

Tianrun Yu

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Education

Shenzhen University(SZU)

Institute for Advanced Study(an elite program at SZU)

Shenzhen,China

Sept.2020 - Present

- Major: Mathematics and Applied Mathematics, Minor: physics
- GPA: 3.81/4.5, major GPA :3.95/4.5
- Course: Operational Research, Discrete Mathematics, Database, Probability and Mathematical Statistics, Complex analysis, Object Oriented Language, Operating Systems, Computer Network, Advanced Algebra.

Research And Project Experience

Enhancing Fairness in Federated Learning by Injecting False Gradients at the Server

Advised by Prof. Minghong Fang, University of Louisville

Apr. 2024 - Present

- Developed a PyTorch implementation of our algorithm to optimize fairness in federated learning, demonstrating effectiveness across multiple datasets, and employed the multi-gradient descent algorithm (MGDA) to optimize multiple fairness metrics simultaneously.
- Provided mathematical proofs of the convergence and effectiveness of our algorithm, as well as the convergence of MGDA in our specific scenario.

Numerical Solutions to Time Fractional Convection-Diffusion Equations

Advised by Prof. Yue Chan, Institute for Advanced Study, SZU

Apr. 2022- Feb. 2024

- Implemented a shifted Grünwald finite difference approximation for PDEs, providing proof of consistency, stability, and convergence
- Validated the method's accuracy through extensive testing against exact solutions.

The Brick Breaker Game and Vocabulary Learning Application.

Project of 'Object Oriented Language', SZU

Mar. 2023- July. 2023

- Using Java to write a brick pinball game, and using the mouse to control the baffle to bounce the ball to eliminate bricks.
- Using java to write a word memorization program that has the functions of reciting words and querying vocabulary.

Seminar Series on Gradient Descent

Advised by Prof. Zhaobo Liu, Institute for Advanced Study, SZU

Mar. 2022- July. 2022

- Discussed the mathematical proof that the stochastic gradient descent algorithm can escape from the saddle point by adding a disturbance term.

2021 Mathematical Contest in Modeling

Finalist Winner(1%)

Feb. 2021

- Created a comprehensive model for bicycle race performance.
- Utilized PDE, difference equations and periodic functions to model athletes' physical fatigue and the impact of terrain, wind direction,team competition and other factors.
- Developed a complex set of PDE, which was solved Monte Carlo methods and optimized through stochastic gradient descent.

Awards & Skills

- 2023 Star of Learning, SZU
- 2023 Outstanding Innovative Talent, SZU.
- 2022 Star of Double Innovations(Group), SZU.
- 2022 Outstanding Innovative Talent, SZU.
- Skills: Python, Java, C, Matlab, LATEX, PyTorch, Numpy, SQL.