Xueru Zhang

Contact Information

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Education

University of Michigan, Ann Arbor, MI

- Ph.D. in Electrical Engineering and Computer Science *01/2017 - 06/2021*
  Advisor: Mingyan Liu
  Thesis committee: Yiling Chen, Alfred Hero, Mingyan Liu, Atul Prakash, Aaron Roth
- M.Sc. in Electrical Engineering and Computer Science *09/2015 - 12/2016*
  GPA: **4.0/4.0**

Beihang University (BUAA), Beijing, China

- B.Eng. in Electronic and Information Engineering *09/2011 - 06/2015*
  GPA: **3.8/4.0** Rank: **2/295**

Research Interests

- Societal Aspects of AI (Privacy and Algorithmic Fairness)
- Machine Learning, Sequential Decision-making, Distributed Optimization
- Economics of Security and Privacy

Honors and Awards

- **Rackham Predoctoral Fellowship**, University of Michigan *2020*
- **ITA Graduation Day Invited Talk**, University of California, San Diego *2020*
- **Travel Award** in the Conference on Neural Information Processing Systems *2019*
- **Travel Award** in the EC Workshop on Mechanism Design for Social Good *2019*
- **Rackham Travel Grant**, University of Michigan *2018, 2019*
- **Outstanding Graduate of Beijing (Top 5%)**, Beijing, China *2015*
- **First-Class Academic Scholarship**, BUAA, China *2012, 2013, 2014*
- **Merit Student of Beijing (1/295)**, Beijing, China *2014*
- **Baosteel Education Scholarship (1/3591)**, China *2013*
- **Outstanding Member in Summer School**, Maynooth University, Ireland *2013*
- **Best Paper Award of Summer Practical Training**, BUAA, China *2013*
- **Third Prize in the 29th National Physics Competition**, China *2012*
- **National Scholarship (Top 2%)**, China *2012*
- **First Prize in Innovative Electronics Design Contest**, BUAA, China *2012*

Conference Publications

- **X. Zhang***, R. Tu*, Y. Liu, M. Liu, H. Kjellström, K. Zhang and C. Zhang. How Do Fair Decisions Fare in Long-term Qualification? *In the 34th Conference on Neural Information Processing Systems **(NeurIPS)**, 2020.*
- **X. Zhang***, M. Khalili*, C. Tekin and M. Liu. Group Retention when Using Machine Learning in Sequential Decision Making: the Interplay between User Dynamics and Fairness. *In the 33rd Conference on Neural Information Processing Systems **(NeurIPS)**, 2019.*

- **X. Zhang**, M. Khalili and M. Liu. Improving the Privacy and Accuracy of ADMM-based Distributed Algorithms. *In the 35th International Conference on Machine Learning **(ICML)**, 2018.*
- M. Khalili*, **X. Zhang*** and M. Liu. Contract Design for Purchasing Private Data Using a Biased Differentially Private Algorithm. *In the 14th Workshop on the Economics of Networks, Systems and Computation **(NetEcon)**, 2019.*
- M. Khalili, **X. Zhang** and M. Liu. Incentivizing Effort in Interdependent Security Games Using Resource Pooling. *In the 14th Workshop on the Economics of Networks, Systems and Computation **(NetEcon)**, 2019.*
- M. Khalili, **X. Zhang** and M. Liu. Effective Premium Discrimination for Designing Cyber Insurance Policies with Rare Losses. *In the 10th Conference on Decision and Game Theory for Security **(GameSec)**, 2019.*
- **X. Zhang**, M. Khalili and M. Liu. Recycled ADMM: Improve Privacy and Accuracy with Less Computation in Distributed Algorithms. *In the 56th Annual Allerton Conference on Communication, Control, and Computing **(Allerton)**, 2018.*
- M. Khalili, **X. Zhang** and M. Liu. Public Good Provision Games on Networks with Resource Pooling. *In the International Conference on Network Games Control and Optimization **(NetGCoop)**, 2018.*
- C. Huang, **X. Zhang**, R. Salehi, T. Ersal and A. Stefanopoulou. A Robust Energy and Emissions Conscious Cruise Controller for Connected Vehicles with Privacy Considerations. *In 2020 American Control Conference **(ACC)**, 2020.*

Journal Publications

- **X. Zhang**, M. Khalili and M. Liu. Recycled ADMM: Improving the Privacy and Accuracy of Distributed Algorithms. *In IEEE Transactions on Information Forensics and Security **(TIFS)**, 2019.*
- **X. Zhang***, C. Huang*, M. Liu, A. Stefanopoulou and T. Ersal. Predictive Cruise Control with Private Vehicle-to-Vehicle Communication for Improving Fuel Consumption and Emissions. *In IEEE Communications Magazine, 2019.*
- **X. Zhang**, M. Khalili and M. Liu. Long-term Impacts of Fair Machine Learning. *In Ergonomics in Design: The Quarterly of Human Factors Applications, 2019.*
- M. Khalili, **X. Zhang** and M. Liu. Resource Pooling for Shared Fate: Incentivizing Effort in Interdependent Security Games through Cross-investments. *In IEEE Transactions on Control of Network Systems **(TCNS)**, to appear.*

Book Chapters

- **X. Zhang** and M. Liu. Fairness in Learning-Based Sequential Decision Algorithms: A Survey. *Springer Studies in Systems, Decision and Control, Handbook on RL and Control, 2020.*

