

# Haocheng Dai

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**Summary**      My research interest is centered on developing specialized and trustworthy machine learning tools. My focus extends to, but is not limited to:







- Large Language Models and Retrieval-Augmented Generation [2, 8]
- Trustworthy Machine Learning [2, 3]
- Vision Language and Diffusion Models [1, 2, 5, 8]
- Geometric Deep Learning and Shape Modeling [4, 7, 9, 10]
- Physics-informed Machine Learning [6, 7]

**Work Experience**      **Amazon**      *Seattle, USA*  
*Applied Scientist-LLM, Shopping Convo Foundation*      *2024 - Present*  
Enhancing the LLM-based conversational shopping assistant Rufus with RAG.  
  
*Applied Scientist Intern*  
Design diffusion models for text inpainting [5].      *2023*  
Design vision language models for visual documents understanding [8].      *2022*

**Education**      **University of Utah**      *Salt Lake City, USA*  
*PhD in Computer Science*      *2019 - 2024*  
Committee: S.C. Joshi (Advisor), M. Bauer, S.Y. Elhabian, P.T. Fletcher, R.M. Kirby  
  
**Tongji University**      *Shanghai, China*  
*BE in Computer Science*      *2015 - 2019*  
  
**Institut de Mathématiques de Toulouse**      *Toulouse, France*  
*Exchange Student in Mathematics*      *2019*  
  
**Technion - Israel Institute of Technology**      *Haifa, Israel*  
*Exchange Student in Electrical Engineering*      *2018*

**Publications & Preprints**

1. Therapy-Agnostic Prognostication of Prostate Cancer via MR Imaging and Clinical Data Integration. H. Dai, G. Nelson, G. Morrell, J. Tward, S. Joshi, *In Submission to IEEE International Symposium on Biomedical Imaging (ISBI) 2025*, .
2. Refining Skewed Perceptions in Vision-Language Models through Visual Representations. H. Dai, S. Joshi, *In Submission to Conference on Computer Vision and Pattern Recognition (CVPR) 2025*, .
3. The Silent Majority: Demystifying Memorization Effect in the Presence of Spurious Correlations, C. You\*, H. Dai\*, Y. Min\*, J. Sekho, S. Joshi, J. Duncan (\*equal contribution), *In Submission to Nature Communications*, .
4. 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. Joshi, B. J. Salter, *Applied Radiation Oncology (ARO) 2023*, .

5. 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*, .
6. Neural Operator Learning for Ultrasound Tomography Inversion, H. Dai\*, M. Penwarden\*, R. M. Kirby, S. Joshi (\*equal contribution), *International Conference on Medical Imaging with Deep Learning (MIDL) 2023*, .
7. Modeling the Shape of the Brain Connectome via Deep Neural Networks, H. Dai, M. Bauer, P. T. Fletcher, S. Joshi, *International Conference on Information Processing in Medical Imaging (IPMI) 2023*, Oral Presentation, .
8. Understanding Visual Documents from Customer Self-Service Workflow using Multi-modal Transformer, H. Dai, J. Chou, S. Chen, B. Xiao, Y. Chen, *Amazon Machine Learning Conference (AMLC) 2022*, .
9. 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. Joshi, *Journal of Machine Learning for Biomedical Imaging (MELBA) 2022*, .
10. Structural Connectome Atlas Construction in the Space of Riemannian Metrics, K. M. Campbell, H. Dai, Z. Su, M. Bauer, P. T. Fletcher, S. Joshi, *International Conference on Information Processing in Medical Imaging (IPMI) 2021*, François Erbsmann Prize (**Best Paper Award**), .

## Services

## Reviewer

- Conferences: *ACM MM, AISTATS, CVPR, ICLR, ICML, MICCAI, MIDL, NeurIPS*
- Journals: *ACM TIST, IEEE TNNIS, Medical Image Analysis, MELBA, Scientific Reports*
- Workshops: *AI for Differential Equations in Science@ICLR, WiCV@ECCV*

## Honors & Awards

François Erbsmann Prize (Best Paper Award), *IPMI 2021*  
 Department Fellowship, *School of Computing, University of Utah*  
 Scholarship for France Excellence Summer School, *French Embassy in China*  
 Scholarship for Summer School of Technion, *CHE of Israel & Technion*  
 Chinese Government Scholarship, *Chinese Scholarship Council*  
 Tongji Scholarship of Excellence (2016, 2017, 2018), *Tongji University*

## Technical Skills

Python, MatLab, C++, PyTorch