

Curriculum Vitæ

Junyuan Hong

University of Texas at Austin

Phone: +1 (517) 668-5790

E-mail: jyhong@utexas.edu, Webpage: <https://jyhong.gitlab.io>

I am a joint postdoctoral fellow in the Institute for Foundations of Machine Learning (IFML) and Wireless Networking and Communications Group (WNCG) at UT Austin.

Education

Ph.D. in Computer Science and Engineering 2023

Michigan State University, East Lansing, MI, USA

Supervisor: Dr. Jiayu Zhou

Committee: Dr. Anil K. Jain, Dr. Sijia Liu, Dr. Zhangyang Wang, Dr. Jiayu Zhou

Thesis: Data-Centric Privacy-Preserving Machine Learning

M.S. in Computer Science 2018

University of Science and Technology of China, Hefei, China

Supervisor: Dr. Huanhuan Chen

B.S. in Physics with minor in Computer Science 2015

University of Science and Technology of China, Hefei, China

Research Interests

Privacy-Centric Trustworthy Machine Learning: Theory and algorithms of privacy-preserving learning with assurance of fairness, robustness, security and inclusiveness.

Democratizing Machine Learning for Healthcare: Trustworthy and affordable medical predictive modeling and treatment for cognition dementia diseases, especially using generative artificial intelligence (e.g., large language models).

Research Experiences

2023 - Present **Joint Postdoctoral Fellow**, IFML&WNCG at University of Texas, Austin, TX, USA

Supervisor: Dr. Zhangyang Wang

(1) Large language models for healthcare (dementia diagnosis and treatment);

(2) Democratizing vision/language foundation models with privacy protection.

Aug '18 - July '23 **Research Assistant**, Michigan State University, MI, USA

Supervisor: Dr. Jiayu Zhou

(1) Privacy-preserving and fair machine learning systems for healthcare with heterogeneous users;

(2) Holistic trustworthy machine learning that are affordable, adaptive and beneficial for more and diverse users.

Feb '22 - Aug '22 **Research Intern**, Sony AI, NY, USA

Mentor: Dr. Lingjuan Lyu

(1) Privacy-preserving cloud training algorithms that require low computation costs and

low privacy risks for edge devices;
 (2) Memory-efficient model adaptation algorithms for dynamically-changing test-time environments, which can fit into edge devices.

Aug '15 - Jun '18 **Research Assistant**, University of Science and Technology of China, Hefei, China
 Supervisor: Huanhuan Chen
 (1) Hardware and software prototype for detecting underground cables;
 (2) Implicit data-augmentation optimization algorithms for subspace data with applications to human action recognition.

Honors & Awards

2023	Research Enhancement Award, Michigan State University The 3rd place in the U.S.-U.K. Privacy-Enhancing Technologies (PETs) prize challenge Dissertation Completion Fellowship, Michigan State University
2021	Carl V. Page Memorial Graduate Fellowship, Michigan State University
2015	Outstanding Freshman Scholarship, University of Science and Technology of China

Selected Publications

([†] indicates the equal contribution, * indicates (co-)advised students.)

(1) Machine Learning for Healthcare

- [2023] **Junyuan Hong**, Wenqing Zheng, Hiroko Dodge, Jiayu Zhou, Zhangyang Wang. Large Language Models Can Be Trustworthy Chatbot for Mitigating. *Ongoing work*. Application: Digital twin by chatbots.
- [FL4DM'23] Haobo Zhang*, **Junyuan Hong**, Fan Dong, Steve Drew, Liangjie Xue, Jiayu Zhou. A Privacy-Preserving Hybrid Federated Learning Framework for Financial Crime Detection. *International Workshop on Federated Learning for Distributed Data Mining*.
- [KDD'21] **Junyuan Hong**, Zhuangdi Zhu, Shuyang Yu*, Zhangyang Wang, Hiroko Dodge, and Jiayu Zhou. Federated Adversarial Debiasing for Fair and Transferable Representations. *Proceedings of the 27th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*.
Application: Disease modeling from daily-activity data collected from distributed patients.
- [AD'20] **Junyuan Hong**, Jeffrey Kaye, Hiroko H Dodge, Jiayu Zhou. Detecting MCI Using Real-time, Ecologically Valid Data Capture Methodology: How to Improve Scientific Rigor in Digital Biomarker Analyses. *Alzheimer's & Dementia*
Application: Disease modeling from daily-activity data.
- [ECML'16] Yang Li, **Junyuan Hong** and Huanhuan Chen. Sequential Data Classification in the Space of Liquid State Machines. (2016) *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases*.
Application: Model the correlation of genetic predisposition to alcoholism in EEG.

