Zhen Zhang

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https://zzhang222.github.io

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, 4.11/4.3   *2014-2018*
Dean's List every semester

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

Research Interests

- Physical priors in neural networks
- Dynamical system view of deep learning
- Mathematical modeling

Honors & Awards

HKSAR Government Scholarship

Joseph Lau Student Exchange Awards

HKSAR Government Scholarship Fund - Reaching Out Award

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. Jin, Pengzhan, Zhang, Zhen, Zhu, Aiqing, 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.)

Research Experience

Brown University   **2019-Present**
Graduate Student Researcher
Currently I am working on two projects: inferring the dynamics of Poisson systems and probabilistic modeling of COVID-19.

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

- o **APMA 1170**: Introduction to Computational Linear Algebra, head teaching assistant (Fall 2019)
- o **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.

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

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.

Presentations

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

Programming Skills

Languages: Java, C/C++, SQL, MATLAB, Python, SAS, 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.

Cornwall School   2015-2016
Volunteer
Teach and help mentally disabled students with daily lives.