

Yang Zhongyu

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Lanzhou University, No. 222 Tianshui South Road, Chengguan District, Langzhou City, Gansu Province, China

Education Background

Lanzhou University (Project 985) Lanzhou, China	Sept. 2021 - Present
<i>Bachelor</i> of Mathematics and Applied Mathematics in School of Mathematics and Statistics (Main major)	
• Relevant courses: Mathematical Analysis, Advanced Algebra, C++ Programming, Probability Theory, Ordinary Differential Equations, Numerical Analysis, Microeconomics, Differential Geometry, Functional Analysis, etc.	
Administrative Management (Minor major)	Sept. 2023 - Present

Publications

- Mengying Su, **Zhongyu Yang***, Shujaat Abbas, et al. Toward Enhancing Environment Quality in OECD Countries: Role of Municipal Waste, Renewable Energy, Environment Innovation and Environmental Policy[J]. *Renewable energy*. 2023, 211: 975-984. (Second author & Corresponding author, SCI Q1)
- Zhongyu Yang**, Ziyue Xue. Analysis and Forecast of GDP of Gansu Province based on ARIMA Model. *Chinese Market*. 2023. (First author, Chinese core journal)
- Patent: **Zhongyu Yang**. A mathematics teaching system based on virtual reality. (CN116312091A)
- Computer Software Copyright: **Zhongyu Yang**. Green and Low-carbon Integrated Monitoring Software. (2023SR1355487)

Working paper

- Green Effect of Energy Transition Policy: A quasi-natural Experiment Based on New Energy Demonstration Cities(Under Review,Corresponding author)
- Item Recommendation Algorithm Based on Knowledge Graph with Strongly and Weakly Connected Attention Mechanisms (joint with Xuanming Jiang, Fuqing Wang and Wei Su)
- Machine learning based vibrator bar recognition system (joint with Xuanming Jiang, Dingyu Nie)

Research Experiences

UNet–Centric MambaMorph: A Comprehensive Visual Mamba Framework Enhanced with Cross–Scan and Semi–Supervised

Learning for Medical Segmentation

Project Leader Jan. 2024 - Present

Fundamental Research Funds for Central Universities Research Capacity Improvement Project (Highland Barley Plan)

- Integrated the UNet and Mamba architectures to enhance the global context understanding of medical images and optimize segmentation accuracy through the novel Cross-Scan module;
- Introduced a semi-supervised learning strategy to address the challenge of limited labeled data;
- Leveraged data augmentation and pseudo-labeling techniques to enhance the learning process of unlabeled data and significantly enhance the model's generalization capabilities.

FPGA–Based AI Doctor: Deep Learning–Based Clinical Target Delineation for Cervical Cancer

Project Leader Mar. 2024 - Present

National College Student Innovation and Entrepreneurship Training Program

- Proposed a deep learning model based on FPGA to enhance the speed and accuracy of medical imaging data processing;
- Enhanced the traditional U-Net architecture and harnessed the parallel processing capabilities of FPGA to achieve

remarkable advancements in medical image segmentation;

- Integrated the attention mechanism and residual learning strategy into the model, elevating its capacity to identify subtle features in medical images.

A Generative Model for Chinese Paintings Incorporating Textual Cues and Chinese Character Structures

Project Leader

May 2023 - Present

- Constructed an innovative cross-modal art generation framework, by leveraging Text-to-Image technology to directly map the aesthetic features of Chinese characters into visual elements;
- Integrated the single-step diffusion model with CycleGAN to achieve textual cue-driven visual information fusion of Chinese characters;
- Developed deep learning models incorporating adversarial learning and regularization techniques, enabling accurate mapping of the strokes of Chinese characters to the layout of painting elements.

