

Lingwei Zhang

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EDUCATION BACKGROUND

Pennsylvania State University, State College, Pennsylvania

08/2025 - 05/2030 (expected)

- Ph.D. in Informatics
- Advisor: Dr. Fenglong Ma
- Honors: University Graduate Fellowships

Johns Hopkins University, Baltimore, Maryland

08/2023-05/2025

- M.S. in Computer Science

Tsinghua University, Beijing, China

09/2018-06/2022

- B.Eng. in Computer Science and Engineering, Yao Class (Experimental CS Department)
- Advisor: Dr. Yang Yu
- Honors: First-class honors

RESEARCH EXPERIENCE

Research Assistant @ Tsinghua University & Shanghai Qi Zhi Institute | Prof. Yang Yu

- **Aligning Reasoning with Causal Bayesian Networks**
 - Implemented variable detection and independence recovery methods on the GSM8K dataset.
 - Developed D-Separate Tuning (DST) based on LoftQ and QLoRA, achieving a 5% performance gain over baseline on GSM8K dataset.
 - Evaluated DST in Chain, Fork and Collision conditions in cases of causality.
- **Understanding LLM Errors in Reasoning Tasks**
 - Generated causal graphs on LLAMA2 models with simple math questions.
 - Analyzed failure cases in GPT-4 and LLAMA2-70B models on floating-point comparison tasks.
 - Concluded that even the current best LLMs are unable to learn ‘true’ knowledge inside the training dataset.
- **Legal Judgment Prediction and Attack on Language Models**
 - Implemented two models: CIESAM and CASAM based on causal reasoning analysis and achieved 1.6% in performance and 0.2% in robustness.
 - Implemented adversarial attacks on existing language models such as Legal-BERT and our models.
 - Evaluated the robustness of the models based on the adversarial attack results.
- **Dealing with imbalanced data with causal relationship**
 - Proved that methods to solve imbalanced classification problems such as Re-Weighting and Re-Sampling also work well when dealing with imbalanced regression problems with backdoor adjustment.
 - Implemented Re-Weighting with imbalanced image and language datasets and validated the proof.
 - Analyzed the cause of imbalanced data from a causal perspective.

Research Assistant @ Johns Hopkins University

- **Endoscopic neural representation comparison**
 - Implemented 3D Gaussian Splatting, 3D Gaussian Surfels, REIM-NeRF and NeRF on several endoscope datasets.
 - Rendered novel view within the same scene given the other trajectory poses.
 - Concluded that 3D-Gaussian-Splatting performs best for endoscopic reconstruction, and NeRF is best for novel view rendering.
- **CT-SLAM navigation with 3D-Slicer (site project)**
 - Built a real-time 3D and 2D locator within 3D Slicer, capable of visualizing 2D CT slicers given a 3D location.

PUBLICATIONS

Haotian Chen, **Lingwei Zhang**, Yiran Liu, and Yang Yu, “Rethinking the development of large language models from the causal perspective: A legal text prediction case study,” in *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI-24)*, February 20, 2024.

Haotian Chen, **Lingwei Zhang**, Yiran Liu, Fanchao Chen, and Yang Yu, “Knowledge is power: Understanding causality makes legal judgment prediction models more generalizable and robust,” *arXiv preprint arXiv:2211.03046*, November 5, 2022.