

# Lu Zhang

## PERSONAL DATA

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## RESEARCH INTERESTS

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- Applying machine learning/deep learning methods to integrate multi-scale and multi-modal brain imaging data for advancing our understanding of the fundamental organization principles of the brain and for gaining insights into various brain disorders, such as Alzheimer's disease and Autism.
- Leveraging insights from neuroscience to design more effective, efficient, and trustworthy Artificial General Intelligence (AGI) systems (Brain Inspired AGI).

## EDUCATION

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### Ph.D. in Computer Science and Engineering

2018 – now

University of Texas at Arlington, Texas, USA

Advisor: Dajiang Zhu, Ph.D.

GPA: 4.0/4.0

### M.S. in Computer Science and Technology

2015 – 2018

Northwestern Polytechnical University, Xi'an, China

Advisor: Xiaoan Li, Ph.D.

The First Prize Scholarship

### B.S. in Computer Science and Technology

2011 – 2015

Northwestern Polytechnical University, Xi'an, China

GPA Ranking: 36/245

## PUBLICATIONS

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### Journal Paper

10. [Meta-Radiology'23] Lin Zhao\*, **Lu Zhang\***, Zihao Wu, Yuzhong Chen, Haixing Dai, Xiaowei Yu, Zhengliang Liu, Tuo Zhang, Xintao Hu, Xi Jiang, Xiang Li, Dajiang Zhu, Dinggang Shen, Tianming Liu. When brain-inspired ai meets agi. *Meta-Radiology*. \* **co-first authors**
9. [MIA'22] **Lu Zhang**, Li Wang and Dajiang Zhu. Predicting brain structural network using functional connectivity. *Medical Image Analysis*. (**Impact Factor: 13.828**)
8. [Cerebral Cortex'22] **Lu Zhang**, Lin Zhao, David Liu, Zihao Wu, Xianqiao Wang, Tianming Liu and Dajiang Zhu. Cortex2vector: Anatomical Embedding of Cortical Folding Patterns. *Cerebral Cortex*. (**Impact Factor: 5.998**)
7. [MIA'21] **Lu Zhang**, Li Wang, Jean Gao, Shannon L. Risacher, Jingwen Yan, Gang Li, Tianming Liu and Dajiang Zhu. Deep fusion of brain structure-function in mild cognitive impairment. *Medical Image Analysis*. (**Impact Factor: 13.828**)
6. [TNNLS'23] Yuzhong Chen, Zhenxiang Xiao, Yu Du, Lin Zhao, **Lu Zhang**, Zihao Wu, David Weizhong Liu, Dajiang Zhu, Tuo Zhang, Xintao Hu, Tianming Liu, Senior Member, IEEE, and Xi Jiang, A Unified and Biologically-Plausible Relational Graph Representation of Vision Transformers. *IEEE Transactions on Pattern Analysis and Machine Intelligence*
5. [Cerebral Cortex'23] Songyao Zhang, Tuo Zhang, Zhibin He, Xiao Li, **Lu Zhang**, Dajiang Zhu, Xi Jiang, Tianming Liu, Junwei Han, Lei Guo. Gyrar peaks and patterns in human brains. *Cerebral Cortex*. (**Impact Factor: 5.998**)
4. [IEEE TCDS'23] Lin Zhao, Haixing Dai, Zihao Wu, Zhenxiang Xiao, **Lu Zhang**, David Weizhong Liu, Xintao Hu, Xi Jiang, Sheng Li, Dajiang Zhu, and Tianming Liu. Coupling Visual Semantics of Artificial Neural Networks and Human Brain Function via Synchronized Activations. *IEEE Transactions on Cognitive and Developmental Systems*. (**Impact Factor: 4.546**)

