Tianhao ZHANG

Mobile: 612-295-1963 |Email: zhan7594@umn.edu

EDUCATION

University of Minnesota, Twin Cities, *Ph.D. of Applied Mathematics, CS Minor* *MN, Candidate of 2021*

- Advisor: Prof. Hans G. Othmer
- Research Interests: Mathematical Biology, Computational Neuroscience, Computational Biology, Complex Networks, NLP, ML/DL
- Programming Language: Python, Matlab, C, Maple, Latex, Linux, C++
- Deep Learning Framework: Pytorch, Keras
- Academic Performance: GPA: 3.925/4.00

Lawrence Berkeley National Laboratory *CA, July 2022-Sep 2022*

- NSF Math Sciences Graduate Internship, Advisor: Prof. Christoph Kirst

Zhejiang University (Chu Kochen Honors College), *B.S. of Math. and Applied Math.* *Hangzhou, Sep 2016-Jul 2020*

- Academic Performance: GPA: 3.71/4.00 Rank: top 10% out of 106

PUBLICATION

- J. Gou, T. Zhang, H.G. Othmer, "The interaction of mechanics and the Hippo pathway in Drosophila melanogaster" (Submitted)
- Z. Sheng, T. Zhang, J. Chen, D. Kang, "BBScore: A Brownian bridge based metric for assessing text coherence" (Submitted)
- S. Kepley, T. Zhang, A constructive proof of the Cauchy–Kovalevskaya theorem for ordinary differential equations. J. Fixed Point Theory Appl. 23, 7 (2021). https://doi.org/10.1007/s11784-020-00841-1
- Z. Li, T. Zhou, T. Zhang, Base station planning solution based on priority search [J]. Mathematical modeling and its application, 2019,8(02):50-67+79 (Chinese)

AWARD

- First-Class Scholarship for Basic Subject (2%) in Zhejiang University
- First place in the 8th "Shenzhen Cup" Mathematical Modeling Competition
- Fourth Place (Jilin Province) in 2015 Chinese High School Mathematics League; Bronze Medal in 31th Chinese Mathematical Olympiad

RESEARCH and INTERNSHIP

Modeling the Self-reconfiguration Process in Neuronal Networks *Lawrence Berkeley National Laboratory, July 2022-Present*
NSF Graduate Intern/Research Assistant, Advisor: Prof. Christoph Kirst

- Generalized a famous online learning algorithm FORCE to a tensor version to learn multi-task and multi-output problems with the RNN.
- Constructed a theoretical framework for functional self-reconfiguration processes in neuronal networks with RNN and FORCE learning.
- Modeling multi-motive context-dependent learning tasks and exploring the operator learning with current networks and learning methods.

Modeled the Interaction of Mechanics and the Hippo Pathway *University of Minnesota, Twin Cities, Apr 2023-Aug 2023*
Research Assistant, Co-Researcher: Prof. Jia Gou, Advisor: Prof. Hans Othmer

- Developed a new math model that integrates the mechanical interaction between cells, the Hippo pathway and growth in Drosophila.
- Simulated various conditions to understand cell-autonomous and non-autonomous control of growth in response to mechanical force.

Designed a Text Coherence Evaluation Metric with Brownian Bridge *University of Minnesota, Twin Cities, Oct 2022-Aug 2023*
Student Researcher, Advisor: Prof. Dongyeop Kang

- Designed a domain-specific long text coherence (global and local) evaluation metric with Brownian bridge and tested with Wiki data.
- Improved the metric performance to a level comparable to SOTA techniques by designing diffusion coefficients learnt from domains.
- Reached >90% accuracy level on the downstream task to distinguish human-written and AI-generation (large language model) texts.

Designed High-Frequency Quantitative Trading Strategies in the US Stock Market *Beijing, Ubiquant LLC Sep2020-May2021*
Research Intern, Advisor: PM. Huichao Gong

- Designed genetic algorithms to automatically searching features from 1, 5-minute trading data (size>3T), and accelerated it by random search
- Predicted alpha factors with the selected features, and implemented large-scale ML/DL models (LightGBM, LSTM, TCN, Transformer etc.)
- Improved the performance by integrating different timescales (5min, 10min) which used the difference of the attenuation period of factors
- Refined the raw position by designing transaction models, and controlled the risk and cost by solving corresponding optimization problems

A Constructive Proof of the Cauchy-Kovalevskaya Theorem for ODEs *Rutgers, Mar 2019-Dec 2019*
Project Leader, Co-Researcher: Prof. Shane Kepley, Advisor: Prof. Konstantin Mischaikow

- Constructed a high accuracy numerical nonlinear analysis tool with Taylor series approximation and Radii polynomial approach.