Xujiang Zhao, Ph.D.

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Employment History

2022 - Present **Researcher.** NEC Laboratories America.
Research on Uncertainty and Reasoning in AI safety for NLP and LLM

2021 Summer **Research Intern.** NEC Laboratories America.

2019 Summer **Research Intern.** Alibaba Damo Academy.

Education

2019 – 2022 **Ph.D. University of Texas at Dallas** in Computer Science.
Advisor: Prof. Feng Chen
Thesis title: *Multidimensional Uncertainty Quantification for Deep Neural Networks.*

2014 – 2017 **M.Sc. University of Science and Technology of China** in Computer Science.

2010 – 2014 **B.S. Chongqing University** in Civil Engineering.

Research Interests

- AI Safety: Uncertainty Quantification and Reasoning, Fairness and Equity, Privacy-preserving
- Natural Language Processing: Interpretability of Large Language Models, Neural Machine Reasoning
- Machine Learning: Robust ML, Out-of-Distribution Detection and Generalization
- Graph Mining: Explainability of Graph Neural Networks

Research Publications

Preprint

1. J. Light, Y. Wu, Y. Sun, *et al.*, *Scattered forest search: Smarter code space exploration with llms*, 2025. ICLR 2025 Under Review: 2302.02083.
2. Q. Zhao, J. Leng, X. ZHao, S. Luo, H. Chen, and H. Yao, *Learning how to prompt with large language models*, 2025. NAACL 2025 Under Review: 2302.02173.
3. Q. Zhao, X. Zhao, Y. Liu, Y. Sun, H. Chen, and W. Chen, *Saup: Situation awareness uncertainty propagation on llm agent*, 2025. NAACL 2025 Under Review: 2302.02073.
4. C. Deng, Z. Chen, X. Zhao, *et al.*, *RIO-CPD: A riemannian geometric method for correlation-aware online change point detection*, Presented at the ICML 2024 Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM), 2024. DOI: 10.48550/ARXIV.2407.09698. arXiv: 2407.09698.
5. T. Chowdhury, C. Ling, X. Zhang, *et al.*, *Knowledge-enhanced neural machine reasoning: A review*, 2023. DOI: 10.48550/ARXIV.2302.02093. arXiv: 2302.02093.
6. Y. Lin, C. Zhao, M. Shao, B. Meng, X. Zhao, and H. Chen, *Pursuing counterfactual fairness via sequential autoencoder across domains*, 2023. DOI: 10.48550/ARXIV.2309.13005. arXiv: 2309.13005.
7. C. Ling, X. Zhao, J. Lu, *et al.*, *Domain specialization as the key to make large language models disruptive: A comprehensive survey*, 2023. DOI: 10.48550/ARXIV.2305.18703. arXiv: 2305.18703.
8. C. Ling, X. Zhao, X. Zhang, *et al.*, *Improving open information extraction with large language models: A study on demonstration uncertainty*, Presented at the ICLR 2024 Workshop on Reliable and Responsible Foundation Models, 2023. DOI: 10.48550/ARXIV.2309.03433. arXiv: 2309.03433.

9 X. Yang, W. Cheng, X. Zhao, L. R. Petzold, and H. Chen, *Dynamic prompting: A unified framework for prompt tuning*, 2023. DOI: 10.48550/ARXIV.2303.02909. arXiv: 2303.02909.

10 X. Zhao, Y. Ou, L. M. Kaplan, F. Chen, and J. Cho, *Quantifying classification uncertainty using regularized evidential neural networks*, Presented at the AAAI 2019 Fall Symposium Series, Artificial Intelligence in Government and Public Sector, 2019. arXiv: 1910.06864. URL: http://arxiv.org/abs/1910.06864.

Journal Article

1 Z. Guo, Z. Wan, Q. Zhang, *et al.*, "A survey on uncertainty reasoning and quantification in belief theory and its application to deep learning," *Inf. Fusion*, vol. 101, p. 101 987, 2024. DOI: 10.1016/J.INFFUS.2023.101987.

2 J. Jiang, C. Ling, H. Li, G. Bai, X. Zhao, and L. Zhao, "Quantifying uncertainty in graph neural network explanations," *Frontiers Big Data*, vol. 7, 2024. DOI: 10.3389/FDATA.2024.1392662.

3 X. Zhao, "Multidimensional uncertainty quantification for deep neural networks," *The University of Texas at Dallas*, 2022, PhD Thesis. DOI: 10.48550/ARXIV.2304.10527.