Submitted Papers

- M. Khalili, **X. Zhang**, M. Abroshan and S. Sojoudi. Fairness and Privacy Improvement in Classification with a Limited Number of Approvals *In the 35th AAAI Conference on Artificial Intelligence **(AAAI)**, submitted, 2021.*
- **X. Zhang**, M. Khalili and M. Liu. Differentially Private Real-Time Release of Sequential Data. *In IEEE Transactions on Signal Processing **(TSP)**, submitted, 2020.*
- M. Khalili*, **X. Zhang*** and M. Liu. Designing Contracts for Trading Private and Heterogeneous Data Using a Biased Differentially Private Algorithm, *In IEEE Transactions on Information Forensics and Security **(TIFS)**, submitted, 2020.*

(* indicates equal contribution)

Teaching and Mentoring

Graduate Student Instructor, University of Michigan
- **Course:** EECS 501 Probability and Random Processes *Winter 2020*
- **Responsibilities:** Held weekly lectures for the discussion session, designed quiz problems and in-class exercises, held office hours, helped grade the midterm and final exams.

Course Assistant, University of Michigan
- **Course:** EECS 501 Probability and Random Processes *Fall 2016*
  EECS 445 Introduction to Machine Learning *Winter 2016*
- **Responsibilities:** Graded the quizzes and homework, helped develop course projects.

Course Assistant, Beihang University
- **Course:** Circuits Analysis *2014*
- **Responsibilities:** Helped prepare experiments for laboratory sessions.

Mentor, Beihang University
- **Role:** vice president of *Student Association of Science and Technology* *2013, 2014*
- **Responsibilities:** Held weekly lectures to teach microcomputer programming to more than 40 first-year students and sophomores, organized university-wide student technology competitions (e.g., electronics design contest).

Project Leader, Beihang University
- **Role:** Leader in *National Training Program of Innovation and Entrepreneurship* *2013*
- **Project:** "Intelligent Guidance System Based on Image Recognition and 3D Reconstruction"
- **Responsibilities:** Formulated the research problem, wrote the proposal, and the project was awarded 18,600 CNY by the Chinese Ministry of Education; developed algorithms and circuits; wrote project reports.

Invited Talks

Human-centric Machine Learning: on the Preservation of Individual Privacy and Fairness
- **Graduation Day**, Information Theory and Applications (ITA) Workshop, UCSD *02/2020*

Human-centric Machine Learning: on the Preservation of Individual Privacy and Fairness
- Shanghai Jiao Tong University, China *07/2020*

Workshop and Poster

Group Retention when Using Machine Learning in Sequential Decision Making: the Interplay between User Dynamics and Fairness
- **ICML Workshop**, Women in Machine Learning (WiML) *07/2020*
- Conference on Neural Information Processing Systems (NeurIPS), Vancouver *12/2019*

Long Term Impact of Fair Machine Learning in Sequential Decision Making: Representation Disparity and Group Retention
- ACM conference on Economics and Computation (EC), Phoenix *06/2019*
- **EC Workshop**, Mechanism Design for Social Good (MD4SG), Phoenix *06/2019*

Using Resource Pooling to Obtain More Efficient Equilibrium in Interdependent Security Games
- ACM conference on Economics and Computation (EC), Phoenix *06/2019*

Improving the Privacy and Accuracy of ADMM-Based Distributed Algorithms
- International Conference on Machine Learning (ICML), Stockholm *07/2018*

Differential Privacy of ADMM-based Distributed Machine Learning Algorithms
- **Engineering Graduate Symposium**, University of Michigan *11/2017*

Academic Services

Journal and Conference Reviewer
- AAAI Conference on Artificial Intelligence (AAAI) *2020*
- International Conference on Learning Representations (ICLR) *2020*
- Conference on Neural Information Processing Systems (NeurIPS) *2020*
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI) *2019*
- Conference on Decision and Control (CDC) *2019, 2020*

Session chair/leader

- **Session:** Fairness and bias in ML and NLP session *07/2020*
  Women in Machine Learning (WiML) Un-Workshop, ICML
- **Session:** People, AI, and Fairness, Physics and Machine Learning *02/2020*
  Information Theory and Applications (ITA) Workshop, UCSD

Internship

Research intern, Modern Nondestructive Testing Engineering Technology Research Center, Taiyuan, China *2013, 2014*

Career Training

Rackham Interdisciplinary Workshops, University of Michigan *2019*

- **Topic:** What's Next? Career Paths for Ph.Ds. in STEM
- A full-day workshop for selected doctoral students to engage in skill and career exploration, gain insights into a variety of career paths.

Center for Research on Learning and Teaching (CRLT), University of Michigan *2019*

- **Topic:** Training for Diversity and Inclusive Teaching
  Teaching Policies, Science of Learning, Lesson Planning
  Teaching a Great Lab Class
  Engaging Students in Learning
- A series of seminars throughout a semester that provide participants the opportunity to learn and practice various effective teaching strategies.

Skills

Python, Pytorch, Tensorflow, Matlab, C/C++

Selected Coursework

University of Michigan

Reinforcement Learning Theory; Stochastic Control; Deep Learning; Large Scale Graph-Data Mining; Machine Learning; Signal Estimation, Filtering and Detection; Probability theory and Stochastic Processes; Linear/Nonlinear Programming; Mathematical Methods for Signal Processing; Information Retrieval; Queuing Theory in Communication systems; Computer Vision

Beihang University

Probability and Statistics; Stochastic Process Theory; Information Theory; Digital Signal Processing; Image Signal Processing; Economic Management; Automatic Control; Mathematical Analysis; Complex Function and Integral Transformation; Programming Language C; Basis of Computer Software Technology; Digital Signal Processing; Circuits Analysis; Digital/Analog Circuits; Signals and Systems; Electromagnetic Field Theory; Microwave Technology