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

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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, "Coupled Modeling Reveals Spatiotemporal Microplastic Dynamics and Ecological Stress in the Yangtze River Estuary", ***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 microplastics on fish based on unstructured grids _Jan 2023 - Present_
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)