Lu Zhang

CONTACT INFORMATION

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RESEARCH INTERESTS

- **Medical AI**
  AI for Brain Aging and Brain Disease
  Imaging-Based Network-Level Biomarker for Brain Aging and Dementia
  AI in Uncovering Fundamental Principles of Brain Structure-Function Network
- **Brain Foundation Model/Healthcare Foundation Model**
- **Brain Inspired AI**

EDUCATION

Ph.D. in Computer Science and Engineering, advised by Dr. Dajiang Zhu 2018 – 2024
University of Texas at Arlington, Texas, USA

M.S. in Computer Science and Technology, advised by Dr. Xiaoan Li 2015 – 2018
Northwestern Polytechnical University, Xi'an, China

B.S. in Computer Science and Technology 2011 – 2015
Northwestern Polytechnical University, Xi'an, China

PROFESSIONAL EXPERIENCE

Indiana University Indianapolis IN, USA

- Assistant Professor in Computer Science Starting from 08/2024
  Luddy School of Informatics Computing, and Engineering

AWARDS and HONORS

- UTA College of Engineering Outstanding Doctoral Dissertation Award 2024
- Trainee Professional Development Award (TPDA) at SfN 2023
- NIH-MICCAI STudent-Author Registration (STAR) Award 2023
- The ICMA PhD Fellowship Award **(5 Fellows Elected Annually World-wide)** 2023
- MICCAI 2020 Young Scientist Award **(First Author, Best Paper Award, Rate: 4/1809=0.2%)** 2020
- MICCAI 2020 Student Travel Award 2020
- MMMI **Best Oral Paper Award (Major Contributor, Rate: 10%)** 2019
- UTA Doctoral Student Research and Travel Grant Award 2019

GRANTS

- **EMPOWER: Enhanced Mentoring Program with Opportunities for Ways to Excel in Research Application (10/1/2024-09/30/2025)**
  Role: Principal Investigator (PI)
  Funding Agency: IU Research and the Office of the Provost
  Amount: $7,000
  Status: Awarded

PUBLICATIONS

AI in Brain Disease Modeling

10. **Zhang, L.**, Wang, L., Liu, T., and Zhu, D. (2024). Disease2Vec: Representing Alzheimer's Progression via Disease Embedding Tree. *Pharmacological Research.* **(IF: 9.3)**
9. **Zhang, L.**, Na, S., Liu, T., Zhu, D. and Huang, J. (2023). Multimodal Deep Fusion in Hyperbolic Space for Mild Cognitive Impairment Study. In the *26th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI).* **(Early Accepted, Rate: 13.6%; NIH-MICCAI STudent-Author Registration (STAR) Award; Oral).**
8. **Zhang, L.**, Yu, X., Lyu, Y., Liu, T. and Zhu, D. (2023). Representative Functional Connectivity Learning for Multiple Clinical Groups in Alzheimer's Disease. In *IEEE 20th International Symposium on Biomedical Imaging (ISBI).*
7. **Zhang, L.**†, Qu, J., Ma, H., Chen, T., Liu, T., and Zhu, D. (2023). Exploring Alzheimer's Disease: A Comprehensive Brain Connectome-Based Survey. *Psychoradiology.* **(† Corresponding Author)**
6. **Zhang, L.**, Wang, L., Gao, J., Risacher, S.L., Yan, J., Li, G., Liu, T. and Zhu, D. (2021). Deep fusion of brain structure-function in mild cognitive impairment. *Medical Image Analysis (MedIA).* (**IF: 13.828**).
5. **Zhang, L.**, Wang, L. and Zhu, D., (2020). Jointly Analyzing Alzheimer's Disease Related Structure-Function Using Deep Cross-Model Attention Network. In *IEEE 17th International Symposium on Biomedical Imaging (ISBI)* **(Oral).**
4. **Zhang, L.**, Zaman, A., Wang, L., Yan, J. and Zhu, D. (2019). A Cascaded Multi-Modality Analysis in Mild Cognitive Impairment. In *International Workshop on Machine Learning in Medical Imaging (MLMI).*
3. Yu, X., Scheel, N., **Zhang, L.**, Zhu, D.C., Zhang, R. and Zhu, D., (2021). Free water in T2 FLAIR white matter hyperintensity lesions. *Alzheimer's & Dementia.*
2. Wang, L., **Zhang, L.** and Zhu, D., (2020). Learning Latent Structure Over Deep Fusion Model of Mild Cognitive Impairment. In *IEEE 17th International Symposium on Biomedical Imaging (ISBI).*
1. Wang, L., **Zhang, L.** and Zhu, D., (2019). Accessing Latent Connectome of Mild Cognitive Impairment via Discriminant Structure Learning. In *IEEE 16th International Symposium on Biomedical Imaging (ISBI).*

