Tianhao ZHANG

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EDUCATION

University of Minnesota, Twin Cities, *Ph.D. of Applied Mathematics, CS Minor* *MN, Sep 2021-Present*
- Advisor: Prof. Hans G. Othmer
- Research Interests: Mathematical Biology, Computational Neuroscience, Computational Biology, NLP, ML/DL
- Academic Performance: GPA: 3.925/4.00

Lawrence Berkeley National Laboratory *CA, July 2022-Present*
- NSF Math Sciences Graduate Internship, Advisor: Prof. Christoph Kirst *July 2022-Sep 2022*
- Research Assistant, Advisor: Prof. Christoph Kirst *Sep 2022-Present*

Zhejiang University (Chu Kochen Honors College), *B.S. of Math. and Applied Math.* *Zhejiang, Sep 2016-Jul 2020*
- Academic Performance: GPA: 3.71/4.00 Rank: top 10% out of 106

SKILLS

- Coding Language: Python (Advanced), MATLAB (Advanced), C (Proficient), C++ (Proficient), Linux (Proficient)
- Skills and Tools: LATEX, Git, machine learning, deep learning, Pytorch, Keras

PUBLICATION and MANUSCRIPT

- **T. Zhang**, Christoph Kirst, "Operator learning in neuronal networks with tensor FORCE " (in preparation)
- Z. Sheng, **T. Zhang**, J. Chen, D. Kang, "BBScore: A Brownian bridge based metric for assessing text coherence" (Submitted)
- J. Gou, **T. Zhang**, H.G. Othmer, "The interaction of mechanics and the Hippo pathway in Drosophila melanogaster" (Accepted by Cancers)
- S. Kepley, **T. Zhang**, A constructive proof of the Cauchy–Kovalevskaya theorem for ordinary differential equations. J. Fixed Point Theory Appl. 23, 7 (2021). full article.

ACADEMIC RESEARCH

Modeling the Self-reconfiguration Process in Neuronal Networks *LBNL, July 2022-Present*
NSF Graduate Intern/Research Assistant, Advisor: Prof. Christoph Kirst
- Generalized the online learning algorithm FORCE to a tensor version to learn multi-task and multi-output problems with the RNN.
- Implemented multiple transients learning tasks and realized the operator learning (input-output, integrator, etc...) around these transients.
- Constructed a theoretical framework for functional self-reconfiguration processes in neuronal networks with RNN and FORCE learning.

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 multi-scale model that integrates mechanical interactions between cells, biochemical pathways, and tissue growth.
- 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.

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.

WORK EXPERIENCE

Designed High-Frequency Quantitative Trading Strategies in the US Stock Market *Beijing, Ubiquant LLC Sep2020-May2021*
- Designed genetic algorithms to search features from 1,5-minute trading data (size>3T), and accelerated it by random search.
- Predicted alpha with the selected features, and improved by large-scale ML/DL models(LightGBM, LSTM, TCN, Transformer etc.)
- Improved the performance by integrating different timescales (5,10min) by using the difference of the attenuation period of factors.
- Refined the raw position with transaction models, and controlled the risk and cost by solving corresponding optimization problems

AWARD

- First-Class Scholarship for Basic Subject (2%) in Zhejiang University
- First place in the 8th "Shenzhen Cup" (2018) Mathematical Modeling Competition
- 31st (2015) China Mathematics Olympiad Finalist (Top 300 nationwide, 4th in Province Competition)