Conference Proceedings

1 C. Ling, X. Zhao, X. Zhang, *et al.*, "Uncertainty quantification for in-context learning of large language models," in *Proceedings of the 2024 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (Volume 1: Long Papers), NAACL 2024, Mexico City, Mexico, June 16-21, 2024*, K. Duh, H. Gómez-Adorno, and S. Bethard, Eds., Association for Computational Linguistics, 2024, pp. 3357–3370. DOI: 10.18653/V1/2024.NAACL-LONG.184.

2 Y. Xiao, Y. Jin, Y. Bai, *et al.*, "Large language models can be good privacy protection learners," in *Proceedings of the 2024 Conference on Empirical Methods in Natural Language Processing, EMNLP 2024, Miami, Florida, 12-16 November, 2024*, Association for Computational Linguistics, 2024, pp. 6716–6723. DOI: 10.18653/V1/2021.EMNLP-MAIN.538.

3 N. Zhang, Y. Liu, X. Zhao, *et al.*, "Pruning as a domain-specific LLM extractor," in *Findings of the Association for Computational Linguistics: NAACL 2024, Mexico City, Mexico, June 16-21, 2024*, K. Duh, H. Gómez-Adorno, and S. Bethard, Eds., Association for Computational Linguistics, 2024, pp. 1417–1428. DOI: 10.18653/V1/2024.FINDINGS-NAACL.91.

4 X. Zhao, C. Zhao, F. Chen, J. Cho, W. Hua, and H. Chen, "3rd workshop on uncertainty reasoning and quantification in decision making (UDM)," in *Proceedings of the 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, KDD 2024, Barcelona, Spain, August 25-29, 2024*, R. Baeza-Yates and F. Bonchi, Eds., ACM, 2024, pp. 6755–6756. DOI: 10.1145/3637528.3671496.

5 Y. Lin, C. Zhao, M. Shao, X. Zhao, and H. Chen, "Adaptation speed analysis for fairness-aware causal models," in *Proceedings of the 32nd ACM International Conference on Information and Knowledge Management, CIKM 2023, Birmingham, United Kingdom, October 21-25, 2023*, I. Frommholz, F. Hopfgartner, M. Lee, *et al.*, Eds., ACM, 2023, pp. 1421–1430. DOI: 10.1145/3583780.3614774.

6 C. Ling, X. Zhang, X. Zhao, *et al.*, "Open-ended commonsense reasoning with unrestricted answer candidates," in *Findings of the Association for Computational Linguistics: EMNLP 2023, Singapore, December 6-10, 2023*, H. Bouamor, J. Pino, and K. Bali, Eds., Association for Computational Linguistics, 2023, pp. 8035–8047. DOI: 10.18653/V1/2023.FINDINGS-EMNLP.540.

7 W. Shi, X. Yang, X. Zhao, H. Chen, Z. Tao, and S. Li, "Calibrate graph neural networks under out-of-distribution nodes via deep q-learning," in *Proceedings of the 32nd ACM International Conference on Information and Knowledge Management, CIKM 2023, Birmingham, United Kingdom, October 21-25, 2023*, I. Frommholz, F. Hopfgartner, M. Lee, *et al.*, Eds., ACM, 2023, pp. 2270–2279. DOI: 10.1145/3583780.3614797.

8 X. Zhao, X. Zhang, C. Zhao, *et al.*, "Multi-label temporal evidential neural networks for early event detection," in *IEEE International Conference on Acoustics, Speech and Signal Processing ICASSP 2023, Rhodes Island, Greece, June 4-10, 2023*, IEEE, 2023, pp. 1–5. DOI: 10.1109/ICASSP49357.2023.10096305.

9 X. Zhao, C. Zhao, F. Chen, J. Cho, and H. Chen, "2nd workshop on uncertainty reasoning and quantification in decision making," in *Proceedings of the 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, KDD 2023, Long Beach, CA, USA, August 6-10, 2023*, A. K. Singh, Y. Sun, L. Akoglu, *et al.*, Eds., ACM, 2023, pp. 5907–5908. DOI: 10.1145/3580305.3599230.

10 H. Wang, C. Zhao, X. Zhao, and F. Chen, "Layer adaptive deep neural networks for out-of-distribution detection," in *Advances in Knowledge Discovery and Data Mining - 26th Pacific-Asia Conference, PAKDD 2022, Chengdu, China, May 16-19, 2022, Proceedings, Part II*, J. Gama, T. Li, Y. Yu, E. Chen, Y. Zheng, and F. Teng, Eds., ser. Lecture Notes in Computer Science, vol. 13281, Springer, 2022, pp. 526–538. DOI: 10.1007/978-3-031-05936-0_41.

