Zhiwen Yang

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Education

YangZhou University, School of Mathematical Sciences, Tianyuan Class *Sep. 2022 – Jun. 2026*
BS in Mathematics and Applied Mathematics (Education)
Coursework: Mathematical Analysis; Probability and Statistics; Abstract Algebra; Numerical Analysis;
Differential Geometry; Mathematical Modeling; Complex Variable Functions; Real Variable Function.

Westlake University, China *Apr. 2025 – Present*
Research Student, Laboratory for Proteome Complexity Science, School of Life Sciences

Zhejiang University, Data Visualization, China *Jun. 2025 – Aug. 2025*
SDG Global Summer School, College of Computer Science and Technology   Full Scholarship Recipient

Reseaerch Interests

Machine Learning, Deep Learning, Computational Biology, Dynamic population, Medical Image Segmentation

Patent and Publications

1. Z. Li, **Z. Yang**, Y. Chen, T. Guo, "AutoPIM: A Autoencoder for MNAR Imputation in Proteomics Data", ***Nature Communications***, In preparation. (JCR Q1, IF: 16.6)

2. **Z. Yang**, L. Zhang, "Microplastic Transport and Ecological Impacts in the Yangtze River Estuary: A Coupled Modeling Approach", ***Ecology Letters***, In preparation. (JCR Q1, IF: 11.3)

3. **Z. Yang**, X. Guo, and J. Huang, "Modeling the relationship between maternal health and infant behavioral characteristics based on machine learning", ***PLOS ONE***, vol.19, no.8, e0307332, 2024. (JCR Q1, IF: 3.7)

4. Z. Fang, **Z. Yang**, X. Zhang, and Q. Han, "MedSegKAN: A superior medical image segmentation method based on the improved KAN structure", in *Proceedings of the 16th International Conference on Graphics and Image Processing (**ICGIP**)*, 2024. (EI & Scopus Indexed)

5. **Z. Yang** and L. Zhang, "Coupled algorithm for investigating microplastics' impact on fish using unstructured grids", *Chinese **Patent** CN119558222A*, 2025.

Honors and Awards

Science Pioneer (<0.01%), Yangzhou University *Nov 2024*
First Prize, 10th National College Students Statistical Modeling Competition *Jul 2024*
Honorable Mention, 2024 COMAP's Mathematical Contest in Modeling (MCM) *May 2024*
National Second Prize (Top 1.5%), Contemporary Undergraduate Mathematical Contest in Modeling *Sep 2023*
Third Prize, 36th Shanghai Adolescents Science and Technology Innovation Contest *Apr 2021*
Outstanding Student (Top 1%), Department of Mathematics, Shanghai University *Dec 2020*

Research Grants

National Undergraduate Training Program for Innovation, Total Award: 7,000 RMB, Role: **Project Leader**,
Excellent Project. *May 2024 – May 2025*

Academic Activities

President, Mathematical Modeling Association, Yangzhou University *Sep 2024 - Sep 2025*
Attendee, *ICGIP 2024* (Presented MedSegKAN) *Nov 2024*

Research Experience

Research Intern – Westlake University, CN *Mar 2025 – Present*
Project: Missing Value Imputation *Supervisor: Prof. Tiannan Guo*

- Developed an innovative imputation model named AutoPIM for missing values in proteomics data by **Pytorch**, combining a Autoencoder (AE) with a missingness pattern prediction network to address MNAR data.
- Trained and evaluated the model on both simulated and real proteomics data, comparing it against multiple baseline models to demonstrate its superior performance.
- *Resulting Publication:* Z. Li, **Z. Yang**, et al., "AutoPIM...", ***Nature Communications***, in prep.

Selected Projects

Advection-diffusion coupling algorithm for studying the impact of *Jan 2023 - Present*
microplastics on fish based on unstructured grids *Supervisor: Prof. Lai Zhang*

- Used Matlab to construct unstructured grids, which consisted of **17,656** nodes and **99,948** connection information.
- Developed an advection-diffusion coupling algorithm to simulate **PDE** equations, demonstrating the dynamic migration patterns of microplastics in the marine environment.
- Improved the Logistic model and the **Lotka-Volterra** model, accurately depicting the dynamic changes in the population sizes of predator and prey fish schools.

Machine learning methods and applications on biostatistics data *Jul 2023 - Aug 2024*
Supervisor:Jianfei Huang

- Designed a hybrid model combining Random Forest and MLP to predict infant behavior using maternal psychological data, achieving an AUC value of **0.97** and improving the validation set performance by over **15%**.
- Applied the **Fuzzy C Means clustering** algorithm to grade the infant sleep quality and developed a regression model to deeply explore the relationship between maternal anxiety and infants' contradictory behaviors.

Medical Image Segmentation Method Based on Deep Learning *Jan 2024 - Jan 2025*

- Conduct research on the limited accuracy of the traditional **KAN** architecture in medical image segmentation.
- Employ Gaussian smoothing preprocessing, boundary loss functions and regularization strategies to reduce segmentation errors; incorporate the **ECA Attention Module** to enhance feature focusing capabilities.
- Achieved a Dice score of **92.89%** in medical image segmentation tasks, highlighting the high efficiency of the method.

Skills

Languages: English (IELTS: 6.5; Listening: 7.0; Reading: 7.0); Chinese (Native)

Programming: Python (Fluent), Matlab (Excellent), SPSS, R, LaTeX, Git/GitHub, Visual Studio Code

Interests: Music, Movie, Swimming. Driving... (curious about everything)