PENG, ZIYUE

Faculty of Science and Technology, University of Macau
dc22951@umac.mo
+86 18201590638

Education

University of Macau, Mathematics (Statistics and Data Science), *Junior*

August 2022 - Present

- GPA: 3.53/4.0

Hanyang University, International Summer School, South Korea Jul 2024 – Aug 2024

- Relevant Coursework: Artificial Intelligence, Numerical Methods (Credit-transferrable)

Publications

Squeeze and Excitation: A Weighted Graph Contrastive Learning for Collaborative Filtering Accepted at SIGIR 2025 (Short Paper, Paper ID: 1876)

- **Authors:** Zheyu Chen, Jinfeng Xu, Yutong Wei, **Ziyue Peng**
- **Contribution:** Validation, Writing - review & editing
- Proposed a novel Weighted Graph Contrastive Learning framework (WeightedGCL) integrating a squeeze-and-excitation network (SENet) to dynamically reweight features in perturbed views within graph convolutional networks, enhancing robustness in sparse recommendation scenarios.
- Demonstrated significant accuracy improvements over baselines through extensive experiments on benchmark datasets.

Project Experience

China Construction Bank Fund Management Co., Ltd. (Internship), Quantitative Investment Department Intern May 2024 - June 2024

- During my internship in the quantitative investment field, I explored the core value of factor analysis. By meticulously interpreting complex and key quantitative metrics such as IC mean, annualized returns, group monotonicity, and long-short group returns, I conducted a comprehensive evaluation of numerous potential investment factors. I identified high-quality factors with stable performance, significant returns, and controllable risks, while decisively eliminating underperforming and high-risk factors to avoid redundancy and inefficiency in the portfolio. I compiled detailed factor analysis results and strategy optimization recommendations into high-quality reports, regularly presenting progress and outcomes to my mentor and team, while actively incorporating feedback for continuous improvement.

2025 Mathematical Contest in Modeling (MCM) January 2025

- Forest to Farm: Can Agriculture Coexist with the Wisdom of Nature?

Developed two dynamic models to analyze the transformation of ecosystems during deforestation for agriculture. Constructed the **Ecopulse model** using nonlinear ODEs to simulate interactions among species, chemical usage, and nutrient cycles, solved via **RK45 and BDF** methods. Designed the **PISSE model** to evaluate biodiversity, economic returns (via **time-series integration**), and stability (through **Jacobian eigenvalue analysis**). Applied the models to various scenarios—agricultural seasonality, species reintroduction, and human interventions such as herbicide removal—visualizing outcomes through time-series plots and phase diagrams. Conducted **Latin**

Hypercube Sampling (LHS) to assess sensitivity, revealing stable parameter regions for both ecological and economic indicators.

14th Asia-Pacific Mathematical Contest in Modeling (APMCM) November 2024

- Forecasting and Policy Analysis of the Global and Chinese Pet Industry:

Built a comprehensive forecasting framework to analyze trends in the Chinese and global pet industries. Applied cubic spline interpolation, Pearson correlation, and Lasso regression to identify key factors, and developed a **GM(1,N) grey prediction model** optimized via **genetic algorithms** to forecast pet population trends in China. Constructed panel data across multiple countries, applying **ARIMA** and **Pooled OLS models** to project global pet food demand. Predicted production value and export volume of China's pet food industry using **PCA, linear regression, and Ridge regression**, achieving high accuracy. Assessed the impact of international policy changes through **Bayesian Ridge regression**, incorporating nonlinear feature engineering and exchange rate simulations. Provided strategic insights and methodological innovations applicable to broader market analysis contexts.

5th "Greater Bay Area Cup" Guangdong-Hong Kong-Macao Financial Mathematics Modeling Competition November 2024

- Economic Forecasting of the Greater Bay Area Using Ridge Regression and Principal Component Analysis:

Utilized **Principal Component Analysis (PCA)** for dimensionality reduction to identify key economic factors and applied **Ridge Regression** to quantify their contributions to GDP, highlighting higher education levels and transportation network length. Implemented **SARIMA** for time-series forecasting, integrated with Ridge Regression to project GDP growth over the next 10 years. Conducted comparative analysis of Tokyo and New York Bay Areas, providing data-driven policy recommendations to foster regional economic development.

2024 Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM)

September 2024

- Agricultural Planting Optimization Project Using IBEA Algorithm:

Designed a **multi-objective optimization model** leveraging the **IBEA algorithm** to optimize rural agricultural planting plans, addressing constraints like continuous cropping, legume rotation, and land area. Enhanced planting efficiency with a complementary and exclusion matrix and applied **Monte Carlo simulations** to model market price and crop yield fluctuations, ensuring robustness and adaptability. Delivered a 7-year planting strategy to maximize profit and minimize resource waste, promoting sustainable agricultural development.

2024 Mathematical Contest in Modeling (MCM) February 2024

- Mathematical Modeling on the Impact of Lamprey Sex Ratio Variability on Ecosystems:

Analyzed the ecological effects of lamprey sex ratio changes on ecosystem stability and other species using **the Lotka-Volterra model** and an extended **logistic growth model**. Employed **AHP** and **Agent-Based Modeling** to evaluate the advantages and disadvantages of lamprey sex-switching traits for ecological stability and biodiversity. Proposed insights on the positive ecological impact of dynamic sex ratio changes on competing species, contributing to ecosystem management strategies.

Skills

Technical Skills

- Proficient in programming languages: C, C++, Python, latex, SQL, R, Java, Matlab.
- Experienced with mathematical modeling and statistical analysis.

Languages

- Proficient in English (listening, speaking, reading, and writing).

Compulsory Major Courses

- Compulsory Major Courses Advanced Mathematics, Discrete Mathematics, Probability, Applied Statistics, Mathematical Analysis, Database Systems, Numerical Methods and Computation, Mathematical Modeling, Linear Statistical Analysis, Ordinary Differential Equations, Stochastic Process, OOP and Data Structures, Statistics and Data Science, Data-Driven Sampling Methods, Multivariate Data Analysis, Algorithm Design and Analysis, etc.

Achievements

Academic Honors

- Dean's Honor List, University of Macau 2022, 2023 and 2024

Competitions

- 2025 Mathematical Contest in Modeling (MCM), **Meritorious Winner** 2025
- 14th Asia-Pacific Mathematical Contest in Modeling (APMCM), **First Prize** in the Undergraduate Group 2024
- 5th "Greater Bay Area Cup" Guangdong-Hong Kong-Macao Financial Mathematics Modeling Competition, **First Prize** in the Undergraduate Group and **the Finalist of the Prize for The Creative** 2024
- 2024 Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM), **Second Prize** in the Undergraduate Group 2024

Leadership and Campus Involvement

Secretary-General, Mathematical and Interdisciplinary Modeling Association of University of Macau Macau Students' Union Sep 2024 – Present

- Organized workshops and seminars on modeling topics; managed team operations and collaboration.

Interests

Passionate about mathematics and academic research, enjoy programming, and have self-taught some practical programming languages.

Cheerleading:

- University of Macau CICA Dean's Cup Cheerleading Competition, Fourth Place 2023

Dance:

- 13th "Dancing Beijing" Mass Dance Competition, Youth Group, Second Prize 2018
- 20th Beijing Student Art Festival Dance Performance, Silver Award 2017
- 20th Beijing Dongcheng District Student Art Festival (Group Performance) Dance, Gold Award 2017