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

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. Gyral 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

7. Xiang Li, **Lu Zhang**, Zihao Wu, Zhengliang Liu, Lin Zhao, Yixuan Yuan, Jun Liu, Gang Li, Dajiang Zhu, Pingkuan Yan, Quanzheng Li, Wei Liu, Tianming Liu, Dinggang Shen, (2023). Artificial General Intelligence for Medical Imaging. arXiv preprint arXiv:2306.05480.
6. Zhenxiang Xiao, Yuzhong Chen, **Lu Zhang**, Junjie Yao, Zihao Wu, Xiaowei Yu, Yi Pan, Lin Zhao, Chong Ma, Xinyu Liu, Wei Liu, Xiang Li, Yixuan Yuan, Dinggang Shen, Dajiang Zhu, Tianming Liu, Xi Jiang, (2023). Instruction-vit: Multi-modal prompts for instruction learning in vit. arXiv preprint arXiv:2305.00201.
5. Zihao Wu, **Lu Zhang**, Chao Cao, Xiaowei Yu, Haixing Dai, Chong Ma, Zhengliang Liu, Lin Zhao, Gang Li, Wei Liu, Quanzheng Li, Dinggang Shen, Xiang Li, Dajiang Zhu, Tianming Liu, (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.
4. Lian Zhang, Zhengliang Liu, **Lu Zhang**, Zihao Wu, Xiaowei Yu, Jason Holmes, Hongying Feng, Haixing Dai, Xiang Li, Quanzheng Li, Dajiang Zhu, Tianming Liu, Wei Liu, (2023). Segment Anything Model (SAM) for Radiation Oncology. arXiv preprint arXiv:2306.11730.
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

- 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
- 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

- 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