Kun Wang

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RESEARCH INTERESTS

As an undergraduate researcher specializing in deep learning, I have developed expertise in the areas of causal reasoning and generative modeling. My goal is to develop robust and interpretable models through causality that advance scientific research across multiple disciplines.

EDUCATION

University of California San Diego ***San Diego, CA***
B.S. in Mathematics and Computer Science (Minors in Economics) *Sep 2021 – Dec 2024*
GPA: 3.98/4.0 Provost's Honor); GRE: 327
Coursework Includes: Advanced Computer Vision, Design and Analysis of Algorithm, Deep Learning, Advanced Data Structures, Computer System and Organization, Probability and Statistics, Discrete Mathematics and Graph Theory, Game Theory

RESEARCH

Spatiotemporal Causal Discovery, UC San Diego ***San Diego, CA***
Undergraduate Researcher with Prof. Rose Yu and Prof. Yian Ma *Sep 2023 - Present*

- Many important phenomena (e.g. climate, road networks) are spatiotemporal. Traditional causal discovery algorithms have low detection power and suffer from high computational complexity.
- Using variational inference, we infer a causal graph at a lower-dimensional latent level, and we utilize deep learning for causal representation learning and upscaling between the latent and grid levels, providing an end-to-end solution.
- We derive identifiability results, implement frameworks, utilize GPU parallel computing for optimized training of deep learning models, and empirically evaluate its efficacy.
- Recognized with the HDSI Research Scholarship for leading a machine learning project that improved causal discovery in climate and advanced the field of causal representation learning.

Center for Visual Computing, UC San Diego ***San Diego, CA***
Undergraduate Researcher with Prof. Manmohan Chandraker & Ravi Ramamoorthi *May 2023 - Present*

- Existing works on text-to-3D generation struggle with abundant spatial errors and limited scopes of application domains.
- Recognized and supported by Qualcomm's Innovation Fellowship, we developed a novel Vision-Language Processing framework to optimize layout generation and 3D reasoning.
- We significantly improve spatial understanding of text-3D generation by integrating an LLM-based Multi-Agent feedback framework and Retrieval Augmented Generation system, reducing physical and visual error by 65% compared to the current state-of-the-art Diffusion Model.

The Slade Lab, UC San Diego ***San Diego, CA***
Undergraduate Research Assistant *Feb 2022 - May 2023*

- Implemented a probabilistic model for simulating aerosol transmission in different indoor settings.
- Extensive research and model formulation to infer trends in the aerosol spreading of respiratory diseases under various environments.

Xie Lab, Tsinghua University ***Beijing, China***
Summer Research Assistant *Jun 2017 - Jul 2021*

- Worked with a research team of graduate students to find new interventions for cancers through genetic modification and engineering.
- Performed genetic cell therapy experiments with different types of perturbation experiments.
- Build a mathematical model to analyze experiment results, and formulate findings and conclusions using statistically significant results.

PUBLICATION

- Kun Wang[1], Sumanth Varambally[1], Duncan Watson-Parris, Yian Ma, Rose Yu, *"Discovering Latent Structural Causal Models from Spatio-Temporal Data"*, under review[https://arxiv.org/abs/2411.05331]
- Kun Wang[1], Sumanth Varambally[1], Duncan Watson-Parris, Yian Ma, Rose Yu, *"Uncovering Latent Causal Structures from Spatiotemporal Data"*, NeurIPS 2024 Causal Representation Learning Workshop (oral presentation)
- Kunal Gupta, Ishit Mehta, Kun Wang, Nicholas Chua, Yan Deng, Abhimanyu Krishna, Ravi Ramamoorthi, Manmohan Chandraker, *"SceneProg: Program Synthesis for 3D Scene Generation using LLMs"*, under review

WORK EXPERIENCE

China Asset Management Co., Ltd. ***Beijing, China***
Machine Learning Intern *Jul 2024 - Sept 2024*

- Developed and implemented ML models for financial forecasting and asset management on more than 5000 stock data. Collaborated with the financial engineering division on aligning technical solutions with business strategy, improving model prediction accuracy by 15%.
- Designed and maintained time-series prediction frameworks using PyTorch, managed and optimized database operations for large-scale financial data using MySQL databases.
- Ensured high system availability and scalability by deploying backend solutions on AWS and using containerization technologies (e.g., Docker, Kubernetes).

Computer Science Engineering Department ***San Diego, CA***
Computer Science Engineering Instructional Assistant/Tutor *Sept 2023 - Present*

- Undergraduate Instructional Assistant for CSE 152A, Introduction to Computer Vision
- Provided one-on-one and group tutoring to undergraduate students, addressing questions related to course materials, assignments, and concepts in computer vision

Mathematics Department, UC San Diego ***San Diego, CA***
Mathematical Instructional Assistant/Tutor *Sept 2022 - Jun 2023*

- Undergraduate Instructional Assistant for Linear Algebra and Differential Equations
- Math tutor for calculus and MATLAB
- Experience in teaching mathematical programming with 95% positive feedback from evaluation

O-STEM: Queer in AI ***Remote/San Diego, CA***
Volunteer Organizer *Winter 2024*

- Coordinated with members to ensure diverse and inclusive representation in panels and discussions at UCSD.
- Implemented strategies such as ML workshops and social media team to increase membership and engagement within the Queer in AI community on campus by 20%
- Facilitated collaboration event (100 attendees) with allied organizations (Women in STEM) to advocate for equitable practices in AI research and industry

SKILLS

- Programming Language: Python, C, C++, Java, Javascript, Bash (Linux Shell Scripting)
- Frameworks/Packages: Numpy, Pandas, scikit-learn, Pytorch, Pytorch Lightning, Amazon Web Services(AWS), MySQL, Spark, Docker, MATLAB, Jax, Git, Node.js, Jupyter, Weights and Biases
- FPGA (Basys 3), microcontroller: (MSP-EXP432P401R [Texas Instrument], Arduino, Raspberry Pi, Jetson Nano).

ACHIEVEMENTS

2023	HDSI Undergraduate Scholarship, Halicioglu Data Science Institute	***UCSD***
2023	First Place, Taxi travel time prediction Kaggle Competition	***UCSD***
2020	7/15, American Invitational Mathematics Examination (AIME) Exam	***New Jersey, U.S.***
2020	126/150, American Mathematics Competition (AMC 12) Exam	***New Jersey, U.S.***

[1] Equal contribution