Yuanjie Shi

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Education

Washington State University, Ph.D. in Computer Science — Expected 12/2026
Stevens Institute of Technology, M.S. in Electrical Engineering — 05/2019
Chongqing University, B.E. in Automation — 06/2016

Publications

- **AAAI 2026**: *Cost-Sensitive Conformal Training with Provably Controllable Learning Bounds* (†)
- **AAAI 2026**: *Minimum-Length Conformal Prediction Sets for Ordinal Classification.* (*)
- **ICML 2025**: *Direct Prediction Set Minimization via Bilevel Conformal Classifier Training* (†)
- **UAI 2025**: *Federated Rényi Fair Inference in Federated Heterogeneous System* (†)
- **AAAI 2025**: *FedSum: Data-Efficient Federated Learning under Data Scarcity Scenario for Text Summarization.* (*)
- **NeurIPS 2024**: *Class-wise Coverage via Augmented Label Rank Calibration*
- **UAI 2023**: *Probabilistically Robust Conformal Prediction* (†)
- **Workshop**: *Reliable UQ via Conformal Prediction*, AAAI/SIGAI Doctoral Consortium 2025

(†) indicates equal contribution.   (*) indicates third author.

Projects

LLM / NLP-Oriented Projects

- **Preference Selection for Alignment Optimization (Under Review @ ICLR 2026)**:
    - Investigated ambiguous training pairs in DPO-style preference alignment for LLMs.
    - Proposed RAPPO, a selective and order-aware DPO variant that filters uncertain samples via loss signals.
    - Improved generalization on instruction-tuning benchmarks with theoretical guarantees under selective learning.
- **FedSum for Federated Text Summarization (AAAI 2025)**:
    - Developed a federated summarization framework for privacy-constrained and data-scarce settings.
    - Introduced a depth–breadth strategy for sample selection and representation diversity from local/global knowledge.
    - Achieved strong performance on four NLP datasets with improved robustness and lower communication cost.

Uncertainty Quantification Projects

- **Direct Prediction Set Minimization (ICML 2025)**:
    - Designed a bilevel optimization framework to minimize conformal prediction set size via differentiable quantile surrogates.
    - Achieved up to 20% reduction in average prediction set size with provable $O(1/\sqrt{n})$ generalization bounds.
- **Class-wise Calibration (NeurIPS 2024)**:
    - Introduced a class-conditional rank calibration method to refine thresholds for low top-k error classes.
    - Improved per-class coverage guarantees and reduced prediction set size by 26.25% under distribution shift.
- **Probabilistically Robust Conformal Prediction (UAI 2023)**:
    - Developed a double-quantile scheme to ensure robust prediction sets under label noise and adversarial perturbations.
    - Outperformed standard and adversarial CP methods on benchmark datasets while maintaining valid coverage.

Federated Learning Projects

- **Federated Rényi Fair Inference (UAI 2025)**:
    - Proposed an inference-time fairness correction scheme based on Rényi divergence reweighting for federated systems with client heterogeneity.
    - Improved group fairness under non-IID data while maintaining accuracy, achieving 2% gain over baseline methods.

Technical Skills

Languages: Python, C++, MATLAB, LaTeX   **ML Frameworks**: PyTorch, TensorFlow   **LLM/NLP Tools**: transformers, accelerate, deepspeed, peft, trl   **Libraries**: CVXPY, OpenCV   **Systems**: Linux, Docker, SLURM