(2) Privacy-Centric Trustworthy Learning on Distributed Systems

- [Preprint'23] **Junyuan Hong**, Jiachen T. Wang, Chenhui Zhang, Zhangheng Li, Bo Li, Zhangyang Wang. DP-OPT: Make Large Language Model Your Differentially-Private Prompt Engineer. *Preprint*. #Privacy #LLM
- [Preprint'23] Zhangheng Li^{*}, **Junyuan Hong**, Bo Li, Zhangyang Wang. Shake to Leak: Amplifying the Generative Privacy Risk through Fine-Tuning. *Preprint*. #Privacy #Generative-AI
- [NeurIPS'23] Haobo Zhang^{*†}, **Junyuan Hong**[†], Yuyang Deng, Mehrdad Mahdavi, Jiayu Zhou. Understanding Deep Gradient Leakage via Inversion Influence Functions. *Proceedings of the Thirty-Seventh Conference on Neural Information Processing Systems*. #Privacy
- [Preprint'23] Shuyang Yu^{*}, **Junyuan Hong**, Haobo Zhang, Haotao Wang, Zhangyang Wang, Jiayu Zhou. Safe and Robust Watermark Injection with a Single OoD Image. *Preprint*. #Copyright-Protection
- [RML'23] Shuyang Yu^{*}, **Junyuan Hong**, Yi Zeng, Fei Wang, Ruoxi Jia, Jiayu Zhou. Who Leaked the Model? Tracking IP Infringers in Accountable Federated Learning. *Regulatable ML @NeurIPS2023*. #Copyright-Protection
- [ICML'23] **Junyuan Hong**[†], Yi Zeng[†], Shuyang Yu^{†*}, Lingjuan Lyu, Ruoxi Jia, Jiayu Zhou. Revisiting Data-Free Knowledge Distillation with Poisoned Teachers. *Proceedings of Fortieth International Conference on Machine Learning*. #AI-Security
- [ICLR'23] **Junyuan Hong**, Lingjuan Lyu, Jiayu Zhou, Michael Spranger. MECTA: Memory-Economic Continual Test-Time Model Adaptation. *Proceedings of the Eleventh International Conference on Learning Representations*. #Edge-Computing #Robustness
- [ICLR'23] Shuyang Yu^{*}, **Junyuan Hong**, Haotao Wang, Zhangyang Wang and Jiayu Zhou. Turning the Curse of Heterogeneity in Federated Learning into a Blessing for Out-of-Distribution Detection. *Proceedings of the Eleventh International Conference on Learning Representations*. #Federated-Learning #Robustness #Fairness
- [TMLR'23] Haotao Wang, **Junyuan Hong**, Jiayu Zhou, and Zhangyang Wang. How Robust is Your Fairness? Evaluating and Sustaining Fairness under Unseen Distribution Shifts. *Transactions on Machine Learning Research*. #Federated-Learning #Robustness
- [AAAI'23] **Junyuan Hong**, Haotao Wang, Zhangyang Wang, and Jiayu Zhou. Federated Robustness Propagation: Sharing Adversarial Robustness in Heterogeneous Federated Learning. *Proceedings of the Thirty-Seventh AAAI Conference on Artificial Intelligence*. #Federated-Learning #Robustness #Inclusiveness
- [NeurIPS'22] **Junyuan Hong**, Lingjuan Lyu, and Jiayu Zhou, Micheal Spranger. Outsourcing Training without Uploading Data via Efficient Collaborative Open-Source Sampling. *Proceedings of the Thirty-Sixth Conference on Neural Information Processing Systems*. #Privacy #Edge-Computing
- [NeurIPS'22] Haotao Wang, **Junyuan Hong**, Aston Zhang, Jiayu Zhou and Zhangyang Wang. Trap and Replace: Defending Backdoor Attacks by Trapping Them into an Easy-to-Replace Subnetwork. *Proceedings of the Thirty-Sixth Conference on Neural Information Processing Systems*. #AI-Security