Recommendation Algorithm Based on Knowledge Graph and Strong-Weak Connection Attention Mechanism

Main Researcher

May 2023-Present

Hui-Chun Chin and Tsung-Dao Lee Chinese Undergraduate Research Endowment, CURE

- Improved existing knowledge graph-based recommendation algorithm by considering subtle user group similarities and fully utilizing indirect relationships within the knowledge graph;
- Utilized attention mechanism-based graph convolutional networks to extract structural information and user group directional information from graph data;
- Improved significantly baseline algorithms in public datasets with clearer user preferences in AB testing, enhanced the accuracy and diversity of recommendations, and aligned the algorithms with the actual structure of modern social networks.

Tropical Linear Representation of Involute Chinese Monoids

Project Leader

Mar. 2023 - Present

National College Student Innovation and Entrepreneurship Training Program

- Introduced free monoids and rewriting systems, and simplified the Chinese monoids into an algorithm that can be represented by simple methods, i.e. $\langle a_1, \dots, a_n \rangle$;
- Introduced tropical linear representation, and defined the tropical linear representation for the Chinese monoids of involution operations;
- Explored potential distinctive properties compared to the general Chinese monoids, and extended the findings to the general case.

Global Urban Sustainable Development Strategies and Empirical Research

Main Researcher

May 2022 - Present

The Ministry of Science and Higher Education of the Russian Federation (Ural Federal University Program of Development within the Priority-2030 Program)

- Utilized time series analysis and combined statistics with econometrics to accurately capture the long-term equilibrium relationship and short-term dynamic adjustment mechanism of urban green policies;
- Conducted a cross-scale assessment of green development policies in various countries and regions, and performed a quantitative assessment of the spatial heterogeneity effects of urban green development policies;
- Carried out pattern recognition and predictive analysis on the key influencing factors of urban green development using machine learning and data mining.

Prediction of Steel Cold Rolling Performance Based on Machine Learning

Project Leader

Mar. 2022 - Mar. 2023

College Student Innovation and Entrepreneurship Training Program

- Constructed a mechanistic model based on a real-world dataset, and processed over 1.8 million valid data;
- Utilized six types of intelligent algorithms for machine learning to build models, compared the predicted outcome, adopted the Gradient Boosting Decision Tree (GBDT) algorithm for modelling, and proposed rationalization suggestions.

Internship Experiences

IFLYTEK Co., Ltd.

June 2023 - Aug. 2023

Product Operation Intern of Smart Home Department

- Built statistic models based on the previous week's website user data to perform data analysis, and go live with popular content in the recommendation section;
- Enhanced revenue growth by submitting product content operation design requirements, applying for business exposure opportunities and applying for the deployment of business pop-ups for user touchpoint marketing;
- Conducted product promotion and plan implementation that increased the product activation rate from 9.9% to 68.2% and achieved the product revenue completion rate of over 120%.

Academic Experiences

International Genetically Engineered machine Competition

Apr. 2023 - Present

Advisor of Mathematical Modeling Team

- Built mathematical model for synthetic biological systems for further studies;
- Utilized Python to programmatically analyze experimental data, and derived predictive outcomes, enabling simulation prior to experiments, advancing experimental progress, validating experiments, and elucidating experimental phenomena.

Awards and Scholarships

- International College Mathematical Modeling Competition Meritorious Winner (2023)
- Honorable Award of the American Collegiate Mathematical Contest in Modeling (2023)
- Provincial-level Gold Medal in China College Students' 'Internet+' Innovation and Entrepreneurship Competition (2023)
- Best hardware Winner, Best Target Molecule Nominees & Winner, Best Genome Evolutionary Outcomes Nominees & Winner, Bronze Awards in International Directed Evolution Competition (iDEC) 2023 (2023)
- National First Prize in 2022 National College Student Data Analysis Competition (2022)
- First Prize in the National 2022 Second China University Big Data Challenge (2022)
- National Second Prize in the 12th APMCM Asia-Pacific College Student Mathematical Modeling Competition (2022)

Skills and Languages

Languages: Mandarin (native), Cantonese (native), English (fluent)

Technical skills: Proficient in the use of Microsoft Office (Word, Excel, and PowerPoint), Stata, Python, R.