Yuchen Ge

Oxford, United Kingdom — lina4506@ox.ac.uk — (44) 7421801229 — https://yuchenge-am.github.io/

EDUCATION

University of Oxford Oxford, UK

MSc in Mathematics and Foundations of Computer Science Shandong University Oct 2023 - Oct 2024 (Expected) Jinan, China

BSc (Hons) in Mathematics and Applied Mathematics, GPA: 3.98 out of 4.00

Sep 2019 - Jun 2023

HONORS AND AWARDS

Shandong University President's Award (25 out of 10265)

China National Scholarship

2022 - 2023

2019 - 2022

Shandong University Advanced Individual in Innovation and Entrepreneurship 2019 - 2020

RESEARCH WORK

Ge, Y., Ortmann, J., Rei, W. (2023+) "Gröbner and Graver Bases for Calculating Opportunity Cost Matrices." [Paper Link] Ge, Y., Liu, K., et al. (2022) "Breast Cancer Classification Based on Various CNNs and Classifiers." [Paper Link

WORK & INDUSTRY COLLABORATIONS

Peking University - Algebraic Combinatorics

Beijing, China July 2023 - Present

Research Assistant, Advisor: Prof. Guoliang Wang, Beijing Institute of Technology

• Transformed the non-e-positivity problem to number theory problems

• Aimed to study the non-e-positivity of general Spider Graphs

Semitronix - Non-convergence Problem for EDA

Data Scientist, Advisor: Dr. Christine Tan, Vice President, Semitronix Corp.

Hangzhou, China Sep 2022 - Nov 2022

• Self-studied research literature in Chemical Mechanical Polishing process and FFT/IFFT techniques

• Invited PhD students in THU to form a research group

• Optimized the algorithm by adjusting the iteration equation and proposing the matrix normalization technique

PROJECTS

Observational Study with Multi-valued Treatment

Advisor: Prof. Siyu Heng

New York University

Jul 2023 - Present

- Aimed to study the observational study with multi-valued treatment
- Designed new test statistic for general observational study

Limiting Capacity of Finite State Channels

Advisor: Prof. Jun Chen, Member, IEEE

McMaster University

Jul 2023 - Present

- $\bullet\,$ Aimed to study the limiting capacity of finite state channels
- Designed new computing algorithms for the limiting capacity of finite state channels

Algebra for Machine Learning and Stochastic Optimization [Paper Link]

Advisor: Prof. Janosch Ortmann, Prof. Walter Rei

Université du Québec à Montréal Jul 2022 - Present

- $\bullet \ \ {\rm Applied \ algebraic \ methods \ to \ reduce \ the \ complexity \ of \ large-scale \ stochastic \ optimization \ problem}$
- Developed an unsupervised ML algorithm that clusters scenarios into similarity groups measured on the basis of solutions
- Used Grobner Basis and combinatorial methods to reduce the algorithm's computational complexity
- The Python-implemented algorithm exhibited superior performance over existing benchmarks

Concentration Inequalities for Discretization Errors of Stochastic Integration

Advisor: Prof. Hanchao Wang

Shandong University Jan 2022 - Jun 2022

- Proved that the discretization error of specific Itô integrals with Jumps is of sub-Gaussian distribution
- Constructed exponential martingales with Ito's formula to study the exponential inequality of the discretization error
- \bullet Applied Daniell's mean, Picard's norm and functional inequalities in L_p -space to bound the discretization error
- Studied the real-world application to the hedging errors arising from discrete-time trading

Breast Cancer Classification Based on CNNs [Paper Link]

Massachusetts Institute of Technology $Apr\ 2022\ -\ Jul\ 2022$

Supervisor: Prof. Mark Vogelsberger

- Aimed to train a neural network for eight-classification of breast cancers
 Utilized the Inception-V3 and Inception-ResNet-V2 architectures, among others, for feat.
- Utilized the Inception-V3 and Inception-ResNet-V2 architectures, among others, for feature extraction, and employed logistic regression and Support Vector Machine (SVM) algorithms for classification
- Implemented a cyclic learning rate decay policy and the identification of local optimal solutions to optimize performance
- Obtained the accuracy rate of 93.9% (outperformed existing benchmarks) and developed a chatbot based on TKinter

SKILLS

Sublime Text, Lingo, AnyLogic, Keil MDK, GitHub Desktop, IBM Db2

Language: English (fluent), Chinese (native)

Mathematics Proficiency

Geometry: topology, smooth manifold, algebraic topology

Algebra: linear algebra, commutative algebra, homological algebra, representation theory **Analysis:** mathematical analysis, real/complex analysis, ODE, PDE, analytic number theory

Prob & stats: measure theory, stochastic calculus, regression analysis, mathematical statistics, causal inference

Combinatorics: graph theory, probabilistic and algebraic combinatorics

Applied maths: statistical learning theory, numerical analysis, combinatorial optimization