Zizhao Zhang, Ph.D. Student

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EDUCATION

PhD Student, Software Engineering 2018 - Present
Tsinghua University | Supervisor: Dr. Yue Gao
Bachelor of Science, Software Engineering 2014 - 2018
Tsinghua University | GPA: 88/100

RESEARCH INTERESTS

Complex Network Graph Signal Processing Brain Science

HONORS AND AWARDS

1. Microsoft Research Asia Fellowship 2019
   (12 outstanding PhD candidates in the Asia-Pacific region)
2. National Scholarship (Top 1 graduate in year 1) 2019
3. Best Student Paper of Pacific-Rim Conference on Multimedia 2018
4. Outstanding Undergraduate Thesis Award, Tsinghua University (1%) 2018
5. First Prize of "Challenge Cup" the National Science and Technology Innovation Competition, Tsinghua University (10/300) 2018
6. First Prize of Outstanding Project Award for Student Innovation Training Program, Tsinghua University (1%) 2018
7. "Academic Promotion Plan" Grant, Tsinghua Univeristy (RMB 50,000) 2018
8. Academic Merit Scholarship, Tsinghua University (1%) 2016

PUBLICATIONS

Journal Papers

1. Yue Gao, **Zizhao Zhang**, Haojie Lin, Xibin Zhao, Shaoyi Du, and Changqing Zou, "Hypergraph Learning: Methods and Practices", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2020.
2. Shuyi Ji, **Zizhao Zhang**, Shihui Ying, Liejun Wang, Xibin Zhao, Yue Gao, "Kullback-Leibler Divergence Metric Learning", *IEEE Transactions on Cybernetics*, 2020.
3. 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.
4. 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.
5. **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.

Conference Papers

6. Yifan Feng, Haoxuan You, **Zizhao Zhang**, Rongrong Ji, Yue Gao, "Hypergraph Neural Networks", *AAAI Conference on Artificial Intelligence*, 2019.
7. 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.
8. **Zizhao Zhang**, Haojie Lin, Yue Gao, "Dynamic Hypergraph Structure Learning", *International Joint Conference on Artificial Intelligence*, pp. 3162-3169, 2018. (Oral)
9. **Zizhao Zhang**, Yubo Zhang, Xibin Zhao, Yue Gao, "EMD Metric Learning", *AAAI Conference on Artificial Intelligence*, 2018. (Oral)
10. **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)

RESEARCH EXPERIENCE

Institute for Brain and Cognitive Sciences, Tsinghua University
Mentor: Qionghai Dai
Projects on Neural Relational Inference via Dynamical Systems *Apr. 2020 – Present*

- Proposed an unsupervised model that learns to infer interactions among neural population while simultaneously learning the dynamics purely from observational data.
- The method can effectively and consistently infer the latent interactions and model high-dimensional, highly nonlinear dynamics on synthetic datasets which use chaotic RNNs as data generators with random perturbations and trial-to-trial variability.

Intelligent Media and Cognition Lab, School of Software, Tsinghua University
Mentor: Yue Gao
Projects on ASD Automated Diagnosis *Jun. 2018 – May. 2019*

- Proposed 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.

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

- Proposed a tensor-based dynamic hypergraph to flexibly, adaptively model the high-order correlation among data.
- Proposed a dynamic hypergraph learning method for node classification/clustering in a semi-supervised manner while simultaneously optimizing the hypergraph structure to model data correlation better.
- Systematically reviewed the seminal works on hypergraph learning and participated in developing a hypergraph learning toolkit called THU-HyperG (https://github.com/iMoonLab/THU-HyperG).

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 Wasserstein Metric Learning *Oct. 2016 – Aug. 2017*

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

SERVICES

Organizer

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

Session Chair

- International Joint Conference on Artificial Intelligence (IJCAI 2019)

Program committee or reviewer for conferences:

- AAAI Conference on Artificial Intelligence (AAAI 2020)
- 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
- IEEE Signal Processing Letters

Teaching Assistant:

- Software Testing Techniques (2019, 2018)
- Software Project Management (2018)
- The Thoughts and Works in the Western Literature (2020)

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)