11 X. Yang, J. Wang, X. Zhao, S. Li, and Z. Tao, "Calibrate automated graph neural network via hyperparameter uncertainty," in *Proceedings of the 31st ACM International Conference on Information & Knowledge Management, CIKM 2022, Atlanta, GA, USA, October 17-21, 2022*, M. A. Hasan and L. Xiong, Eds., ACM, 2022, pp. 4640–4644. DOI: 10.1145/3511808.3557556.

12 X. Zhao, K. Killamsetty, R. K. Iyer, and F. Chen, "How out-of-distribution data hurts semi-supervised learning," in *IEEE International Conference on Data Mining, ICDM 2022, Orlando, FL, USA, November 28 - Dec. 1, 2022*, X. Zhu, S. Ranka, M. T. Thai, T. Washio, and X. Wu, Eds., IEEE, 2022, pp. 763–772. DOI: 10.1109/ICDM54844.2022.00087.

13 X. Zhao, X. Zhang, W. Cheng, *et al.*, "Seed: Sound event early detection via evidential uncertainty," in *IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP 2022, Virtual and Singapore, 23-27 May 2022*, IEEE, 2022, pp. 3618–3622. DOI: 10.1109/ICASSP43922.2022.9746756.

14 Y. Hu, Y. Ou, X. Zhao, J. Cho, and F. Chen, "Multidimensional uncertainty-aware evidential neural networks," in *Thirty-Fifth AAAI Conference on Artificial Intelligence, AAAI 2021, Thirty-Third Conference on Innovative Applications of Artificial Intelligence, IAAI 2021, The Eleventh Symposium on Educational Advances in Artificial Intelligence, EAAI 2021, Virtual Event, February 2-9, 2021*, AAAI Press, 2021, pp. 7815–7822. DOI: 10.1609/AAAI.V35I9.16954.

15 K. Killamsetty, X. Zhao, F. Chen, and R. K. Iyer, "RETRIEVE: coreset selection for efficient and robust semi-supervised learning," in *Advances in Neural Information Processing Systems 34: Annual Conference on Neural Information Processing Systems 2021, NeurIPS 2021, December 6-14, 2021, virtual*, M. Ranzato, A. Beygelzimer, Y. N. Dauphin, P. Liang, and J. W. Vaughan, Eds., 2021, pp. 14 488–14 501. URL: https://proceedings.neurips.cc/paper/2021/hash/793bc52a941b3951dfdb85fb04f9fd06-Abstract.html.

16 Z. Wang, Y. Chen, C. Zhao, *et al.*, "CLEAR: contrastive-prototype learning with drift estimation for resource constrained stream mining," in *WWW '21: The Web Conference 2021, Virtual Event / Ljubljana, Slovenia, April 19-23, 2021*, J. Leskovec, M. Grobelnik, M. Najork, J. Tang, and L. Zia, Eds., ACM / IW3C2, 2021, pp. 1351–1362. DOI: 10.1145/3442381.3449820.

17 L. Xu, X. Zhang, X. Zhao, H. Chen, F. Chen, and J. D. Choi, "Boosting cross-lingual transfer via self-learning with uncertainty estimation," in *Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing, EMNLP 2021, Virtual Event / Punta Cana, Dominican Republic, 7-11 November, 2021*, M. Moens, X. Huang, L. Specia, and S. W. Yih, Eds., Association for Computational Linguistics, 2021, pp. 6716–6723. DOI: 10.18653/V1/2021.EMNLP-MAIN.538.

18 W. Shi, X. Zhao, F. Chen, and Q. Yu, "Multifaceted uncertainty estimation for label-efficient deep learning," in *Advances in Neural Information Processing Systems 33: Annual Conference on Neural Information Processing Systems 2020, NeurIPS 2020, December 6-12, 2020, virtual*, H. Larochelle, M. Ranzato, R. Hadsell, M. Balcan, and H. Lin, Eds., 2020. URL: https://proceedings.neurips.cc/paper/2020/hash/c80d9ba4852b67046bee487bcd9802c0-Abstract.html.

