

Jianan Chen

West Lafayette, IN, USA | +1 (317) 777-0889 | chen3873@purdue.edu | <https://drjonac.github.io/DrJonaC/>

EDUCATION

Purdue University, Department of Computer Science

09/2020-Now

◆ Ph.D. (Candidate) of Computer Science (**Supervisor: Dr. Qin Hu, Dr. Snehasis Mukhopadhyay**)

◆ Research area: Federated learning, Game theory, Privacy Protection

Beijing Normal University, College of Information Science and Technology

09/2015-06/2019

◆ Bachelor of Science in Computer Science and Technology (**GPA: 3.88/4.00, Rank: 6/55**)

PROJECT EXPERIENCE

◆ **Research Assistant, Purdue University**

01/2021-Now

Primarily assisted supervisor with all stages of research, including setting up environment, defining problem statements, identifying gaps in literature, structuring papers, providing insights on writing and publication. The details are as follows:

-- **Utility-Enhanced Personalized Privacy Preservation in Applied Federated Learning**

Proposed Group Local Differential Privacy (GLDP), a novel privacy framework tailored for Hierarchical Federated Learning (HFL).

Designed the Sampling-Randomizing-Shuffling (SRS) mechanism, integrating randomized response and shuffling to balance model utility and privacy protection.

Published in IEEE Transactions on Mobile Computing (IEEE TMC), 2025

-- **Upcycling Noise for Privacy Protection in Distributed Machine Learning**

Proposed Federated Unlearning with Indistinguishability (FUI), a novel unlearning framework for Differential Privacy-enhanced Federated Learning, ensuring "the right to be forgotten" without degrading model utility.

Introduced a two-step approach to achieve statistical indistinguishability between the unlearned and the retrained model.

Proceeding in IEEE Transactions on Information Forensics and Security (IEEE TIFS), 2025

-- **Maximizing Social Welfare in Practical Machine Learning Scenarios**

Modeled cross-silo Federated Learning as a public goods game and proved the existence of a social dilemma, where selfish behaviors degrade global model performance.

Introduced the Multi-player Multi-action Zero-Determinant (MMZD) strategy, allowing individual organizations to control social welfare without incurring additional costs.

Published in IEEE International Conference on Acoustics, Speech, and Signal Processing (IEEE ICASSP), 2022

Developed the MMZD Alliance (MMZDA) strategy, proving that cooperation enhances social welfare maximization.

Published in IEEE Transactions on Vehicular Technology (IEEE TVT), 2024

-- **Game Theory and Deep Learning Methods in Economics**

Developed a novel iterative algorithm for computing stationary Markov perfect equilibria in stochastic games, enabling strategic decision-making in dynamic multi-agent systems.

Applied the proposed framework to cybersecurity and market competition games.

Validated the algorithm through extensive simulations, confirming its robustness and efficiency.

Published in MDPI Algorithms, 2024

-- **Distributed Machine Learning For Mobile Crowd Sensing**

Developed a zero-determinant (ZD) strategy for audit games, enabling defenders to unilaterally control attackers' utility when accessing sensitive data.

Designed an optimization scheme based on the ZD strategy to maximize the utility difference between defenders and attackers, ensuring cost-efficient security management.

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Published in Elsevier Computers & Security, 2022. Project supported by NSF CRII Award #2105004

◆ Undergraduate Research Experience, Beijing Normal University

04/2016-06/2019

--Representation of Christian Civilization in Virtual Reality (Advisor: Yanlin Luo, Associate Professor)

Designed and developed a virtual reality (VR) simulation in Unity3D and SketchUp for visualizing historical aspects of Christian civilization in a Basilica style church. Integrated multimedia technologies with VR to enhance user immersion.

Project Fund of the Key Laboratory of Computer Science, Chinese Academy of Sciences

--Software Development Engineering for WeChat Programs H! Morning (Advisor: Ying Wang, Professor)

Designed and implemented core features for WeChat mini-program, improving user engagement and experience.

Developed backend systems to support real-time data retrieval and personalized recommendations.

National College Student Research Training & Innovation and Entrepreneurship Program

--Research on Combination of Visual Reality and Digital Multimedia (Advisor: Haibo Wang, Professor)

Investigated novel methods for integrating VR with digital multimedia technologies to create interactive experiences.

Developed a naïve 3D model to enhance virtual simulations in VR.

