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

Awards

- **Caltech Young Investigators Forum**, Engineering and Applied Science, Caltech *2021*
- **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. How Do Fair Decisions Fare in Long-Term Qualification?
   X. Zhang*, R. Tu*, Y. Liu, M. Liu, H. Kjellström, K. Zhang and C. Zhang
   *In the 34th Conference on Neural Information Processing Systems **(NeurIPS)**, 2020.*

2. Group Retention when Using Machine Learning in Sequential Decision Making: the Interplay between User Dynamics and Fairness.
   X. Zhang*, M. Khalili*, C. Tekin and M. Liu
   *In the 33rd Conference on Neural Information Processing Systems **(NeurIPS)**, 2019.*

3. Improving the Privacy and Accuracy of ADMM-based Distributed Algorithms.
   X. Zhang, M. Khalili and M. Liu
   *In the 35th International Conference on Machine Learning **(ICML)**, 2018.*

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

5. Contract Design for Purchasing Private Data Using a Biased Differentially Private Algorithm.
   M. Khalili*, **X. Zhang*** and M. Liu
   *In the 14th Workshop on the Economics of Networks, Systems and Computation **(NetEcon)**, 2019.*

6. Incentivizing Effort in Interdependent Security Games Using Resource Pooling.
   M. Khalili, **X. Zhang** and M. Liu
   *In the 14th Workshop on the Economics of Networks, Systems and Computation **(NetEcon)**, 2019.*

7. Effective Premium Discrimination for Designing Cyber Insurance Policies with Rare Losses.
   M. Khalili, **X. Zhang** and M. Liu
   *In the 10th Conference on Decision and Game Theory for Security **(GameSec)**, 2019.*

8. Recycled ADMM: Improve Privacy and Accuracy with Less Computation in Distributed Algorithms.
   X. Zhang, M. Khalili and M. Liu
   *In the 56th Annual Allerton Conference on Communication, Control, and Computing **(Allerton)**, 2018.*

9. Public Good Provision Games on Networks with Resource Pooling.
   M. Khalili, **X. Zhang** and M. Liu
   *In the International Conference on Network Games Control and Optimization **(NetGCoop)**, 2018.*

10. A Robust Energy and Emissions Conscious Cruise Controller for Connected Vehicles with Privacy Considerations.
    C. Huang, **X. Zhang**, R. Salehi, T. Ersal and A. Stefanopoulou
    ASME Automotive and Transportation Systems **Best Paper Award Finalist**
    *In 2020 American Control Conference **(ACC)**, 2020.*

Journal Publications

11. Recycled ADMM: Improving the Privacy and Accuracy of Distributed Algorithms.
    X. Zhang, M. Khalili and M. Liu
    *In IEEE Transactions on Information Forensics and Security **(TIFS)**, 2019.*

12. Predictive Cruise Control with Private Vehicle-to-Vehicle Communication for Improving Fuel Consumption and Emissions.
    X. Zhang*, C. Huang*, M. Liu, A. Stefanopoulou and T. Ersal
    In IEEE Communications Magazine, 2019.

13. Long-Term Impacts of Fair Machine Learning.
    X. Zhang, M. Khalili and M. Liu
    In Ergonomics in Design: The Quarterly of Human Factors Applications, 2019.

14. Resource Pooling for Shared Fate: Incentivizing Effort in Interdependent Security Games through Cross-investments.
    M. Khalili, **X. Zhang** and M. Liu
    *In IEEE Transactions on Control of Network Systems **(TCNS)**, 2020.*

15. Designing Contracts for Trading Private and Heterogeneous Data Using a Biased Differentially Private Algorithm.
    M. Khalili*, **X. Zhang*** and M. Liu
    In IEEE Access, 2021.

Book Chapters

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

Submitted Papers

17. Fairness Interventions as (Dis)incentives for Strategic Manipulation.
X. Zhang, M. Khalili, P. Naghizadeh and M. Liu

18. Fair Online Selection Using Supervise Learning Models.
M. Khalili and **X. Zhang**

19. Differentially Private Real-Time Release of Sequential Data.
X. Zhang, M. Khalili and M. Liu
(* 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).

Proposal Writing

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, 2021*
- 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

Workshop Organizer
- Workshop on Socially Responsible Machine Learning, *07/2021*
International Conference on Machine Learning (ICML)

Guest Editor

- **Research Topic:** Trustworthy Machine Learning
  Frontiers in Computer Science & Big Data

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

Trustworthy Machine Learning: On the Preservation of Individual Privacy and Fairness *2021*

- Emory University, *Department of Computer Science*
- Ohio State University, *Department of Computer Science & Engineering*
- Purdue University, *School of Industrial Engineering*
- Purdue University, *Department of Computer Science*
- Pennsylvania State University, *College of Information Sciences & Technology*
- University of California, Santa Cruz, *Department of Computer Science & Engineering*
- University of Maryland, College Park, *Department of Electrical & Computer Engineering*
- University of Notre Dame, *Department of Computer Science & Engineering*
- Virginia Polytechnic Institute and State University, *Department of Computer Science*
- Washington University in St. Louis, *Department of Computer Science & Engineering*

Human-Centric Machine Learning: On the Preservation of Individual Privacy and Fairness *07/2020*

- Shanghai Jiao Tong University, China

Human-Centric Machine Learning *02/2020*

- **Graduation Day**, *Information Theory and Applications Workshop*, UCSD

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*, UC Berkeley *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 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*

Skills

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

References

Available upon request.