Zizhao Zhang, Ph.D. Student

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EDUCATION

PhD Student, Software Engineering 2018 - Present
Tsinghua University
Thesis: "Automated Diagnosis and Pathological Mechanisms Understanding of Brain Disorders"
Supervisor: Dr. Yue Gao

Bachelor of Science, Software Engineering 2014 - 2018
Tsinghua University

RESEARCH INTERESTS

Brain Science Graph Signal Processing Complex Network

RESEARCH EXPERIENCE

Intelligent Media and Cognition Lab, School of Software, Tsinghua University
Mentor: Yue Gao
Projects on EMD Metric Learning *Oct. 2016 – Aug. 2017*

- Proposed an EMD metric learning algorithm to optimize traditional EMD, leading to better distance measurement between pairwise probability distributions.
- Proposed a relaxed EMD metric to reduce the computational complexity of calculating EMD.
- Applied EMD metric learning on the tasks of multiview object classification and document classification and outperformed existing methods on accuracy.

Intelligent Media and Cognition Lab, School of Software, Tsinghua University
Mentor: Yue Gao
Projects on Dynamic Hypergraph Learning *Nov. 2017 – May. 2019*

- Proposed the first dynamic hypergraph structure learning algorithm to jointly conduct hypergraph structure updating and hypergraph learning, which outperforms the traditional static hypergraph learning method.
- Proposed the hypergraph structure optimization model which takes both label and feature information into consideration, thus leading to better correlation modelling.
- Proposed tensor representation of dynamic hypergraph structure and tensor-based dynamic hypergraph learning method, which is more flexible for dynamic structure updating than traditional representations.

Intelligent Media and Cognition Lab, School of Software, Tsinghua University
Mentor: Yue Gao
Projects on Multimodal Data Fusion *Sep. 2017 – Jul. 2018*

- Proposed the multi-hypergraph structure to model the high-order correlation among multimodal data and an inductive multi-hypergraph learning algorithm which can learn the optimal feature-to-label projection in a supervised manner.
- The inductive multi-hypergraph learning is 200~10k+ faster than transductive multi-hypergraph learning, while achieving comparable or even better performance in most cases.
- Further proposed a cross diffusion process on multi-hypergraph, in which the label information is propagated from multiple hypergraphs alternatively, to effectively combine multi-modal information.

Intelligent Media and Cognition Lab, School of Software, Tsinghua University
Mentor: Yue Gao
Projects on ASD Automated Diagnosis *Jun. 2018 – Now*

- Propose a learning-based ASD diagnosis framework that combines the strengths of dynamic functional network with subject correlation modelling, which can identify the ASD patients efficiently.
- Extracted discriminative functional connections for ASD diagnosis, which are consistent with the previous studies and may serve as potentially useful biomarkers for ASD.
- Revealed that aberrant functional connectivity within the crucial nodes could play an important role in diagnose for ASD.

HONORS AND AWARDS

1. Best Student Paper of Pacific-Rim Conference on Multimedia 2018
2. Outstanding Undergraduate Thesis Award, Tsinghua University (1%) 2018
3. First Prize of "Challenge Cup" the National Science and Technology Innovation Competition, Tsinghua University (10/300) 2018
4. First Prize of Outstanding Project Award for Student Innovation Training Program, Tsinghua University (1%) 2018
5. "Academic Promotion Plan" Grant, Tsinghua Univeristy (RMB 50,000) 2018
6. ITCSC-INC Winter School Research Grant, Chinese University of Hong Kong 2017
7. Academic Merit Scholarship, Tsinghua University (1%) 2016

PUBLICATIONS

Papers in submission

1. **Zizhao Zhang**, Shihui Ying, Rongrong Ji, Xibin Zhao, Yue Gao, "Learning on Dynamic Hypergraph via Tensor Representation", submitted to *IEEE International Conference on Computer Vision,* 2019.
2. **Zizhao Zhang**, Shoujun Xu, Sichao Shen, Lei Wei, Baojuan Li, Yue Gao, "Diagnosis of Childhood Autism using Dynamic Hypergraph Learning", submitted to International Conference on Medical Image Computing and Computer Assisted Intervention, 2019.

Conference Papers

3. Yifan Feng, **Zizhao Zhang**, Xibin Zhao, Rongrong Ji, Yue Gao, "GVCNN: Group-View Convolutional Neural Networks for 3D Shape Recognition", *IEEE Conference on Computer Vision and Pattern Recognition*, pp. 264-272, 2018.
4. **Zizhao Zhang**, Haojie Lin, Yue Gao, "Dynamic Hypergraph Structure Learning", *International Joint Conference on Artificial Intelligence*, pp. 3162-3169, 2018. (Oral)
5. **Zizhao Zhang**, Yubo Zhang, Xibin Zhao, Yue Gao, "EMD Metric Learning", *AAAI Conference on Artificial Intelligence*, 2018. (Oral)
6. Yifan Feng, Haoxuan You, **Zizhao Zhang**, Rongrong Ji, Yue Gao, "Hypergraph Neural Networks", *AAAI Conference on Artificial Intelligence*, 2019.
7. **Zizhao Zhang**, Haojie Lin, Junjie Zhu, Xibin Zhao, Yue Gao, "Cross-Diffusion on Multi-Hypergraph for Multi-Modal 3D Object Recognition", *Pacific-Rim Conference on Multimedia*, pp. 38-49, 2018. (Oral)

Journal Papers

8. Nan Wang, **Zizhao Zhang**, Xibin Zhao, Quan Miao, Rongrong Ji, Yue Gao, "Exploring High-Order Correlations for Industry Anomaly Detection", *IEEE Transactions on Industrial Electronics*, 2019.
9. **Zizhao Zhang**, Haojie Lin, Xibin Zhao, Rongrong Ji, Yue Gao, "Inductive Multi-Hypergraph Learning for View-Based 3D Object Classification", *IEEE Transactions on Image Processing*, pp. 5957-5968, 2018.

10. Heyuan Shi, Yubo Zhang, **Zizhao Zhang**, Nan Ma, Xibin Zhao, Hai Wan, Yue Gao, Jiaguang Sun, "Hypergraph Induced Convolutional Networks for Visual Classification", *IEEE Transactions on Neural Networks and Learning Systems*, 2019.

CONFERENCE PRESENTATIONS

1. The 32nd AAAI Conference on Artificial Intelligence, February 2-7, 2018 (Oral)
2. The 27th International Joint Conference on Artificial Intelligence, July 13-19, 2018 (Oral and Poster)
3. The Pacific-Rim Conference on Multimedia, September 21-22, 2018 (Oral)

SERVICES

Organizer

- Tutorial on Hypergraph Learning: Methods, Tools and Applications in Medical Image Analysis (MICCAI 2019)

Program committee or reviewer for conferences:

- International Joint Conference on Artificial Intelligence (IJCAI 2019)
- IEEE International Conference on Image Processing (ICIP 2019)
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2019)

Reviewer for journals:

- Journal of Visual Communication and Image Representation
- Neurocomputing