Tian, Zhiwen

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Education

Beijing Normal University-Hong Kong Baptist University united international college (UIC) Sept 2022 – June 2026

- **Major BSc in Applied Mathematics GPA: 3.79/4.0 (Rank 2)**
  Relevant Courses: Mathematical Modeling, Real Analysis, Complex Analysis, Mathematical Analysis, Optimization, Numerical Analysis, Ordinary Differential Equations, Partial Differential Equation, Applied Statistics, Probability Theory, Applied Stochastic Process, Time Series for Finance and Macroeconomics, Linear Algebra II, Calculus II
- **Minor in Computer Science and Technology**
  Relevant Courses: Machine Learning, Bayesian Network, Data Mining, Database Management Systems, Data Structure and Algorithm, Design Analysis and Algorithm, Discrete Structure, Python, C Programming

Research Experience

Multiscale Stochastic Modeling of Cell Carcinogenesis Evolution Feb 2025 - Present
Team member (Preparation for FYP, Mentor: Prof.Jianglun Wu)

- Develop a hybrid probabilistic model to study leader-follower cell migration in cancer invasion, combining Markov chains for state transitions (e.g.polarity to dynamic states) and Poisson processes for timing of migration events.
- Employed Bayesian networks to analyze carcinogenic factors including gene mutations, signaling pathways, and environmental factors like FGF10 gradient, using experimental data to calibrate model parameters.
- Identify key causal nodes in carcinogenesis for better diagnostic and therapeutic strategies.
- Explore the impact of cell-cell interactions and chemical cues on metastatic potential through agent-based simulations.
- Proposed preliminary strategies to predict high-risk migration paths and potential therapeutic targets.
- Search for multiple median data to validate model predictions against live-cell imaging data.

A Fluid Mechanical Study of Rotation-induced Traumatic Brain Injury Feb 2025 - Present
Research Assistant (Mentor: Dr.Jiaqi Zhang)

- Read papers on rotation - induced traumatic brain injury to understand cerebrospinal fluid's role
- Analyzed different density ratios and created scatter plots to explore their impact on related factors

Olympic Preparation Technology Research Project: Development of the Third Generation Intelligent Selection Arrow Equipment and System June 2024 – Oct 2024
Research Assistant (Mentor: Dr.Jiaqi Zhang)

- Test archery experiments, and collect datasets (8 parameters) about the arrow's ejection motion
- Use Python for statistical processing of data and Matlab numerical integration for error estimation
- Built regression models to observe their stability
- Created visualizations, analysis how to optimize the selected arrow's machine

Project Experience

2020 U.S. Election Sentiment Analysis , Core Member Nov 2024

- Analyzed 1.7M+ tweets using XLNet and TextBlob, achieving 99.2% data integrity
- Developed a hybrid sentiment model, revealing Biden's balanced vs. Trump's polarized sentiment trends
- Visualized sentiment trends and regional insights, aligning with election outcomes
- Tools: Python, Pandas, Transformer-XLNet, TextBlob

Spam Classification Analysis & Optimization, Sole Author Oct 2024

- Developed and optimized 7 ML models (Gradient Boosting, SVM, Random Forest) for spam detection, achieving 94% accuracy and 0.978 AUC via grid search and 5-fold cross-validation.
- Engineered data preprocessing pipeline including Z-score standardization, outlier removal ($Z > 3$ threshold), and index alignment, improving model robustness.
- Conducted error analysis using PCA visualization, identifying perceptron boundary limitations and decision tree underfitting, proposing feature engineering enhancements.
- Visualized results through ROC curves, confusion matrices, and accuracy trends to quantify model performance differences.

- Tools: Python, Scikit-learn, GridSearchCV, Matplotlib, UCI Spambase Dataset.

Analysis of Regional Medical Resource Allocation in China, Core Member — Aug 2024

- Analyzed 1990–2023 medical institution data across 31 provinces using ARIMA and LSTM, achieving MSE of 235.69 (LSTM) vs. 403.28 (ARIMA) on test sets
- Identified regional disparities via PCA and Moran's I spatial analysis, revealing economic level (GDP) as the dominant factor in resource allocation
- Forecasted 2024–2034 trends showing stable growth in developed regions and persistent gaps in underdeveloped areas, informing national healthcare policy optimization
- Tools: Python, ARIMA, LSTM, PCA, Spatial Lag Model (SLM), KNN-based Moran's I

Sex Ratio Effects on Lamprey Ecosystem Dynamics, Core Member — Feb 2024

- Developed four models (Logistic, Lotka-Volterra, TOPSIS, Parasitic Ecosystem) to analyze gender ratio impacts on population stability.
- Integrated Least Squares with Great Lakes data (2012-2017), achieving 89% growth rate accuracy.
- Conducted phase trajectory analysis, identifying critical sex ratio thresholds for ecosystem equilibrium.
- Tools: MATLAB, Python, AHP, Lotka-Volterra Simulator.

Extracurricular Experience

ITSC department of UIC, Student Assistant — Sept 2024 – Present

- Assisted in daily work, provided auxiliary technical support, engaged in project management

UIC, Peer Mentor — Aud 2023 - June 2024

- Provided academic and life guidance for freshmen to help them adapt to university life
- Established a good teacher-student relationship through regular meetings and activities, which has improved the satisfaction and sense of belonging of new students

UIC W-beE Outdoor Club, Finance Department Officer — Sept 2023 - Aug 2024

- Responsible for the financial management of the club, including budget preparation, sponsorship, fund allocation, and financial reporting
- Successfully organized multiple outdoor activities, ensured the reasonable use of activity funds, and improved the financial transparency of the club

UIC Table Tennis Association, Working Staff — Sept 2022 - June 2023

- Assisted in organizing table tennis competitions and training activities, including venue arrangements and equipment management, and served as a match referee, ensuring the smooth progress of the event

Scholarship and Awards

- *2022-2024* First Class Award & Second Class Award — Dec 2023 & Dec 2024
- *2024* The Third National Data Analysis Competition for College Students, Second Prize — Sept 2024
- *2024* Mathematical Contest in Modeling (MCM), Meritorious Winner (Top 8%) — May 2024
- *2023-2024* Outstanding Peer Mentor Award , UIC — May 2024
- *2024* Bronze Award of Servant Leadership, UIC — May 2024
- *2023* National Undergraduate Mathematical Contest in Modeling, Third Prize — Jan 2024
- *2023* GUANGDONG-HONG KONG-MACAO GREATER BAY AREA MATHEMATICS EDUCATION FORUM volunteer — Jan 2024
- *2022-2023* Guangdong Medical Valley Scholarship — Dec 2023
- *2023* Shenzhen Cup Mathematical Modeling Challenge, Second Prize — Oct 2023
- *2023* Best Chinese Writing Award, UIC — May 2023

Skills and Habbies

Technology Skills: python, Matlab, R , Latex, SPSS, Microsoft Office
Language: English (Medium of Instruction, CET-6), Chinese (Mother Tongue)
Hobbies: Writing, Swimming, Frisbee, Basketball