- [FAccT'22] **Junyuan Hong**, Zhangyang Wang, and Jiayu Zhou. Dynamic Privacy Budget Allocation Improves Data Efficiency of Differentially Private Gradient Descent. *Proceedings of the 2022 ACM Conference on Fairness, Accountability, and Transparency*.
#Privacy
- [ICLR'22] **Junyuan Hong**, Haotao Wang, Zhangyang Wang, and Jiayu Zhou. Efficient Split-Mix Federated Learning for On-Demand and In-Situ Customization. *Proceedings of the Tenth International Conference on Learning Representations*.
#Federated-Learning #Inclusiveness
- [ICML'22] Zhuangdi Zhu, **Junyuan Hong**, Steve Drew, and Jiayu Zhou. Resilient and Communication Efficient Learning for Heterogeneous Federated Systems. *Proceedings of Thirty-ninth International Conference on Machine Learning*.
#Federated-Learning
- [ICML'21] Zhuangdi Zhu, **Junyuan Hong**, and Jiayu Zhou. Data-Free Knowledge Distillation for Heterogeneous Federated Learning. *Proceedings of Thirty-eighth International Conference on Machine Learning*.
#Federated-Learning
- [AAAI'21] **Junyuan Hong**, Haotao Wang, Zhangyang Wang, and Jiayu Zhou. Learning Model-Based Privacy Protection under Budget Constraints. *Proceedings of the Thirty-Fifth AAAI Conference on Artificial Intelligence*.
#Privacy
- [FL4DM'23] Siqu Liang*, Jintao Huang, **Junyuan Hong**, Dun Zeng, Jiayu Zhou, Zenglin Xu. FedNoisy: A Federated Noisy Label Learning Benchmark. *International Workshop on Federated Learning for Distributed Data Mining*.
#Federated-Learning #Robustness

Teaching Experiences

Fall 2023	Mentor, “Trustworthy Large Language Models” (undergraduate level), Directed Reading Program (DiRP), University of Texas at Austin Mentoring students on reading papers and conduct projects
Spring 2023	Lectures on privacy and federated learning at “CSE847: Machine Learning” (graduate level), Michigan State University
Spring 2021	Teaching Assistant, “CSE847: Machine Learning” (graduate level), Michigan State University Lectures on privacy and federated learning
Fall 2020	Teaching Assistant, “CSE404: Introduction to Machine Learning” (undergraduate level), Michigan State University

Invited Talks & Presentations

2023	(Invited Talk) Backdoor Meets Data-Free Learning. <i>TMLR Group</i> , Hong Kong Baptist University, September, 2023 (Invited Talk) MECTA: Memory-Economic Continual Test-Time Model Adaptation. <i>Computer Vision Talks</i> , April, 2023
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- (Oral) Federated Robustness Propagation: Sharing Adversarial Robustness in Heterogeneous Federated Learning, *The Thirty-Seventh AAAI Conference on Artificial Intelligence* (AAAI 2023), Washington D.C., February 2023.
- 2022 (Poster) Outsourcing Training without Uploading Data via Efficient Collaborative Open-Source Sampling. *The Thirty-seventh Conference on Neural Information Processing Systems* (NeurIPS 2022), November, 2022.
- (Invited Talk) Split-Mix Federated Learning for Model Customization, *TrustML Young Scientist Seminars*, RIKEN, July, 2022
- (Poster) Efficient Split-Mix Federated Learning for On-demand and In-situ Model Customization, *The Tenth International Conference on Learning Representations* (ICLR 2022), Virtual, April, 2022.
- (Poster) Efficient Split-Mix Federated Learning for On-demand and In-situ Model Customization, *Engineering Graduate Research Symposium*, Michigan State University, April, 2022.
- (Invited Talk) Efficient Split-Mix Federated Learning for On-demand and In-situ Model Customization, *Sony AI Journal Club*, Virtual, February, 2022.
- (Oral) Dynamic Privacy Budget Allocation Improves Data Efficiency of Differentially Private Gradient Descent, *The 2022 ACM Conference on Fairness, Accountability, and Transparency* (FAccT 2022), Virtual, June 2022.
- 2021 (Talk) Federated Adversarial Debiasing for Fair and Transferable representations, *CSE Graduate Seminar*, Michigan State University, October, 2021
- (Oral) Federated Adversarial Debiasing for Fair and Transferable Representations, *The 27th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (SIGKDD 2021), Virtual, August 2021.
- (Poster) Learning model-based privacy protection under budget constraints, *The Thirty-Fifth AAAI Conference on Artificial Intelligence* (AAAI 2021), Virtual, February 2021.
- 2020 (Invited Talk) Dynamic Policies on Differential Private Learning, *VITA Seminars*, University of Texas at Austin, Virtual, March 2020.
- 2018 (Oral) Disturbance Grassmann kernels for subspace-based learning, *The 24th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (SIGKDD 2018), London, August 2018.

