

## EDUCATION

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### Georgia Institute of Technology

Ph.D. in Machine Learning

Atlanta, Georgia, USA

Aug. 2019 – May. 2023

- Department: H. Milton Stewart School of Industrial and Systems Engineering (ISYE)
- Advisor: Dr. Yao Xie

### Georgia Institute of Technology

M.S. in Electrical and Computer Engineering

Atlanta, Georgia, USA

Aug. 2017 – May. 2019

- Thesis: “Online Subspace Tracking for Community Change Detection”

### Tsinghua University

B.S. in Electronic Engineering

Beijing, China

Aug. 2013 – May. 2017

- Thesis: “Hardware Acceleration on Image Recognition”

## SKILLS

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- **Programming:** Python, Pytorch, Tensorflow, MATLAB, R, C/C++, Java, Perl, JavaScript, HTML, CSS.
- **Technical:** Machine Learning, Meta Learning, Time-series Analysis, Point Process, Anomaly Detection.
- **Mathematics:** Stochastic Process, Statistical Machine Learning, Convex Optimization.

## WORK EXPERIENCE

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### Tencent AI Lab, Machine Learning Center

Research Assistant supervised by Dr. Long-Kai Huang

Shenzhen, China

Summer 2021

- Out-of-Distribution Detection for Task-adaptive Meta Learning
- Based on MAML, developed an out-of-distribution task by combining data from various distribution
- Proposed to use multi-stage optimization process with learning to stop criteria to help better fine-tuning

### Argonne National Lab

Research Assistant supervised by Dr. Qiu Feng

Chicago, IL, USA

Fall 2020

- Graph Learning for solving Combinatorial Optimizations
- worked on using a Graph embedding technique to optimize a power restoration problem for better generalization ability

### SF Express

Machine Learning and Artificial Intelligence Engineer

Shenzhen, Guangzhou, China

Summer 2018

- Built a recommendation system based on logistic networks between companies
- Implemented change point detection to find out the fluctuation of the employers' salaries
- Used multiple machine learning techniques such like SVM, random forest and deep neural networks to decide whether added-value insurance is needed for a delivery

## RESEARCH EXPERIENCE

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### Georgia Institute of Technology

Atlanta, GA, USA

Research Assistant supervised by Dr. Yao Xie and con-advised by Dr. Hongyuan Zha

Summer 2021 - Current

- Causal Discovery from Unobserved Variables in Point Processes
- Proposed a novel framework for modeling point process with potential hidden confounders
- Use a generator to simulate the behavior of the confounders and two-step optimization to learn the generator as well as the point process model

### Georgia Institute of Technology

Atlanta, GA, USA

Research Assistant supervised by Dr. Yao Xie

Spring 2020 - Fall 2020

- Spatial-Temporal Mutually Interactive Process Models for Solar Radiation Anomaly Events
- Built a generative spatial-temporal Bernoulli model to fit the extracted abnormal events in solar radiation observations
- Came up with a online learning algorithm to get the threshold for predicting future abnormal events, which leads to much better accuracy under non-stationary cases
- Conference version presented at INFORMS Conference on Service Science (ICSS 2021)

### Georgia Institute of Technology

Atlanta, GA, USA

Research Assistant supervised by Dr. Yao Xie

Spring 2020

- Deep Attention Point Processes with Neural Spectrum Fourier Kernel
- Created a novel attention-based model for discrete event data to capture complex non-linear temporal dependence structure
- Used attention mechanism and incorporate it into the conditional intensity function of the point processes
- Introduced a novel score function using Fourier kernel embedding, whose spectrum is represented using neural networks
- Published on AISTATS 2021 with an oral presentation

### Georgia Institute of Technology

Atlanta, GA, USA

Research Assistant supervised by Dr. Yao Xie

Fall 2018 - Fall 2019

- Spectral CUSUM for Online Network Structure Change Detection
- Designed a Spectral CUSUM procedure to detect community change in dynamic graphs
- Used a Gaussian model to represent the graph structure, and got the closed-form for the Expected Detection Delay (EDD) and Average Run Length (ARL)
- Already published a paper on ICASSP and currently working on a more detailed journal version

### University of Southern California (USC)

Los Angeles, CA, USA

Research Assistant supervised by Dr. Peter Beerel

Summer 2016

- Retiming of Two-Phase Latch-Based Resilient Circuits
- Proposed a new network-simplex-based retiming method, which was used for two-phase latch-based resilient circuits, to reduce the overhead of the combination of normal and error detecting latches

### Tsinghua University

Beijing, China

Research Assistant supervised by Dr. Shouyi Yin

Fall 2016 – Fall 2017

- Data Mining and Machine Learning in Vehicle Systems
- Used Tensorflow to study different driving styles based on the filtered data, which allowed the software to distinguish whether the car is turning around, accelerating, coasting, etc
- Applied the Binary Neural Network (BNN) methods to Tensorflow to accelerate the study process and computation speed

## PUBLICATIONS

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- [1] S. Wei, S. Zhu, **M. Zhang**, and Y. Xie, “Goodness-of-fit test for mismatched self-exciting processes”, in *International Conference on Artificial Intelligence and Statistics*, PMLR, 2021, pp. 1243–1251.
- [3] S. Zhu, H. S. Yuchi, **M. Zhang**, and Y. Xie, “Sequential adversarial anomaly detection with deep fourier kernel”, in *ICASSP 2021-2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, IEEE, 2021, pp. 3345–3349.
- [4] S. Zhu, **M. Zhang**, R. Ding, and Y. Xie, “Deep fourier kernel for self-attentive point processes”, in *International Conference on Artificial Intelligence and Statistics*, PMLR, 2021, pp. 856–864.
- [5] **M. Zhang**, L. Xie, and Y. Xie, “Online community detection by spectral cusum”, in *ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, IEEE, 2020, pp. 3402–3406.
- [7] S. Zhu, R. Ding, **M. Zhang**, P. Van Hentenryck, and Y. Xie, “Spatio-temporal point processes with attention for traffic congestion event modeling”, *IEEE Transactions on Intelligent Transportation Systems*, 2020.
- [10] H. Cheng, H.-L. Wang, **M. Zhang**, D. Hand, and P. A. Beerel, “Automatic retiming of two-phase latch-based resilient circuits”, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, vol. 38, no. 7, pp. 1305–1316, 2018.
- [11] H.-L. Wang, **M. Zhang**, and P. A. Beerel, “Retiming of two-phase latch-based resilient circuits”, in *Proceedings of the 54th Annual Design Automation Conference 2017*, 2017, pp. 1–6.

## PREPRINTS

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- [2] **M. Zhang**, L. Xie, and Y. Xie, “Spectral-cusum for network structure change detection.”, 2021.
- [6] **M. Zhang**, C. Xu, and Y. Xie, “Spatial-temporal mutually interactive process models for solar radiation anomaly events”, *aXiv preprint arXiv:2101.11179*, 2020.
- [8] S. Zhu, S. Yuchi, **M. Zhang**, and Y. Xie, “Sequential adversarial anomaly detection for dependent events”, *arXiv preprint arXiv:1910.09161*, 2020.
- [9] S. Zhu, L. Xie, **M. Zhang**, R. Gao, and Y. Xie, “Distributionally robust weighted k-nearest neighbors”, *arXiv preprint arXiv:2006.04004*, 2020.

## TEACHING

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- **Teaching Assistant** at Georgia Tech Summer 2020  
*Computational Data Analysis / Machine Learning I (ISYE/CSE 6740)*
- **Teaching Assistant** at Georgia Tech Fall 2019, Spring 2020  
*Basic Statistical Methods (ISYE 3030)*