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: *Human-Centric Machine Learning: on the Preservation of Individual Privacy and Fairness.*
  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 Artificial Intelligence (Privacy, Security, and Algorithmic Fairness)
- Machine Learning, Sequential Decision-Making, Distributed Optimization
- Economics, Game Theory

Honors and Awards

- **Towner Prize for Outstanding Ph.D. Research**, Departmental Nominee *2020*
- **S. Lipschitz, M. A. Host and A. O. Smith Awards**, Departmental Nominee *2020*
- **EECS Rising Stars 2020**, University of California, Berkeley *2020*
- **Rackham Predoctoral Fellowship**, University of Michigan *2020*
- **ITA Graduation Day Invited Talk**, University of California, San Diego *2020*
- **Travel Award**
  - NeurIPS, WiML Workshop at ICML, MD4SG Workshop at EC
- **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*
- **National Scholarship (Top 2%)**, China *2012*

Conference Publications

1. **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.*
2. **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.*
3. **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.*

4. M. Khalili, **X. Zhang**, M. Abroshan and S. Sojoudi. Improving Fairness and Privacy in Selection Problems. *In the 35th AAAI Conference on Artificial Intelligence **(AAAI)**, 2021.*

5. 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.*

6. 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.*

7. 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.*

8. **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.*

9. 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.*

10. 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.*
    - ASME Automotive and Transportation Systems **Best Paper Award Finalist**

Journal Publications

11. **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.*

12. **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.*

13. **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.*

14. 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)**, 2020.*

Book Chapters

15. **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

16. **X. Zhang**, M. Khalili, P. Naghizadeh and Mingyan Liu. Fairness Interventions as (Dis)incentives for Strategic Manipulation. *In ICLR-21 Workshop on Responsible AI, submitted, 2021.*

17. M. Khalili and **X. Zhang**. Fair Online Selection Using Supervise Learning Models. *In the 38th International Conference on Machine Learning **(ICML)**, submitted, 2021.*

18. **X. Zhang**, M. Khalili and M. Liu. Differentially Private Real-Time Release of Sequential Data. *In IEEE Transactions on Signal Processing **(TSP)**, submitted, 2020.*
    - Available on: *https://bit.ly/3nyA3Xo*

19. 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 Knowledge and Data Engineering **(TKDE)**, submitted, 2020.*
    - Available on: *https://bit.ly/3fjXC3D*

    (* 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.

Guest Lecturer, University of Delaware
- **Course:** CIS 849010 Economics of Security and Privacy *Fall 2020*
- **Responsibilities:** Gave a lecture on privacy-preserving machine learning algorithms, introduced common approaches to achieve differential privacy in optimization and the applications in distributed learning.

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).

Proposal Writing

National Science Foundation (NSF) Award University of Michigan
- **Award number:** CNS-1646019 *2017 - 2020*
- **Project:** *CPS: Synergy: Connected Testbeds for Connected Vehicles*
- PI: Tulga Ersal, Co-PI: Mingyan Liu, Anna Stefanopoulou
- **Responsibilities:** Helped to write the research proposal and annual reports.

National Training Program of Innovation and Entrepreneurship Beihang University
- **Award number:** 201310006007 *2013 - 2014*
- **Project:** *Intelligent Guidance System Based on Image Recognition and 3D Reconstruction* (Awarded 18,600 CNY by the Chinese Ministry of Education)
- **Responsibilities:** As the *project leader*, I formulated the research problem, developed the algorithms and circuits, and wrote the proposal and project reports.

Academic Services

Journal and Conference Reviewer
- International Conference on Machine Learning (ICML) *2021*
- AAAI Conference on Artificial Intelligence (AAAI) *2021*
- International Conference on Learning Representations (ICLR) *2021*
- IEEE Transaction on Information Forensics and Security (TIFS) *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

– Website: *https://wimlworkshop.org/icml2020/program/*

- **Session:** People, AI, and Fairness, Physics and Machine Learning *02/2020*
  Information Theory and Applications (ITA) Workshop, UCSD

Workshop Organizer

- Towards Fair, Robust, Private and Interpretable Machine Learning, *submitted*
  – Proposal is available on: *https://bit.ly/3nB49tg*

Guest Editor

- **Research Topic:** Trustworthy Machine Learning
  Frontiers in Computer Science & Big Data
  – Details are available on: *https://bit.ly/3f9HEc6*

Discussant

- *ECE Communications and Signal Processing Seminar*, University of Michigan *2020*
  – Enabling Fast and Robust Federated Learning
  – Connections between Online Learning and Differential Privacy

Invited Talks

Human-Centric Machine Learning: on the Preservation of Individual Privacy and Fairness

- **Seminar**, Shanghai Jiao Tong University, China *07/2020*

Human-Centric Machine Learning

- **Graduation Day**, *Information Theory and Applications (ITA) Workshop*, UCSD *02/2020*

Workshop and Poster

How Do Fair Decisions Fare in Long-Term Qualification?

- *Engineering Graduate Symposium (EGS)*, University of Michigan *02/2021*
- *NeurIPS Workshop, Consequential Decision Making in Dynamic Environments* *12/2020*
- *EECS Rising Stars Workshop* *11/2020*
- *Conference on Neural Information Processing Systems (NeurIPS)* *12/2020*

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*
- *Information Theory and Applications (ITA) Workshop,* UCSD *02/2020*
- *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 (EGS)*, University of Michigan *11/2017*

Internship

Modern Nondestructive Testing Engineering Technology Research Center, 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++, HTML, CCS

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; Signals and Systems; Mathematical Analysis; Linear Algebra

REFERENCES

Prof. Mingyan Liu
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Prof. Alfred Hero
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