AI in Brain Fundamental Organization Principles

12. **Zhang, L.**, Wu, Z., Yu, X., Lyu, Y., Dai, H., Zhao, L., Wang, L., Li, G., Wang, X., Liu, T.*, and Zhu, D.* (2025) Learning Lifespan Brain Anatomical Correspondence via Cortical Developmental Continuity Transfer. *Medical Image Analysis (MedIA).* (**IF: 13.828**)
11. **Zhang, L.**, Wang, L. and Zhu, D. (2022). Predicting brain structural network using functional connectivity. *Medical Image Analysis (MedIA).* (**IF: 13.828**).
10. **Zhang, L.**, Zhao, L., Liu, D., Wu, Z., Wang, X., Liu, T. and Zhu, D. (2022). Cortex2vector: Anatomical Embedding of Cortical Folding Patterns. *Cerebral Cortex.* (**IF: 5.998**).
9. **Zhang, L.**, Wang, L. and Zhu, D., (2020). Recovering brain structural connectivity from functional connectivity via multi-GCN based generative adversarial network. In *the 23rd International Conference on Medical mage Computing and Computer-Assisted Intervention (MICCAI).* **(Early Accepted, Rate: 13.3%; Prestigious Young Scientist Award (Best Paper Award), Rate: 4/1809 =0.2%; Oral)**.
8. Yu, X., **Zhang, L.**, Cao, C., Chen, T., Lyu, Y., Zhang, J., Liu, T., and Zhu, D. (2024) Gyri vs. sulci: Core-periphery organization in functional brain networks. In the *27th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI).*
7. Yu, X., Wu, Z., **Zhang, L.**, Zhang, J., Lyu, Y.,and Zhu, D. (2024) CP-CLIP: Core-Periphery Feature Alignment CLIP for Zero-Shot Medical Image Analysis. In the *27th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI).*
6. Lyu, Y., **Zhang, L.**, Yu, X., Cao, C., Liu, T., and Zhu, D. (2024) Mild Cognitive Impairment Classification Using A Novel Finer-Scale Brain Connectome. In the *IEEE 21th International Symposium on Biomedical Imaging (ISBI).*
5. Cao, C., Yu, X., **Zhang, L.**, Chen, T., Lyu, Y., Liu, T., and Zhu, D. (2024) Enhancing Group-Wise Consistency in 3-Hinge Gyrus Matching Via Anatomical Embedding and Structural Connectivity Optimization. In the *IEEE 21th International Symposium on Biomedical Imaging (ISBI).*
4. Zhang, S., Zhang, T., He, Z., Li, X., **Zhang, L.**, Zhu, D., Jiang, X., Liu, T., Han, J. and Guo, L., (2023). Gyral peaks and patterns in human brains. *Cerebral Cortex.* (**IF: 5.998**).
3. Gao, X., Zhang, X., **Zhang, L.**, Xu, X. and Zhu, D. (2023). Predicting Diverse Functional Connectivity from Structural Connectivity Based on Multi-contexts Discriminator GAN. In *the 26th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI).* **(Early Accepted, Rate: 13.6%)**

2. Yu, X., Hu, D., **Zhang, L.**, Huang, Y., Wu, Z., Liu, T., Wang, L., Lin, W., Zhu, D., and Li. G. (2022). Longitudinal Infant Functional Connectivity Prediction via Conditional Intensive Triplet Network. In *the 25th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI).*

1. Zaman, A., **Zhang, L.**, Yan, J. and Zhu, D. (2019). Multi-modal image prediction via spatial hybrid U-Net. In *the Multiscale Multimodal Medical Imaging (MMMI).* **(Best Oral Paper Award, Rate: 10%)**

Brain Inspired AI

6. Yu, X.*, **Zhang, L.***, Dai, H., Zhao, L., Lyu, Y., Liu, T. and Zhu, D., (2024). Core-Periphery Principle Guided Redesign of Self-Attention in Transformers. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI).* (**IF: 24.314**) *** co-first authors**. (Under review).

