Yuanjie Shi

PhD candidate (expect to graduate in 2026)
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Research Interests

Robust Machine Learning, Uncertainty Quantification, Conformal Prediction, Federated Learning, Controllable and Structure-Aware LLM, Generative Models.

Research Summary

My research lies at the intersection of robust machine learning and trustworthy AI, with a growing emphasis on uncertainty-aware generative models and large language models (LLMs). The overall goal is to enable reliable deployment of AI systems under real-world noise, shift, and ambiguity. I develop practical yet theoretically grounded algorithms that provide uncertainty awareness, safety guarantees, and scalability for both discriminative and generative AI models. Specific research thrusts include:

- Uncertainty quantification for robust and effective Human-ML collaborative systems using conformal prediction.
- Federated learning frameworks for privacy-preserving and robust deep learning, facilitating secure collaboration across decentralized, heterogeneous data sources.
- Controllable and structure-aware text generation and preference alignment for reliable LLM fine-tuning.

Education

Washington State University, Pullman, WA — Fall 2021 – Present
Doctor of Philosophy in Computer Science
Advisor: Prof. Yan Yan
Research Topic: *Robust Machine Learning: From Representation to Uncertainty Quantification*

Stevens Institute of Technology, Hoboken, NJ — 2017 – 2019
Master of Science in Electrical Engineering
Advisor: Prof. Kevin Lu
Thesis: *An Auto-drive Car based on Raspberry Pi*

Chongqing University, Chongqing, China — 2012 – 2016
Bachelor of Engineering in Automation
Advisor: Prof. Jianghong Ren
Thesis: *Research on Failure Modes of Urban Secondary Water Supply System*

Professional Appointments

Teaching Assistant, Washington State University, EECS — January 2025 – April 2025
CptS 434: Neural Network Design and Applications (Spring-2025)

Research Assistant, Washington State University, EECS — September 2021 – Present

Research Intern, Tsinghua University, Automation February 2017 – June 2017
Worked with Prof. Lingxuan Zhang on optimizing production scheduling of assembly lines based on genetic algorithm.

Automation Engineering Intern, No. 3 Research Institute Of State-owned Dazhong Machine Works, China July 2016 – September 2016

Awards and Honors

NeurIPS Top Reviewer, NeurIPS 2025 2025

Outstanding Research Assistant in EECS, College of Engineering, WSU 2025

Mahmoud M. Dillsi Family Graduate Fellowship, WSU 2023 – 2024

Publications

Conference Papers

1. X. Jia†, **Y. Shi**†, Z. Liu, Y. Xu, Y. Yan. Cost-Sensitive Conformal Training with Provably Controllable Learning Bounds. Fortieth AAAI Conference on Artificial Intelligence (**AAAI 2026**).
2. Z. Zhang, X. Chen, **Y. Shi**, L. Ma, Z. Xu, Y. Yan. Minimum-Length Conformal Prediction Sets for Ordinal Classification. Fortieth AAAI Conference on Artificial Intelligence (**AAAI 2026**).
3. **Y. Shi**†, H. Shahrokhi†, X. Jia, X. Chen, J. Doppa, Y. Yan. Direct Prediction Set Minimization via Bilevel Conformal Classifier Training. Forty-Second International Conference on Machine Learning (**ICML 2025**).
4. Z. Ma†, **Y. Shi**†, Y. Yan, and J. Chen. Federated Rényi Fair Inference in Federated Heterogeneous System. Forty-first International Conference on Uncertainty in Artificial Intelligence (**UAI 2025**).
5. Z. Ma, Z. Li, **Y. Shi**, and J. Chen. FedSum: Data-Efficient Federated Learning under Data Scarcity Scenario for Text Summarization. Thirty-Ninth AAAI Conference on Artificial Intelligence (**AAAI 2025**).
6. **Y. Shi**, S. Ghosh, T. Belkhouja, Y. Yan, and J. Doppa. Conformal Prediction for Class-wise Coverage via Augmented Label Rank Calibration. Thirty-eighth Annual Conference on Neural Information Processing Systems (**NeurIPS 2024**).
7. S. Ghosh†, **Y. Shi**†, T. Belkhouja, Y. Yan, J. Doppa, and B. Jones. Probabilistically Robust Conformal Prediction. Thirty-ninth International Conference on Uncertainty in Artificial Intelligence (**UAI 2023**).

Workshops

1. **Y. Shi**. Reliable Uncertainty Quantification in Machine Learning via Conformal Prediction. Thirtieth AAAI/SIGAI Doctoral Consortium 2025.

Under Review Papers

1. **Y. Shi**†, P.Li†, J. Doppa, Y. Yan. Conformal Margin Risk Minimization: An Envelope Framework for Robust Learning under Label Noise. The 29th International Conference on Artificial Intelligence and Statistics (**AISTATS 2026**).
2. J. Zhu†, **Y. Shi**†, X. Peng, X. Liu, Y. Yan, and H. Wei. Keep the Best, Forget the Rest: Reliable Alignment with Order-Aware Preference Optimization. The Fourteenth International Conference on Learning Representations (**ICLR 2026**).

(†) indicates equal contribution.

Professional Service

Program Committee Member

- The 29th International Conference on Artificial Intelligence and Statistics (AISTATS), 2026
- The Fourteenth International Conference on Learning Representations (ICLR), 2026
- The Fortieth AAAI Conference on Artificial Intelligence (AAAI), 2026
- Conference on Neural Information Processing Systems (NeurIPS, Top Reviewers), 2025
- International Conference on Machine Learning (ICML), 2025

Mentoring Experience

I am mentoring junior PhD students and undergraduate students at WSU on research problems related to uncertainty quantification in machine learning using conformal prediction. Since 2022, I have mentored around 8 students in total (2–3 per year), including undergraduate research assistants and first-year PhD students starting their independent research.

References

- Prof. Yan Yan
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  School of Electrical Engineering and Computer Science
  Washington State University
  Email: yan.yan1@wsu.edu
- Prof. Jana Doppa
  Huie-Rogers Endowed Chair Professor of Computer Science
  Berry Distinguished Professor in Engineering
  School of Electrical Engineering and Computer Science
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- Prof. Ziquan Liu
  Lecturer (Assistant Professor)
  School of Electronic Engineering and Computer Science
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