Media Coverage

- 2023 At Summit for Democracy, the United States and the United Kingdom Announce Winners of Challenge to Drive Innovation in Privacy-enhancing Technologies That Reinforce Democratic Values, The White House
- Privacy-enhancing Research Earns International Attention, MSU Engineering News
- Privacy-Enhancing Research Earns International Attention, MSU Office Of Research And Innovation

Professional Activities

Program Chair:

- Lead Chair at the 1st International Workshop on Federated Learning for Distributed Data Mining co-located with ACM SIGKDD 2023. ([f14data-mining.github.io](https://github.com/f14data-mining))

Technical Program Committee Member (or Equivalent Reviewer) for Conferences or Journals:

- Transactions on Knowledge and Data Engineering (TKDE): 2023
- Journal of Artificial Intelligence Research (JAIR): 2023
- Transactions on Dependable and Secure Computing (TDSC): 2023
- Neurocomputing: 2021, 2022
- ACM Transactions on Knowledge Discovery from Data (TKDD): 2020
- Annual Conference on Neural Information Processing Systems (NeurIPS): 2022, 2023
- International Conference on Learning Representations (ICLR): 2023, 2024
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD): 2022, 2023
- International Conference on Machine Learning (ICML): 2022, 2023
- International Conference on Artificial Intelligence and Statistics (AISTATS): 2022, 2023
- International Conference on Web Search and Data Mining (WSDM): 2022
- AAAI Conference on Artificial Intelligence (AAAI): 2021, 2022, 2023
- International Joint Conference on Artificial Intelligence (IJCAI): 2019

Volunteers:

- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD): 2018, 2021

Advising Students

Students advised or co-advised with my advisor:

2020 - 2023	Shuyang Yu , Ph.D. student, Michigan State University Research: Federated learning, out-of-distribution data. <ul style="list-style-type: none">• (First author) Turning the Curse of Heterogeneity in Federated Learning into a Blessing for Out-of-Distribution Detection. <i>Featured as spotlight at ICLR'23</i>• (First author) Who Leaked the Model? Tracking IP Infringers in Accountable Federated Learning. <i>NeurIPS'23 Workshop on Regulatable ML</i>.• Revisiting Data-Free Knowledge Distillation with Poisoned Teachers. <i>ICML'23</i>.• Federated Adversarial Debiasing for Fair and Transferable Representations. <i>ACM SIGKDD'21</i>.
2022 - 2023	Haobo Zhang , Ph.D. student, Michigan State University Research: Privacy-preserving learning.

	<ul style="list-style-type: none"> • (First author) Won 3rd place at U.S.-U.K. PETs (Privacy-enhancing technologies) Prize Challenge, 2023. • (First author) Understanding Deep Gradient Leakage via Inversion Influence Functions, <i>NeurIPS'23</i>. • (First author) Privacy-Preserving Hybrid Federated Learning Framework for Financial Crime Detection. <i>KDD FL4DataMining Workshop'23</i>.
2022 - 2023	<p>Siqi Liang, Ph.D. student, Michigan State University Research: Federated learning.</p> <ul style="list-style-type: none"> • (First author) FedNoisy: A Federated Noisy Label Learning Benchmark. <i>KDD FL4DataMining Workshop'23</i>.
2023 - Now	<p>Zhangheng Li, Ph.D. student, University of Texas at Austin Research: Privacy of generative models.</p> <ul style="list-style-type: none"> • (First author) Shake to Leak: Fine-tuning Can Amplify the Generative Privacy Risks. <i>Under Review</i>
2023 - Now	<p>Jeffrey Ziwei Tan, Undergraduate student, University of California, Berkeley Research: Privacy of Large Language Models.</p>
2023 - Now	<p>Da Liu, Undergraduate student, University of Texas at Austin Directed Reading Program: Trustworthiness of Large Language Models.</p>
2023 - Now	<p>Jocelyn Zhang, Undergraduate student, University of Texas at Austin Directed Reading Program: Trustworthiness of Large Language Models.</p>
2023 - Now	<p>Satvik Mahendra, Undergraduate student, University of Texas at Austin Directed Reading Program: Trustworthiness of Large Language Models.</p>