# Lu Zhang

## Personal Data

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## Research Interests

- 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

**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

**Journal Paper**

8. [**MIA'22**] **Lu Zhang**, Li Wang and Dajiang Zhu. Predicting brain structural network using functional connectivity. *Medical Image Analysis.* (**Impact Factor: 13.828**)

7. [**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**)

6. [**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**)

5. [**Cerebral Cortex'23**] Songyao Zhang, Tuo Zhang, Zhibin He, Xiao Li,  **Lu Zhang**, Dajiang Zhu, Xi Jiang, Tianming Liu, Junwei Han, Lei Guo. Gyral peaks and patterns in human brains. *Cerebral Cortex.* (**Impact Factor: 5.998**)

4. [**TPAMI'23**]  **Lu Zhang**, Xiaowei Yu, Yanjun Lyu, Zhengwang Wu, Haixing Dai, Lin Zhao, Li Wang, Gang Li, Dajiang Zhu, Tianming Liu. Representing Brain Anatomical Regularity and Variability by Few-Shot Embedding. *IEEE Transactions on Pattern Analysis and Machine Intelligence* (In submit)

3. [**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)

2. [**IEEE MultiMedia'22**] **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)

1. [**TPAMI'22**] 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* (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%**)

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

4. 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, and Tianming Liu, (2023). When Brain-inspired AI Meets AGI. arXiv preprint arXiv:2303.15935, **\* co-first authors**.

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, Jiaxing 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.

## 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)

## Awards and Honours

- 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
- MMML Best Oral Paper Award 2019
- UTA Doctoral Student Research and Travel Grant Award 2019

## 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

## 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 Services

**Academic Conference/Workshop Organizer**
- The leading organizer of international workshop, IAIHI, held in conjunction with the international conference on Brain Informatics (BI 23) 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