3. [TNNLS'23] **Lu Zhang**, Zhengwang Wu, Xiaowei Yu, Yanjun Lyu, Haixing Dai, Lin Zhao, Li Wang, Gang Li, Xianqiao Wang, Tianming Liu, Dajiang Zhu. Learning Lifespan Brain Anatomical Correspondence via Cortical Developmental Continuity Transfer. *IEEE Transactions on Neural Networks and Learning Systems* (In submit)
2. [TPAMI'23] Xiaowei Yu\*, **Lu Zhang\***, Haixing Dai, Yanjun Lyu, Lin Zhao, Zihao Wu, David Liu, Tianming Liu and Dajiang Zhu. Core-Periphery Principle Guided Redesign of Self-Attention in Transformers. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, \* **co-first authors**. (In submit)
1. [IEEE MultiMedia'23] **Lu Zhang\***, Haixing Dai\*, Lin Zhao, Xiaowei Yu, Zihao Wu, Yanjun Lyu, Zhengliang Liu, Changying Li, Dajiang Zhu, Tianming Liu. STree-E: Hierarchical Semantic Tree Embedding for Image Understanding. *IEEE Transaction on Multimedia*, \* **co-first authors**. (In submit)

## Conference Paper

9. [MICCAI'23] **Lu Zhang**, Saiyang Na, Tianming Liu, Dajiang Zhu and Junzhou Huang. Multimodal Deep Fusion in Hyperbolic Space for Mild Cognitive Impairment Study. *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)* (**Early Accepted, Rate: 13.6%, NIH-MICCAI STudent-Author Registration (STAR) Award**)
8. [ISBI'23] **Lu Zhang**, Xiaowei Yu, Yanjun Lyu, Tianming Liu, and Dajiang Zhu. Representative Functional Connectivity Learning for Multiple Clinical Groups in Alzheimer's Disease. *IEEE 20th International Symposium on Biomedical Imaging (ISBI)*
7. [MICCAI'20] **Lu Zhang**, Li Wang, and Dajiang Zhu. Recovering brain structural connectivity from functional connectivity via multi-gcn based generative adversarial network. *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. (**Young Scientist Award, Rate: 4/1809=0.2%**)
6. [ISBI'20] **Lu Zhang**, Li Wang, and Dajiang Zhu. Jointly Analyzing Alzheimer's Disease Related Structure-Function Using Deep Cross-Model Attention Network. *IEEE 17th International Symposium on Biomedical Imaging (ISBI)*. (**Oral**)
5. [MICCAI'23] Xiang Gao, **Lu Zhang**, Dajiang Zhu, Xiangmin Xu and Xin Zhang. Predicting Diverse Functional Connectivity from Structural Connectivity Based on Multi-Contexts Discriminator GAN. *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)* (**Early Accepted, Rate: 13.6%**)
4. [ISBI'23] Xiaowei Yu, **Lu Zhang**, Yanjun Lyu, Tianming Liu, and Dajiang Zhu. Supervised Deep Tree in Alzheimer's Disease. *IEEE 20th International Symposium on Biomedical Imaging (ISBI)*
3. [MICCAI'22] Xiaowei Yu, Dan Hu, **Lu Zhang**, Ying Huang, Zhengwang Wu, Tianming Liu, Li Wang, Weili Lin, Dajiang Zhu, Gang Li. Longitudinal Infant Functional Connectivity Prediction via Conditional Intensive Triplet Network. *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*.
2. [ISBI'20] Li Wang, **Lu Zhang**, and Dajiang Zhu. Learning Latent Structure Over Deep Fusion Model of Mild Cognitive Impairment. *IEEE 17th International Symposium on Biomedical Imaging (ISBI)*.
1. [ISBI'19] Li Wang, **Lu Zhang**, and Dajiang Zhu. Accessing Latent Connectome of Mild Cognitive Impairment via Discriminant Structure Learning. *IEEE 16th International Symposium on Biomedical Imaging (ISBI)*.

