Shicheng Fan

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EDUCATION

University of Illinois Chicago (UIC) Aug. 2025 – Present
Ph.D. in Computer Science Chicago, IL
- Advisor: Prof. Lu Cheng; Co-advisor: Prof. Kun Zhang (CMU). Research: Causal Representation Learning, LLM Factuality Alignment, AI for Science

Zhejiang University, Chu Kochen Honors College Sept. 2021 – June 2025
B.Eng. in Automation (Control and Robotics) Hangzhou, China
- GPA: 3.98/4.0, Rank: 6/121 (Top 5%), Outstanding Graduate

PUBLICATIONS

[1] **Shicheng Fan**, Kun Zhang, Lu Cheng. "TRACE: Trajectory Recovery for Continuous Mechanism Evolution in Causal Representation Learning." Under Review, arXiv:2601.21135

[2] Hanyu Su, **Shicheng Fan**, Yifan Cui, Lu Cheng. "Conformalized Proximal Causal Inference with a Single Proxy." Under Review

RESEARCH EXPERIENCE

TRACE: CRL under Continuous Mechanism Evolution | *First Author, w/ Prof. K. Zhang & Prof. L. Cheng* 2025 – 2026
- Proposed the first theoretical framework extending causal representation learning from discrete mechanism shifts to continuous transitions; proved joint identifiability of latent causal variables and continuous mixture trajectories via nonlinear ICA and variational inference
- Designed the TRACE framework based on Mixture-of-Experts, where each expert learns an atomic mechanism and time-varying mixture coefficients recover mechanism trajectories at inference, generalizable to unseen intermediate states

QuCo-RL: Knowledge-Enhanced RL for LLM Anti-Hallucination Training | *Core Member* 2025 – Present
- Fine-tuned LLMs with GRPO via reinforcement learning; designed QuCo-Infigram factuality reward using entity frequency checks and sentence-level co-occurrence verification in pretraining corpora, eliminating the need for NLI models
- Constructed a local Wikipedia Infini-gram index (6.4M articles) enabling millisecond-level offline queries, replacing remote API calls

Causal MD: End-to-End Causal Discovery for Protein Conformational Transitions | *Core Member* 2025 – Present
- Designed an end-to-end differentiable framework based on causal representation learning, recovering time-varying latent causal structures from molecular dynamics trajectories to identify key residues driving protein loop conformational transitions
- Integrated protein 3D spatial priors (contact map constraints) with temporal structure, bridging the gap of CRL in the molecular dynamics domain

Semantic and Goal-Driven Dexterous Hand Manipulation | *B.Sc. Thesis* 2024 – 2025
- Reproduced the Text2HOI three-stage framework (contact map prediction $\rightarrow$ diffusion-based motion generation $\rightarrow$ hand refinement), matching reported performance on H2O, GRAB, and ARCTIC datasets
- Proposed a Shadow Hand $\rightarrow$ MANO cross-embodiment retargeting algorithm via skeleton-point alignment and two-stage gradient optimization, mapping 24-DoF trajectories to 51-DoF MANO hand inputs
- Joint training with GraspM3 dataset (8000+ objects) improved Physical Realism to 0.897 and reduced penetration volume by $\sim$50%

COMPETITIONS

ASC Student Supercomputer Challenge | *National Second Prize* 2024
- Built a complete HPC system from hardware to software; optimized LLM inference using KV Cache and batching strategies

ACM-IPCC International Parallel Computing Challenge | *National Second Prize* 2022
- Optimized program runtime from 13 minutes to 200 milliseconds ($\sim$4000$\times$ speedup) using MPI, CUDA, and SIMD

SKILLS

Languages: Python, C/C++

Frameworks & Tools: PyTorch, HuggingFace Transformers, verl/TRL, Git, LaTeX, Linux/HPC (NCSA Delta, NRP Nautilus), CUDA, MPI

Research Areas: Causal Inference & Causal Representation Learning, LLM Alignment & Anti-Hallucination, Diffusion Models, Embodied Intelligence

Spoken Languages: Chinese (native), English (fluent)

HONORS & AWARDS

Zhejiang University Academic Excellence Award (2022, 2023, 2024) | ZJU Outstanding Graduate (2025) | Cambridge AI&ML Summer Program Outstanding Student (2023) | National College Math Competition, 2nd Prize (2022)