Minghe Zhang

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EDUCATION

Georgia Institute of Technology Atlanta, Georgia, USA
Ph.D. in Machine Learning Aug. 2019 – May. 2023

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

Georgia Institute of Technology Atlanta, Georgia, USA
M.S. in Electrical and Computer Engineering Aug. 2017 – May. 2019

- Thesis: "Online Subspace Tracking for Community Change Detection"

Tsinghua University Beijing, China
B.S. in Electronic Engineering Aug. 2013 – May. 2017

- Thesis: "Hardware Acceleration on Image Recognition"

SKILLS

- **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

International Machine Learning, Amazon Seattle, WA, USA
Applied Scientist intern Fall 2022

- Accelerating training DNN through data subsampling
- proposed an adaptive subsampling method called *Adaselection* for deep learning models in large-scale machine learning systems.
- demonstrated the method to be effective on various classification and regression and natural language processing tasks when compared with industry-wide adopted baselines.

Recommendation Core ML, Meta Menlo Park, CA, USA
Machine Learning Engineering intern Summer 2022

- Improving Early Stage Ranking Model in Instagram Reels
- Explored the possibility of improving early stage ranker from different perspectives, including building overarch on TTSN model, using Knowledge Distillation to transfer knowledge from final ranker
- Achieved better NE metric on early stage ranker for IG Reels model

Tencent AI Lab, Machine Learning Center Shenzhen, China
Research Assistant supervised by Dr. Long-Kai Huang 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

Georgia Institute of Technology
Research Assistant supervised by Dr. Yao Xie

Atlanta, GA, USA
Spring 2020 - Spring 2023

- 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
Research Assistant supervised by Dr. Yao Xie

Atlanta, GA, USA
Fall 2018 - Spring 2023

- 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 conference paper on ICASSP and published journal version to Transactions IT

Georgia Institute of Technology
Research Assistant supervised by Dr. Yao Xie

Atlanta, GA, USA
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

University of Southern California (USC)
Research Assistant supervised by Dr. Peter Beerel

Los Angeles, CA, USA
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

[1] **M. Zhang**, L. Xie, and Y. Xie, "Spectral-cusum for network structure change detection.", *IEEE Transactions on Information Theory*, 2023.

[2] S. Zhu, S. Yuchi, **M. Zhang**, and Y. Xie, "Sequential adversarial anomaly detection for dependent events", *INFORMS Journal on Data Science (IJDS)*, 2023.

[3] D. Guo, L. Tian, **M. Zhang**, M. Zhou, and H. Zha, "Learning prototype-oriented set representations for meta-learning", in *International Conference on Learning Representations*, 2022.

[4] S. Zhu, L. Xie, **M. Zhang**, R. Gao, and Y. Xie, "Distributionally robust weighted k-nearest neighbors", *NeurIPS 2022*, 2022.

[5] 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.

[6] **M. Zhang**, C. Xu, and Y. Xie, "Spatial-temporal mutually interactive process models for solar radiation anomaly events", *The 2021 INFORMS Conference on Service Science (ICSS 2021)*, 2021.

[7] 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.

[8] 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.

[9] **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.

[10] 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.

[11] 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.

[12] 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.