5. Zhao, L.*, **Zhang, L.***, Wu, Z., Chen, Y., Dai, H., Yu, X., Liu, Z., Zhang, T., Hu, X., Jiang, X. and Li, X. (2023). When brain-inspired ai meets agi. *Meta-Radiology.* *** co-first authors**

4. Huang, H., Zhao, L., Hu, X., Dai, H., **Zhang, L.**, Zhu, D. and Liu, T. (2024). BI AVAN: Brain inspired adversarial visual attention network. *IEEE Transaction on Multimedia.* (**IF: 8.182**)

3. Yu, X., **Zhang, L.**, Zhu, D. and Liu, T. (2023). Robust Core-Periphery Constrained Transformer for Domain Adaptation. arXiv preprint arXiv:2308.13515.

2. Chen, Y., Xiao, Z., Du, Y., Zhao, L., **Zhang, L.**, Wu, Z., Liu, D., Zhu, D., Zhang, T., Hu, X., Liu, T., and Jiang, X., (2023). A Unified and Biologically-Plausible Relational Graph Representation of Vision Transformers. *IEEE Transactions on Neural Networks and Learning Systems (TNNLS).* (**IF: 14.255**)

1. Zhao, L., Dai, H., Wu, Z., Xiao, Z., **Zhang, L.**, Liu, D.W., Hu, X., Jiang, X., Li, S., Zhu, D. and Liu, T. (2023). Coupling visual semantics of artificial neural networks and human brain function via synchronized activations. *IEEE Transactions on Cognitive and Developmental Systems (TCDS).* (**IF: 4.546**)

Large Foundation Model/Large Language Model in Healthcare

8. Li, X.*, Zhao, L.*, **Zhang, L.***, Wu, Z., Liu, Z., X. S., Yuan, Y., Liu, J., Li, G., Zhu, D., Yan, P., Li, Q., and Liu, W. (2023). Artificial General Intelligence for Medical Imaging. *IEEE Reviews in Biomedical Engineering.* *** co-first authors (IF: 17.2)**

7. Liu, Z.*, Yu, X.*, **Zhang, L.***, Wu, Z., Cao, C., Dai, H., Zhao, L., Liu, W., Shen, D., Li, Q. and Liu, T. (2023). Deid-gpt: Zero-shot medical text de-identification by gpt-4. *arXiv preprint arXiv:2303.11032.* *** co-first authors** (**Citation: 170**)

6. Wu, Z.*, **Zhang, L.***, Cao, C.*, Yu, X., Dai, H., Ma, C., Liu, Z., Zhao, L., Li, G., Liu, W. and Li, Q., 2023. Exploring the trade-offs: Unified large language models vs local fine-tuned models for highly-specific radiology nli task. *arXiv preprint arXiv:2304.09138.* *** co-first authors** (**Citation: 47**)

5. Xiao, Z., Chen, Y., Yao, J., **Zhang, L.**, Wu, Z., Yu, X., Pan, Y., Zhao, L., Ma, C., Liu, X. and Liu, W. (2023). Instruction-vit: Multi-modal prompts for instruction learning in vit. *Information Fusion* (**IF: 18.6**)

4. Liu, Z., **Zhang, L.**, Wu, Z., Yu, X., Cao, C., Dai, H., Liu, N., Liu, J., Liu, W., Li, Q. and Shen, D. (2023) Surviving ChatGPT in Healthcare. *Frontiers in Radiology.*

