Haocheng Dai

CONTACT INFORMATION

haocheng@cs.utah.edu
https://users.cs.utah.edu/~haocheng/

SUMMARY

My research interest is centered on developing specialized and trustworthy machine learning tools tailored for computer vision in healthcare settings. My focus extends to, but is not limited to:

- Trustworthy Machine Learning
- Geometric Deep Learning and Shape Modeling
- Multimodal Learning, Vision Language Models, and Diffusion Models
- Physics-Informed Machine Learning

EDUCATION

University of Utah — *Salt Lake City, UT*
Ph.D. Student in Computer Science — *2024*
Committee: *SC Joshi (Chair), M Bauer, S Elhabian, PT Fletcher, RM Kirby*

Tongji University — *Shanghai, China*
B.Eng in Computer Science — *2019*

Institut de Mathématiques de Toulouse — *Toulouse, France*
Exchange Student — *2019*

Technion - Israel Institute of Technology — *Haifa, Israel*
Exchange Student — *2018*

PUBLICATIONS & PREPRINTS

The Silent Majority: Demystifying Memorization Effect in the Presence of Spurious Correlations, C. You*, H. Dai*, Y. Min*, J. Sekho, S. C. Joshi, J. Duncan (*equal contribution), *In submission*, 🔗.

High-Fidelity CT on Rails-Based Characterization of Delivered Dose Variation in Conformal Head and Neck Treatments, H. Dai, V. Sarkar, C. Dial, M. Foote, Y. Hitchcock, S. C. Joshi, B. J. Salter, *Applied Radiation Oncology (ARO) 2023*, 🔗.

Detect AI-generated Images Uploaded for Risk Evidence Collection in Customer Self-Service Workflow, H. Dai, S. Chen, B. Xiao, Y. Chen, *Amazon Machine Learning Conference (AMLC) 2023*, 🔗.

Neural Operator Learning for Ultrasound Tomography Inversion, H. Dai*, M. Penwarden*, R. M. Kirby, S. C. Joshi (*equal contribution), *International Conference on Medical Imaging with Deep Learning (MIDL) 2023*, 🔗.

Modeling the Shape of the Brain Connectome via Deep Neural Networks, H. Dai, M. Bauer, P. T. Fletcher, S. C. Joshi, *International Conference on Information Processing in Medical Imaging (IPMI) 2023*, Oral Presentation, 🔗.

Understanding Visual Documents from Customer Self-Service Workflow using Multimodal Transformer, H. Dai, J. Chou, S. Chen, B. Xiao, Y. Chen, *Amazon Machine Learning Conference (AMLC) 2022*, 🔗.

Integrated Construction of Multimodal Atlases with Structural Connectomes in the Space of Riemannian Metrics, K. M. Campbell, H. Dai, Z. Su, M. Bauer, P. T. Fletcher, S. C. Joshi, *Journal of Machine Learning for Biomedical Imaging (MELBA) 2022*, 🔗.

Structural Connectome Atlas Construction in the Space of Riemannian Metrics, K. M. Campbell, H. Dai, Z. Su, M. Bauer, P. T. Fletcher, S. C. Joshi, *International Conference on Information Processing in Medical Imaging (IPMI) 2021*, François Erbsmann Prize (**Best Paper Award**), 🔗.

Industry Experience

Amazon, Inc *Seattle, WA*
Applied Scientist Intern *2023*

- Mitigated the diffusion model's deterioration in tiny text generation, irrespective of resolution, by implementing a multi-stage generation approach and utilizing templates;
- Utilized the diffusion model for manipulating text information in visual documents, facilitating efficient data generation for fraud image detection;
- Implemented a "legal-edit invariant, illegal-edit variant" fine-tuning strategy to bolster the detection model's resilience against common customer edits;
- Found that GradCAM heatmap masking can fool the detection model substantially, underscoring the significance of this technique in fraud media prevention.

Amazon, Inc *Seattle, WA*
Applied Scientist Intern *2022*

- Designed a multimodal transformer model to understand visual documents in various formats;
- Our model manifested strong generalization capability beyond human supervision — outperforming the AWS Textract query;
- Developed a partially masked visual document understanding framework by incorporating a semantic segmentation module along with the transformer model, standing at a recall rate of 0.85.

Services

Reviewer

- Conferences: *ACM MM, CVPR, MICCAI, MIDL*
- Journals: *Medical Image Analysis, MELBA, Scientific Reports*
- Workshop: *ICLR Workshop on AI for Differential Equations in Science*

Teaching Experience

Teaching Mentor *University of Utah*

- CS 4150: *Algorithms* *2022*
- CS 3190: *Foundations of Data Analysis* *2021*

Honors & Awards

François Erbsmann Prize (Best Paper Award), *IPMI 2021*
Department Fellowship, *School of Computing, University of Utah*
Chinese Government Scholarship, *Chinese Scholarship Council*
Tongji Scholarship of Excellence (2016, 2017, 2018), *Tongji University*

Technical Skills

`Python, MatLab, C++, PyTorch, Jax`