collaborated with Quanling Zhao and Prof. Xiaohui Yang from AITA, as well as Dr. Chenyang Du and Prof. Chen Miao from State Key Laboratory of Crop Stress Adaptation and Improvement, to finish these works: RGxEStat, StomaD^2 and HDIoU.

Intelligent Modeling of Organic Chemical Synthesis Based on Topological Data Analysis and Machine Learning

Henan, China

AITA

Nov 2023 - Mar 2024

- In this project, we utilized topological data analysis, ensemble learning (tree-based models), convolutional neural networks and multi-scale attention to build an intelligent system for yield analysis and prediction of organic synthesis.

Extracurricular Activities

Stellar Corps, Young Sprout Association

Yuqing Middle School, Guizhou, China

Vice Captain and Teaching Volunteer

Jan 2023 - Dec 2024

- I joined Young Sprout Association of Henan University and served as vice captain of Stellar Corps (chapter for high school students). Our team brought together members from diverse discipline backgrounds, including medicine, chemistry, physics, education, business and statistics. We collaborated with Shanghai Lingqing Philanthropy Development Center and co-launched a long-term volunteer project with Yuqing Middle School in Baini Town, Yuqing County, Guizhou Province. We spent most vacations (winter, summer and national vacations) on volunteer teaching activities, student mentoring, and course design. Our team has created a series of engaging extracurricular programs that integrated academic concepts with real-world challenges.
- Hope these efforts can inspire students to decode STEM principles through gamified challenges; discover cultural wisdom within real-world contexts; develop critical thinking via cross-disciplinary exploration. Moverover, this is not merely a top-down transmission of knowledge, but a two-way learning bridge that fosters mutual growth between them and teaching volunteers across generations. The project has been sustained for over two years, and I truly hope it will continue to grow and benefit more people in the years to come.

Debate Team of School of Mathematics and Statistics, Henan University

Kaifeng, China

Fourth Debater

Oct 2021 - Dec 2022

- I served as the fourth debater in the debate team of School of Mathematics and Statistics. As the closing speaker, I was responsible for delivering final rebuttals, synthesizing arguments, and constructing impactful conclusions. In addition to competing, I took on a mentoring role, helping train recruits by organizing internal workshops and preparing research materials for incoming debaters.