Scientific Research Foundation Project of Beijing Normal University

INTERNSHIP EXPERIENCE

◆ Data Operation Assistant, Beijing Didi Infinity Tech & Dev Co., Ltd

03/2018-06/2018, Beijing, China

Designed experimental strategies to evaluate the impact of coupon on user growth, engagement, and retention.

Monitored ROI for different promotional campaigns, optimizing cost-effectiveness and maximizing user acquisition.

Developed coupon allocation strategies based on user segmentation, enhancing user experience while driving revenue growth.

◆ New Media Operator, Want Want China Times Cultural Media Co., Ltd

04/2016-05/2016, Beijing, China

Managed and wrote digital content for the company's social media platforms, increasing audience engagement by 420%.

TEACHING EXPERIENCE

◆ Lecturer, AIS 20000 - Introduction to Data Science

2024 Fall

Redesigned the entire course slides, incorporating the latest developments in data science, machine learning, and big data technologies to ensure up-to-date and engaging content.

Innovatively integrated magic tricks and variety show elements into lectures to enhance student engagement and make complex concepts more accessible. Received **positive student feedback** for delivering an engaging and unconventional teaching approach, fostering curiosity and deeper understanding of data science principles.

◆ Teaching Assistant, CSCI 43600 – Principles of Computer Networking

2023 Fall

◆ Teaching Assistant, CSCI 49000 – Wireless and Mobile Security

2023 Spring

◆ Teaching Assistant, CSCI 43600 – Principles of Computer Networking

2022 Fall

◆ Undergraduate Capstone Project Coordinator

2022 Spring

EXTRACURRICULAR ACTIVITIES

Volunteer teaching in Linxia Hui Autonomous Prefecture, Gansu Province *Team Leader*

08/2017

Propaganda Department of Party Committee, BNU *Editor-in-Chief*

09/2016-09/2017

Second Cross-straits Youth Forum *Student Representative of Beijing Normal University*

07/2016

The 10th Information Culture Festival, BNU *Planner*

04/2016-05/2016

BRICS University President Forum *Coordinator (only one from freshmen)*

09/2015

SELECTED HONORS

Recipient of University Fellowship

04/2022

First Prize in Beijing Undergraduate Mathematical Contest in Modeling

09/2017

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Outstanding Individual in Work-study

09/2017

Top 10% in BNU Mathematical Contest in Modeling

09/2017

PUBLICATIONS

- ◆ Chen, Jianan, Honglu Jiang, and Qin Hu. **"Utility-Enhanced Personalized Privacy Preservation in Hierarchical Federated Learning."** *IEEE Transactions on Mobile Computing* (2024).
- ◆ Chen, Jianan, Qin Hu, Fangtian Zhong, Yan Zhuang, and Minghui Xu. **"Upcycling Noise for Federated Unlearning."** *IEEE Transactions on Information Forensics and Security* (2024).
- ◆ Chen, Jianan, Qin Hu, and Honglu Jiang. **"Alliance Makes Difference? Maximizing Social Welfare in Cross-Silo Federated Learning."** *IEEE Transactions on Vehicular Technology* (2023).
- ◆ Chakrabarti, Subir K., Jianan Chen, and Qin Hu. **"Stationary Markov Equilibrium Strategies in Asynchronous Stochastic Games: Existence and Computation."** *Algorithms* 17.11 (2024): 490.
- ◆ Chen, Jianan, Qin Hu, and Honglu Jiang. **"Strategic signaling for utility control in audit games."** *Computers & Security* 118 (2022): 102721.
- ◆ Chen, Jianan, Qin Hu, and Honglu Jiang. **"Social welfare maximization in cross-silo federated learning."** *ICASSP 2022-2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2022.
- ◆ Peng, Cheng, et al. **"Energy-efficient device selection in federated edge learning."** *2021 International Conference on Computer Communications and Networks (ICCCN)*. IEEE, 2021.

SERVICES

Reviewer for Journal of Network and Computer Applications (JNCA), Journal of Systems Architecture (JSA), High-Confidence Computing (HCC), INFOCOM (2023,2024), GLOBALCOM (2022,2023), BIBM (2024)

HIGHLIGHT SKILLS

Video Production (Adobe After Effects, Adobe Premiere), Image Processing (Photoshop, Snapseed, VSCO), Game Production (RPG Maker), Painting (Color Pencil, Watercolor, Traditional Chinese Painting)

LANGUAGE PROFICIENCY

- ◆English: Fluent. Professional working proficiency with academic publications, lecture speech and conference presentations.
- ◆Chinese: Native proficiency. Extensive academic, literary and professional use.
- ◆Hokkien: Native proficiency. Extensive daily use.