Zhen Zhang

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Education

Brown University **Providence, RI**
Ph.D. Student, Applied Mathematics, 4.0/4.0 *2018-Present*
Relevant coursework: Deep Learning, Real/Functional Analysis, Probability Theory, Partial Differential Equations, Discontinuous Galerkin Methods, Stochastic Control, Dynamical Systems, Interacting Particle Systems, Spectral Methods

Brown University **Providence, RI**
Sc.M., Applied Mathematics *2018-2019*

City University of Hong Kong **Hong Kong**
B.Sc., Computing Mathematics, Minor in Computing, 4.08/4.3 *2014-2018*
Dean's List every semester

University of Toronto **Toronto, Canada**
Exchange, Mathematics, 4.0/4.0 *2017-2017*

Research Interests

- Physics informed neural networks
- Interpretable scientific machine learning
- Time series modeling

Honors & Awards

Fellowship for graduate students *Brown Univeristy*
HKSAR Government Scholarship *HKSAR*
Joseph Lau Student Exchange Awards *City University of Hong Kong*

Publications

1. Jin, Pengzhan*, **Zhang, Zhen***(Co-first author), Zhu, Aiqing, Tang, Yifa and George Em Karniadakis. *SympNets: Intrinsic structure-preserving symplectic networks for identifying Hamiltonian systems.* Neural Networks **132**. 166-179 (2020).
2. Zhang, Sheng*, Joan, Ponce*, **Zhang, Zhen***(Co-first author), Guang Lin and George, Karniadakis. *An integrated framework for building trustworthy data-driven epidemiological models: Application to the COVID-19 outbreak in New York City*. (Accepted by PLOS Computational Biology.)
3. Jin, Pengzhan, **Zhang, Zhen**, Yannis, Kevrekidis, and George Em Karniadakis. *Learning Poisson systems and trajectories of autonomous systems via Poisson neural networks.* (Submitted to IEEE Transactions on Neural Networks and Learning Systems.)
4. Ehsan Kharazmi, Min Cai, Xiaoning Zheng, **Zhen Zhang**, Guang Lin, and George Em Karniadakis. *Identifiability and predictability of integer- and fractional-order epidemiological models using physics-informed neural networks.* (Submitted to Nature Computational Science.)
5. **Zhang, Zhen**, Yeonjong Shin, and George Em Karniadakis. *GENERIC formalism informed neural networks.*

(Submitted to Proceedings of the Royal Society A)

Research Experience

Brown University **2019-Present**
Graduate Student Researcher
Currently I am working on two projects: Predicting blood pressure using machine learning tools; Symmetry-preserving neural networks.

City University of Hong Kong **2017-2018**
Final Year Project
Study theoretical aspect of Deep Neural Network. Run numerical simulations on image classification problems to verify the approximation properties of Convolutional Neural Networks.

Liu Bie Ju Center for Mathematical Sciences **2017-2017**
Summer Research Opportunity
Systematically studied asymptotic analysis and Painleve Equations under Dr. Wang's guidance. Gave series solution to a group of ODEs, and tried to give a closed form solution based on well-known special functions. Reviewed Prof. Wong's work on second order linear difference equations.

University of Tennessee & Oak Ridge National Laboratory **2016-2016**
Research for Undergraduates (REU)
Received training on high performance computing in Oak Ridge National Laboratory. Implemented dasymetric mapping algorithm in GIS and proposed a parallel version of the algorithm. The new method effectively improved running efficiency.

Teaching Experience

- **APMA 1170**: Introduction to Computational Linear Algebra, head teaching assistant (Fall 2019)
- **APMA 1660**: Statistical Inference II, head teaching assistant (Spring 2020)

Mentoring Experience

APMA undergraduate-graduate mentoring program **2020-2021**
Graduate Mentor
Give undergraduate students advice on course selection, preparing for research with faculty, preparing for graduate school and applying to internships and jobs.

CityU Student Mentoring Program **2017-2018**
PALSI leader
Organized orientation and give new students help in academics.

Math Help Center **2017-2018**
Discussion Leader
Organized discussions and answered questions related to engineering mathematics.

Peer-Assisted Learning Scheme using Supplemental Instruction **2016-2017**
Student Mentor
Gave freshmen tutorials on Calculus and organized discussion groups.

Conferences & Presentations

NUMDIFF-16 **Sep, 2021**
SympNet & PNN: structure-preserving networks for identifying Hamiltonian & Poisson systems

Crunch Seminar **Apr, 2020**
Symplectic networks: Intrinsic structure-preserving networks for identifying Hamiltonian systems

Programming Skills

Languages: Python, Java, C/C++, MATLAB, Linux Command, LaTeX.
Packages: TensorFlow, PyTorch.

Outreach & Services

CityU Choir Committee **2015-2016**
Membership Secretary of Bass
Organized annual performance and conducted regular training of bass section.