3. Liu, C., Liu, Z., Holmes, J., **Zhang, L.**, Zhang, L., Ding, Y., Shu, P., Wu, Z., Dai, H., Li, Y. and Shen, D. (2023). Artificial General Intelligence for Radiation Oncology. *Meta-Radiology.*

2. Zhang, L., Liu, Z., **Zhang, L.**, Wu, Z., Yu, X., Holmes, J., Feng, H., Dai, H., Li, X., Li, Q. and Zhu, D. (2023). Segment Anything Model (SAM) for Radiation Oncology. *arXiv preprint arXiv:2306.11730.* (**Citation: 26**)

1. Liu, Z., Zhong, T., Li, Y., Zhang, Y., Pan, Y., Zhao, Z., Dong, P., Cao, C., Liu, Y., Shu, P., Wei, Y., Wu, Z., Ma, C., Wang, J., Wang, S., Zhou, M., Jiang, Z., Li, C., Holmes, J., Xu, S., **Zhang, L.**, Dai, H., Zhang, K., Zhao, L., Chen, Y., Liu, X., Wang, P., Yan, P., Liu, J., Ge, B., Sun, L., Zhu, D., Li, X., Liu, W., Cai, X., Hu, X., Jiang, X., Zhang, S., Zhang, X., Zhang, T., Zhao, S., Li, Q., Zhu, H., Shen, D., and Liu, T. (2023). Evaluating large language models for radiology natural language processing. *arXiv preprint arXiv:2307.13693.* (**Citation: 23**)

TEACHING AND MENTORING EXPERIENCES

Teaching

- IUI, CSCI-B 657, Computer Vision — Fall 2024

TA Experience

- UTA, CSE5350, Computer Architecture II — Fall 2021
- UTA, CSE6331, Cloud Computing — Summer 2021
- UTA, CSE6363, Machine Learning — Spring 2021

- UTA, CSE6363, Machine Learning — Fall 2020
- UTA, CSE4344/5344, Computer Network Organization — Summer 2020
- UTA, CSE6363, Machine Learning — Spring 2020
- UTA, CSE6363, Machine Learning — Fall 2019
- UTA, CSE5334/4334, Data Mining — Spring 2019

Volunteer Service

- I volunteered as a weekly tutor for families experiencing financial hardship for 6 months during my undergraduate stage. — 2012

ACADEMIC SERVICES

Academic Conference/Workshop Organizer

- Leading organizer of ISBI 2025 Special Session on Unlocking the Potential of Foundation Models in Biomedicine: Opportunities and Challenges — 04/2025
- Leading organizer of international workshop: the intersection of Artificial Intelligence and Human Intelligence (IAIHI), held in conjunction with BI 2023 — 08/2023
- Area chair at the 16th international conference on Brain Informatics (BI 2023) — 08/2023

Conference Reviewer

- International Conference on Medical Image Computing and Computer Assisted (MICCAI) — 2020-2025
- The IEEE International Symposium on Biomedical Imaging (ISBI) — 2021-2023
- The International Conference on Machine Learning (ICML) — 2022
- The Annual AAAI Conference on Artificial Intelligence (AAAI) — 2023-2025

Journal Reviewer

- IEEE Transactions on Medical Imaging (TMI)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- Cerebral Cortex
- Medical Image Analysis
- Frontiers in Human Neuroscience
- Journal of Biomedical and Health Informatics
- Frontiers in Computational Neuroscience

INVITED TALKS

- Invited talk about "Applying Deep Neural Networks to Study the Brain Networks" at Stevens Institute of Technology — 03/2023
- Invited talk about "Brain Structural and Functional Networks" at Harvard Medical School — 06/2022
- Invited talk about "Some Thoughts on My PhD Training" at University of Texas at Arlington — 03/2021
- Guest lecture about "Hierarchical Semantic Tree Embedding for Image Understanding" (UTA CSE 6363) — 04/2022
- Guest lecture about "Recurrent Neural Network and Transformer" (UTA CSE 6363) — 11/2021

PUBLIC MEDIA COVERAGE

- "Brain-Inspired AI" – Data Skeptic
  https://dataskeptic.com/blog/episodes/2023/brain-inspired-ai