## Workshop Paper

3. [MLMI'19] **Lu Zhang**, Akib Zaman, Li Wang, Jingwen Yan and Dajiang Zhu. A Cascaded Multi-Modality Analysis in Mild Cognitive Impairment. *10th International Workshop on Machine Learning in Medical Imaging held in Conjunction with MICCAI (MLMI)*.
2. [MLMI'22] Haixing Dai, Qing Li, Lin Zhao, Liming Pan, Cheng Shi, Zhengliang Liu, Zihao Wu, **Lu Zhang**, Shijie Zhao, Xia Wu, Tianming Liu, Dajiang Zhu. Graph Representation Neural Architecture Search for Optimal Spatial/Temporal Functional Brain Network Decomposition. *13th International Workshop on Machine Learning in Medical Imaging held in Conjunction with MICCAI (MLMI)*.
1. [MMMI'19] Akib Zaman, **Lu Zhang**, Jingwen Yan and Dajiang Zhu. Multi-Modal Image Prediction via Spatial Hybrid U-Net. *1st International Workshop on Multiscale Multimodal Medical Imaging held in Conjunction with MICCAI (MMMI)*. (**Best Oral Paper, rate:10%**)

## Abstract

2. [SfN'22] **Lu Zhang**, Li Wang, Xiaowei Yu, Yanjun Lyu. and Dajiang Zhu. Modeling Alzheimer's progression by supervised deep tree. *Society for Neuroscience*.
1. [Alzheimer's & Dementia'21] Xiaowei Yu, Norman Scheel, **Lu Zhang**, David C. Zhu, Rong Zhang, and Dajiang Zhu. Free water in T2 FLAIR white matter hyperintensity lesions. *Alzheimer's Dementia*, 17, p.e057398.

## Pre-print Paper

3. Xiaowei Yu, **Lu Zhang**, Lin Zhao, Yanjun Lyu, Tianming Liu, and Dajiang Zhu, (2022). Disentangling Spatial-Temporal Functional Brain Networks via Twin-Transformers. arXiv preprint arXiv:2204.09225.
2. Chong Ma, Lin Zhao, Yuzhong Chen, **Lu Zhang**, Zhenxiang Xiao, Haixing Dai, David Liu, Zihao Wu, Zhengliang Liu, Sheng Wang, Jiaying Gao, Changhe Li, Xi Jiang, Tuo Zhang, Qian Wang, Dinggang Shen, Dajiang Zhu, Tianming Liu, (2022). Eye-gaze-guided Vision Transformer for Rectifying Shortcut Learning. arXiv preprint arXiv:2205.12466.
1. Heng Huang, Lin Zhao, Xintao Hu, Haixing Dai, **Lu Zhang**, Dajiang Zhu, Tianming Liu, (2022). BIAVAN: Brain inspired Adversarial Visual Attention Network. arXiv preprint arXiv:2210.15790.

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## RESEARCH GRANTS

**NIH Director's Early Independence Awards (DP5), PI (Sole), \$1,714,405.00 (Pending) 2022**  
**Other Grants Writing Experience**

- NIH R01AG075582 Total Funding Amount: \$2,708,267 over 5 years
- NIH RF1NS128534 Total Funding Amount: \$2,867,032 over 5 years (\$1,686,621 for the first three years, the 4th and 5th years of support will be funded contingent upon administrative progress review)

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## AWARDS AND HONOURS

- 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 (Rate: 4/1809=0.2%) 2020
- MICCAI 2020 Student Travel Award 2020
- MML Best Oral Paper Award 2019
- UTA Doctoral Student Research and Travel Grant Award 2019

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## 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

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## TEACHING

### 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 Conference/Workshop Organizer**

- Program Committee at the 16th international conference on Brain Informatics (BI 2023) 08/2023
- The leading organizer of international workshop, IAIHI, held in conjunction with the international conference on Brain Informatics (BI 2023) 08/2023

**Conference Reviewer**

- The 23th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2020
- The 24th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2021
- The 18th IEEE International Symposium on Biomedical Imaging (ISBI) 2021
- The 25th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2022
- The 39th International Conference on Machine Learning (ICML) 2022
- The 37th AAAI Conference on Artificial Intelligence (AAAI) 2023
- The 26th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2023

**Journal Reviewer**

- Cerebral Cortex
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- Frontiers in Human Neuroscience
- Journal of Biomedical and Health Informatics
- Frontiers in Computational Neuroscience
- Machine Intelligence Research