19 X. Zhao, F. Chen, S. Hu, and J. Cho, "Uncertainty aware semi-supervised learning on graph data," in *Advances in Neural Information Processing Systems 33: Annual Conference on Neural Information Processing Systems 2020, NeurIPS 2020, December 6-12, 2020, virtual*, H. Larochelle, M. Ranzato, R. Hadsell, M. Balcan, and H. Lin, Eds., 2020. URL: https://proceedings.neurips.cc/paper/2020/hash/968c9b4f09cbb7d7925f38aea3484111-Abstract.html.

20 A. Alim, X. Zhao, J. Cho, and F. Chen, "Uncertainty-aware opinion inference under adversarial attacks," in *2019 IEEE International Conference on Big Data (IEEE BigData), Los Angeles, CA, USA, December 9-12, 2019*, C. K. Baru, J. Huan, L. Khan, *et al.*, Eds., IEEE, 2019, pp. 6–15. DOI: 10.1109/BIGDATA47090.2019.9006319.

21 X. Zhao, S. Hu, J. Cho, and F. Chen, "Uncertainty-based decision making using deep reinforcement learning," in *22th International Conference on Information Fusion, FUSION 2019, Ottawa, ON, Canada, July 2-5, 2019*, IEEE, 2019, pp. 1–8. URL: https://ieeexplore.ieee.org/document/9011218.

22 X. Zhao, F. Chen, and J. Cho, "Deep learning based scalable inference of uncertain opinions," in *IEEE International Conference on Data Mining, ICDM 2018, Singapore, November 17-20, 2018*, IEEE Computer Society, 2018, pp. 807–816. DOI: 10.1109/ICDM.2018.00096.

23 X. Zhao, F. Chen, and J. Cho, "Deep learning for predicting dynamic uncertain opinions in network data," in *IEEE International Conference on Big Data (IEEE BigData 2018), Seattle, WA, USA, December 10-13, 2018*, N. Abe, H. Liu, C. Pu, *et al.*, Eds., IEEE, 2018, pp. 1150–1155. DOI: 10.1109/BIGDATA.2018.8622252.

24 X. Zhao, F. Chen, and J. Cho, "Uncertainty-based opinion inference on network data using graph convolutional neural networks," in *2018 IEEE Military Communications Conference, MILCOM 2018, Los Angeles, CA, USA, October 29-31, 2018*, IEEE, 2018, pp. 731–736. DOI: 10.1109/MILCOM.2018.8599840.

Mentoring – Thesis Committee

Chen Ling
- Ph.D. from *Emory University*, 2024
- EMNLP 2023, ICLR 2024, NAACL 2024, Frontiers in Big Data 2024, LLM survey paper

Mentoring – Interns

Qiwei Zhao
- Ph.D. student from *University of North Carolina at Chapel Hill*, 2024 Summer
- NAACL 2025 (Submitted), TRML (Submitted)

Ruomeng Ding
- Master student from *Georgia Institute of Technology*, 2023 Summer
- AAAI 2023, SDM 2025 (Submitted)

Invited Talks

Feb 2025 — Uncertainty Quantification in LLMs, **Seminar Talk** at Brigham Young University.

Dec 2024 — Uncertainty Quantification in LLMs, **Keynote** at IEEE BigData 2024 RobustMLDS Workshop.

Dec 2020 — Uncertainty Aware Semi-Supervised Learning on Graph Data, **Spotlight Presentation** at NeurIPS 2020.

Nov 2018 — Deep Learning-based Scalable Inference of Uncertain Opinions, **Keynote** at Institute of Information Engineering, Chinese Academy of Sciences (CAS).

Professional Activities

Program Chair

- 2024 3rd KDD Workshop on Uncertainty Reasoning and Quantification in Decision Making.
- 2023 2nd KDD Workshop on Uncertainty Reasoning and Quantification in Decision Making.
- 1st AAAI Workshop on Uncertainty Reasoning and Quantification in Decision Making.

Program Committee Member / Reviewer

- 2024 ICLR 2024, AAAI 2024, KDD 2024, ICML 2024, ACL 2024, COLM 2024.
- 2023 ICLR 2023, AAAI 2023, KDD 2023, ICML 2023, NeurIPS 2023.
- 2022 NeurIPS 2022, ICML 2022, KDD 2022, ICLR 2022, WSDM 2022, AAAI 2022, SDM 2022.
- 2021 NeurIPS 2021, KDD 2021.
- 2020 KDD 2020.

HONORS & Awards

- 2024 Our survey paper on Domain Specialization of LLMs is honorably mentioned by The 2024 Economic Report of the President from the White House.
- 2020 NeurIPS 2020 Student Travel Award.
- 2018 ICDM 2018 Student Travel Award.