

# Kuangshi Ai

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## Education

### University of Notre Dame

Indiana, USA

Ph.D. Student in *Computer Science and Engineering*

2024.08-Present

Research Interests: Scientific Visualization, Multi-modal LLMs, Human-Computer Interaction

### Fudan University

Shanghai, China

B.E. in *Artificial Intelligence*, School of Data Science

2020.09-2024.06

- Overall GPA: 3.71/4.0 Junior GPA: 4.0/4.0 Rank: 2/16

### The University of Sydney

Sydney, Australia

Exchange Student in the Faculty of Engineering

2023.02-2023.06

- Overall Grade: HD (High Distinction) U.S. scale GPA: 4.0/4.0

## Publications

- **Kuangshi Ai**, Kaiyuan Tang, Chaoli Wang. NLI4VolVis: Natural Language Interaction for Volume Visualization via Multi-LLM Agents and Editable 3D Gaussian Splatting. *Submitted to 2025 IEEE VIS: Visualization and Visual Analytics*
- Kaiyuan Tang, **Kuangshi Ai**, Jun Han, Chaoli Wang. TexGS-VolVis: Expressive Scene Editing for Volume Visualization via Textured Gaussian Splatting. *Submitted to 2025 IEEE VIS: Visualization and Visual Analytics*
- Simret Araya Gebreegziabher, **Kuangshi Ai**, Zheng Zhang, Elena Glassman, Toby Jia-Jun Li. Leveraging Variation Theory in Counterfactual Data Augmentation for Optimized Active Learning. *Submitted to the 63rd Annual Meeting of the Association for Computational Linguistics (ACL 2025)*

## Research Experience

### Natural Language Interaction for Volume Visualization

University of Notre Dame, USA

Instructor: Prof. Chaoli Wang

2024.08-Present

- Developed the first-ever framework enabling natural language interaction with complex 3D scenes using LLM agents and editable 3D Gaussian splatting
- Integrated vision-language foundation models to achieve open-vocabulary querying of objects in 3D volumetric scenes, supporting intuitive scene manipulation with natural language
- Work to be submitted to IEEE VIS2025 (TVCG)

### Counterfactual Data Augmentation for Active Learning

University of Notre Dame, USA

Instructor: Prof. Toby Li

2023.07-2024.05

- Link: <https://github.com/KuangshiAi/VariationTheory>
- Inspired by Variation Theory, proposed an Active Learning (AL) approach which synthesizes artificial datapoints that highlight key similarities and differences among labels
- Developed a neuro-symbolic pipeline combining large language models and rule-based models, which generates high-quality counterfactual examples
- Achieved a comparable accuracy to prevalent AL strategies while necessitating fewer annotations

### Data-Efficient Preprocessing of Vision Transformers

The University of Sydney, Australia

Instructor: Prof. Chang Xu

2023.03-2023.06

- Link: [https://github.com/KuangshiAi/vision\\_transformer](https://github.com/KuangshiAi/vision_transformer)
- Proposed and implemented a method to preprocess and regenerate visual data input sequences, achieving minimal throughput loss and performance improvements on four small-scaled datasets
- Pointed out potentials of ViTs and the limitation of our method on large-scaled datasets, and proposed a practical guideline for ViT training

### Bilevel Optimization with Special Forms of Lower-level Functions

Fudan University, China

Instructor: Prof. Rujun Jiang

2022.12-2023.07

- Conducted experiments on IJCNN1 and corrupted MNIST datasets to evaluate stochastic and variance reduction algorithms for strongly convex lower-level functions
- Proposed case-specific algorithms for typical machine learning problems based on the structure of lower-level functions

## Internship Experience

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### Quantitative Research

Ningbo Lingjun Investment Management Partnership

Beijing, China  
2024.01-2024.05

- Participated in the development and optimization process of the combo model, maintaining and proficiently mastering the company's live trading model framework
- Based on the company's factor library and financial data, designed a graph transformer-based daily-frequency investment portfolio model, which demonstrated superior effectiveness and robustness compared to the existing live trading model through backtesting.

### Embodied AI Algorithm Research

Shanghai Ziyun Intelligent Technology Co., Ltd.

Shanghai, China  
2023.10-2023.12

- As an early member of the startup, developing autonomous control systems for humanoid robots to enhance their capabilities for everyday tasks
- Combined the structure of Swin ViT and Resformer to achieve robot vision focusing ability, and developed a Fast-ACVNet based stereo depth estimation pipeline for affordable environmental information capture
- Deployed and fine-tuned RT2 and Qwen locally as the high-level control unit of robot dogs, and leveraged GPT-4-vision to build navigation system in Meta's Habitat simulation environment

### Business Operations and Data Management

YCIH Logistic Co., Ltd

Yunnan, China  
2022.07-2022.08

- Utilized PostgreSQL database management system and Python web crawler technology to collect, analyze and manage data for the company's "INJA" Intelligent Supply Chain Platform
- Developed a backend system for data monitoring and control, real-time data visualization, and data analysis modeling

## Honors & Awards

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- **Outstanding Graduate**, Fudan University, 2024
- **Second Prize** (Top 2 in major), the Scholarship for Outstanding Students, Fudan University, 2024 & 2021
- **Third Prize**, the Scholarship for Outstanding Students, Fudan University, 2022
- **Outstanding Student Leaders**, Fudan University, 2020-2022
- **Second Prize in Shanghai**, Contemporary Undergraduate Mathematical Contest in Modeling, 2022
- Scholarship for **Outstanding Freshmen**, Fudan University, 2020

## Professional Skills

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**Programming:** Python, MATLAB, C/C++, SQL, R

**Tools:** Pytorch, TensorFlow, paddlepaddle, LaTeX, Numpy, Pandas, Linux

**Language:** English (TOEFL: 106/120), Chinese (native speaker)