Yang Zhongyu

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EDUCATION BACKGROUND

Lanzhou University (Project 985) | Lanzhou, China Sept. 2021 - Present
B.S. in Mathematics and Applied Mathematics **(***Main major)*

- *Relevant courses:* Mathematical Analysis, Advanced Algebra, C++ Programming, Probability Theory, Ordinary Differential Equations, Numerical Analysis, Microeconomics, Differential Geometry, Functional Analysis, etc.

B.A. in Administrative Management (Minor major)

The Chinese University of Hongkong, Shenzhen | Shenzhen, China Mar. 2024 - Present
Research Assistant in Laboratory for Intelligent Autonomous Systems (LIAS) at School of Data Science

- *Advisor:* ***Zhang Ruimao***

WORKING PAPER

Machine learning based vibrator bar recognition system

Manuscript in Preparation / Expect to submit to AAAI

Zhongyu Yang* Xuanming Jiang, Fuqing Wang and Wei Su

Item Recommendation Algorithm Based on Knowledge Graph with Strongly and Weakly Connected Attention Mechanisms

Manuscript in Preparation /Expect to submit to IEEE

Zhongyu Yang* Xuanming Jiang, Fuqing Wang and Wei Su

PUBLICATIONS

- Patent: **Zhongyu Yang**. A mathematics teaching system based on virtual reality. (CN116312091A)
- Software Copyright: **Zhongyu Yang**. Fully automatic spatial sound field environment perception system (2024SR0538446)
- Software Copyright: **Zhongyu Yang**. Green and Low-carbon Integrated Monitoring Software. (2023SR1355487)
- 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. (SCI Q1 TOP)
- **Zhongyu Yang**, Ziyue Xue. Analysis and Forecast of GDP of Gansu Province based on ARIMA Model. Chinese Market. 2023. (Chinese Core Journal)
- Zhichao Yu, **Zhongyu Yang***, et al. Green Effect of Energy Transition Policy: A quasi-natural Experiment Based on New Energy Demonstration Cities,Finance Research Letters.https://doi.org/10.1016/j.frl.2024.105669, (SSCI Q1 1/111)

(* means Corresponding author)

RESEARCH EXPERIENCES

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

Project Leader Mar. 2024 - Present

Supervisor: Prof.Wang Xinghua, Lanzhou University

National College Student Innovation and Entrepreneurship Training Program

- Proposed a FPGA-based deep learning algorithm to enhance the speed and accuracy ;
- Enhanced the traditional U-Net architecture and leveraged 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 the overall capacity to identify subtle features in medical images.

UNet-Centric MambaMorph: A Comprehensive Visual Mamba Framework Enhanced with Cross-Scan and

Semi-Supervised Learning for Medical Segmentation

Project Leader Jan. 2024 - Present

Supervisor: Prof.Zhang Wenting, Lanzhou University

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

- Integrated UNet and Mamba architectures to enhance the global context understanding of medical images and optimize segmentation accuracy through a 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, significantly enhancing the model's generalization capabilities.

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

Project Leader May. 2023 - Present

Supervisor: Postdoctoral Yifan Yuan, Heriot-Watt University,UK

- Proposed 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 a novel deep learning algorithm by incorporating adversarial learning and regularization techniques, enabling accurate mapping of the strokes of Chinese characters to the layout of painting elements.

Global Urban Sustainable Development Strategies and Empirical Research

Main Researcher May. 2022 - Present

Supervisor: Prof.Zhang Guoxing, Lanzhou University

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.

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

Main Researcher Mar. 2023 - May. 2024

Supervisor: Prof.Su Wei, Lanzhou University

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;
- Significantly improved baseline algorithms in public datasets by considering clearer user preferences in AB testing and aligning the algorithms with the actual structure of modern social networks,thereby enhanced the accuracy and diversity of recommendations.

Tropical Linear Representation of Involute Chinese Monoids

Project Leader Mar. 2023 - May. 2024

Supervisor: Prof.Zhang Wenting, Lanzhou University

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 representations;

- 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.

Machine Learning-based Prediction of Steel Cold Rolling Performance

Project Leader Mar. 2022 - May. 2023

Supervisor: Prof.Zhang Wenting, Lanzhou University

College Student Innovation and Entrepreneurship Training Program

- Constructed a mechanistic model based on a real-world dataset that can processe over 1.8 million valid data;
- Implemented and compared six kinds of machine learning algorithms, and finally adopted the Gradient Boosting Decision Tree (GBDT) algorithm for modelling to propose 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 feature popular content in the recommendation section;
- Enhanced revenue growth by submitting design requirements for product content operation, applying for business exposure opportunities and deploying business pop-ups for user touchpoint marketing;
- Conducted product promotion and implemented plans that increased the product activation rate from 9.9% to 68.2% and achieved the product revenue completion rate of over 120%.

Awards and Scholarships

- International College Mathematical Modeling Competition **Meritorious Winner** (2023)**(Top 6%)**
- **Honorable Award** of the American Collegiate Mathematical Contest in Modeling(MCM) (2023)**(Top 25%)**
- Provincial-level Gold Medal in China College Students' 'Internet+' Innovation and Entrepreneurship Competition (2023)**(Top 1%)**
- Best hardware Winner, Best Target Molecule Nominees & Winner, Best Genome Evolutionary Outcomes Nominees & Winner in International Directed Evolution Competition (IDEC 2023) (2023)**(TOP 1%)**
- **National First Prize** in 2022 National College Student Data Analysis Competition (2022)**(Top 3%)**
- **National First Prize** in the National 2022 Second China University Big Data Challenge (2022)**(Top 8%)**

Skills and Languages

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

Technical skills: Python,R,Stata,Latex