TANSHENG ZHU

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EDUCATION

Shanghai Jiao Tong University	Aug. 2021 – June 2025 (Expected)
B.S. in Mathematics and Applied Mathematics (Hons), Zhiyuan College	*Shanghai, China*
The Chinese University of Hong Kong	Jan. 2024 – May 2024
Exchange Student, Department of Mathematics	*Hong Kong, China*
Summer School on Mathematical Methods in Science and Engineering	Aug. 2023
School of Mathematical Sciences, East China Normal University	*Shanghai, China*

COURSEWORK

Overall Average Grade: 90.42/100, **GPA:** 3.93/4.3, **Ranking:** 5/21.

Courses: Optimization Methods, Mathematical Programming, Foundations of Data Science, Numerical Analysis and Scientific Computing, Numerical Methods for ODE & PDEs, Probability, Stochastic Process, Time Series, Financial Mathematics.

Awards: The Finalist Winner of 2024 Mathematical Contest in Modeling (Top 3%),
The Winning Prize of 2024 S.-T. Yau College Student Mathematics Contest (Appl. & Comp. Math.),
The First Prize of 2023 Chinese Mathematics Competitions (Shanghai Division),
The Second Prize of 2023 Asia and Pacific Mathematical Contest in Modeling,
The Third Prize of 2022 China Undergraduate Mathematical Contest in Modeling.

RESEARCH EXPERIENCE

Laboratory on Fast Algorithms and High-Performance Computing Nov. 2022 – Present
Bayesian Optimization Research Assistant, advised by Prof. Zhenli Xu.

- Proposed the improved kernel regression upper confidence bound (IKR-UCB) algorithm under the Bayesian optimization framework, which is derived from the error bounds of Nadaraya-Watson kernel regression with dependent observations and more efficient than existing methods.
- Studied on the generalization of Monte Carlo tree search in continuous action space. Proposed the IKR-UCT algorithm to enhance efficiency and reduce computation costs in online planning tasks.
- Designed numerical experiments for Bayesian optimization and Monte-Carlo tree search algorithms.

Prof. Fenglei Fan's Lab at The Chinese University of Hong Kong Jan. 2024 – Present
Deep Learning Theory Research Assistant

- Studied the properties of neural networks with infinite depth and finite width. Generalized the neural tangent kernel (NTK) theories from infinitely-wide networks to infinitely-deep networks with skip connections using weakly dependence theory.

COURSE PROJECTS

Dendritic Computing with Bilinear Rules and Artifitial Neural Networks Fall 2023
Team leader of the group project, advised by Prof. Douglas Zhou.

- Constructed bilinear rules of dendrite integration from theory to practice. Implemented artificial neural network models hLN and DBNN to fit real neuron data, and the limitation of ANN's parametric space is discussed.

Solving Differential Equations with Deep Learning Fall 2023
Individual project, advised by Prof. Xiaoqun Zhang and Prof. Zhi-Qin John Xu.

- Constructed the framework of physics-informed neural network (PINN) for both forward and inverse problems. Analysed the error components and improve them by incorporating more physics information.

Modeling and Optimization of Biological Transport Networks Spring 2023
Team leader of the group project, earned the highest score, advised by Prof. Dan Hu.

- Built the dynamics of the biological transport network. Implemented different optimization algorithms, and explained the entangled-network phenomenon of results based on spectrum of the graph Laplacian matrix.

Computational Mean-field Optimal Control Spring 2023

Individual project, advised by Prof. Lei Li.

- Studied a class of reaction-diffusion equation mean-field information dynamics, designed the corresponding primal-dual hybrid gradient (PDHG) algorithm to solve the saddle point problem.

HONORS AND AWARDS

Huawei Scholarship: Awarded to Top 5% students in the major.	2023
Zhiyuan Outstanding Leader Scholarship: Awarded for outstanding leadership.	2022
The First Prize Scholarship for Excellent Student: Awarded to Top 1% students in the grade.	2022
Merit Student: Awarded to Top 1% students in the class.	2022
Zhiyuan Honors Scholarship (3x): Awarded for academic excellence.	$2021 - 2023$

SKILLS

Programming Languages: Python, Matlab, R, C/C++, LaTeX, Markdown, CSS, HTML.

Toolkits: NumPy, SciPy, Sklearn, Pandas, Statsmodels, Matplotlib, PyTorch, Cython, Numba, Gurobi.

Language Proficiency: Mandarin (native), English (fluent, CET-6: 560)

REFERENCES

Zhenli Xu, xuzl@sjtu.edu.cn,
Professor of Shanghai Jiao Tong University, Shanghai, China.

Fenglei Fan, flfan@math.cuhk.edu.hk,
Research Assistant Professor of The Chinese University of Hong Kong, Hong Kong, China.