DUNYAO XUE

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Education

School of Mathematics and Statistics(SMS), Lanzhou University(LZU)   Sep. 2020 - Jun. 2021
Mathematics and Applied Mathematics|First Year Undergraduate

Cuiying Honors College(CHC), Lanzhou University(LZU)   Sep. 2021 - Jun.2024
Mathematics cuiying class|Undergraduate
- Candidate of China's Top-Notch Undergraduate Training Program—Cuiying Honors College
- Overall Score: **90.63**/100.00, Rank: **4**/136 (Top **3%**)
- Related Course
  - Pure Math: Mathematics Analysis(Advanced Calculus) (92,92), Advanced Linear Algebra (91,93), Analytic geometry(93), Abstract Algebra (97), Real Analysis (94), Commutative Algebra (98), Differential Geometry (90), Complex Analysis (90).
  - Statistics: Theory of Probability (91), mathematical statistics(96), Financial Statistics and Data Analysis (94).
  - Applied Math: Numerical Analysis I (98,), Operational Research (93), Mathematical Modeling (98).
  - CS: C Programming (89), C++ Programming (91), Data analysis and visualization (98).

Institute Of Statistics And Big Data(ISBD), Renmin University Of China(RUC)   Sep. 2024 - Until now
Statistics|Ph.D. student
- Supervised by A.P.Cheng Meng

School experience

Sep.2020 - Jun.2021	Class 2, School of Mathematics and Statistics	Position: Study Commissioner
Sep.2020 - Jun.2021	School of Mathematics and Statistics Student Union	Position：Officer
Sep.2020 - Jun.2024	School of Mathematics and Statistics Basketball Team	Position：Player
Sep.2021 - Jun.2024	Cuiying Honors College	Position：Recreation Commissioner
Sep.2021 - Jun.2022	Cuiying Honors College General Affairs Department	Position：Department members

Honors and Awards

Contemporary Undergraduate Mathematical Contest in Modeling, Provincial Grand Prize	Oct. 2022
National College Students Mathematical Competition, Provincial First Prize	Dec. 2021
COMAP's Mathematical Contest in Modeling, Honorable Mention	May. 2022
First-class Scholarship for Outstanding Students, LZU	Dec. 2021
Second-class Scholarship for Outstanding Students, LZU	Dec. 2022
Third-class Scholarship for Outstanding Students, LZU	Dec. 2023
National Academic English Vocabulary Competition , First Prize	May. 2021
National English Competition for College Student , Second Prize	Dec. 2022
2022 National Olympiad in Mathematics, Silver Medal	Jun. 2022
Mathematical Modelling Competition, LZU, First Prize, Ranked 3	Jun. 2022
Merit student recognition in Lanzhou University(2 times)	Dec. 2021/2022

Research Projects

Core-elements Subsampling for Alternating Least Squares.

Minor Revision of JCGS, advised by Prof. Cheng Meng, RUC   *Oct.* 2023 - *Jun.* 2024

- First, we design a novel Core-ALS method for ALS with improved scalability. By selecting core-elements from the full sample and leveraging sparse matrix operations at every regression step, the proposed method efficiently approximates the penalized least squares estimation and fully utilizes the information of ratings matrix.
- Second, we establish the theoretical properties of the proposed method. we provide a relative error bound for the core-elements estimation of ALS. Then, We show the convergence of the Core-ALS method when it satisfies some conditions.
- Moreover,we give the specific computation complexity analysis for two proposed method which have great improvement compared to the original algorithm.

Composition analysis and identification of ancient glass objects based on machine learning methods

Project Leader, advised by Lecturer. Yuanyuan Luo, School of Mathematics and Statistics, LZU   Sep. 2022

- A logistic regression model with sample attributes as independent variables and weathering as dependent variables was constructed, and the regression coefficients of each variable were estimated under the principle of least squares to derive the relationships between weathering and unweathering and type, colour and ornamentation.
- A random forest feature screening model was developed to screen out chemical components with and without weathering, fit the distribution of these components, and obtain statistical patterns of the chemical component content of high potassium glass and lead-barium glass with and without weathering;
- The main chemical components influencing the classification were screened using lasso regression and the subclasses of high potassium and lead-barium glasses were classified using dbscan and kmeans++.
- Awarded the Grand Prize of Contemporary Undergraduate Mathematical Contest in Modeling

Outbreak scale and final size studies of seasonal infectious disease models.

Project member, advised by Lecturer. Liang Zhang, School of Mathematics and Statistics, LZU Apr. 2021 - Dec. 2021

- Numerical simulation and theoretical analysis of the constructed seasonal epidemic model;
- The impact of standard and saturation incidence on the spread of infectious diseases is studied to obtain the scale of outbreaks and final size of seasonal infectious disease models for effective prevention, control and management of epidemics.

Chebyshev polynomial acceleration in the iterative solution of partial differential equations.

Project member, advised by A.P.ZhaoZheng Liang, School of Mathematics and Statistics, LZU Apr. 2021 - Dec. 2021

- Application of Chebyshev polynomials to the PMHSS iterative method for accelerating the solution of complex symmetric linear systems of equations arising from the numerical solution process of time-periodic parabolic partial differential equations.
- Constructs new PMHSS iterative methods for solving a class of linear systems with a special two-by-two block structure arising from PDE constrained optimal control problems.
- Consider using the Chebyshev polynomial to further increase its rate of convergence.

Skills

- Coding : PYTHON(advanced), R/C++/MATLAB(intermediate)
- Language : Mandarin(native), English, CET6: 542