Zitai Chen

Master on Computational Mathematics

School of Data and Computer Science, Sun Yat-Sen University

(+86) 150-1301-9909 | princechan1995@gmail.com | zitaichen.github.io | zitaichen

Research Interest

Machine learning, graph mining, multilinear algebra, and optimization in general. In particular, I am interested in developing tensor algorithms to dissect characteristic of graph nodes as well as learning the optimization and the theoretical results of these methods. Problems I investigate are motivated by the network data.

Though most of my works focus on clustering problem on graph data by far, I am open to interesting works in other field and have dabbled in a wide range of AI problem. Recently, I am also working on image recovery with low rank tensor method and knowledge distill with designed tensor scheme.

Education

Sun Yat-Sen University — *Guangzhou, Guangdong, China*

M.S. on Computational Mathematics — *Sep. 2017 - Present*

Central South University — *Changsha, Hunan, China*

B.S. on Mathematics — *Sep. 2013 - Jun. 2017*

- Got an Excellent Paper Award in College Students' Innovation and Entrepreneurship Project
- Got The Third Class Price of Mathematics Competition for College Students in Hunan Province.

Research Experience

InplusLab, Sun Yat-Sen University — *Guangzhou, Guangdong, China*

Research Assistant, Supervisor: Prof. Zibin Zheng and Dr. Chuan Chen — *Sep. 2017 - Present*

- Research Topic: Applications of Tensor Method, and Network (Graph) Analysis: Embedding, Clustering and Information Fusion.

Data Center of Wechat Group, Tencent Technology — *Shenzhen, Guangdong, China*

Research Intern, Supervisor: Guohui Ling — *Jun. 2018 - May. 2019*

- Research Topic: Network Embedding with Attributes and Labels.
- Paper is published in conference DASFAA 2019.

Liu's Research Team, Central South University — *Changsha, Hunan, China*

Student Intern, Supervisor: Prof. Shengjun Liu and Dr. Xinru Liu — *May. 2015 - Jun. 2017*

- Research Topic: Fast construction of 2D offset curve, and Point cloud denoising and surface reconstruction

Selected Projects

Variational Graph Embedding and Clustering with Laplacian Eigenmaps — *IJCAI 2019*

Advisor: Dr. Chuan Chen — *Oct. 2018 - Feb. 2019*

- We explore the graph embedding and clustering from a deep probability viewpoint, catching the uncertainty nature of the graph nodes. To address the sparsity, scalability, robustness issue, the proposed (VGECLE) learns node embeddings and assigns node clusters simultaneously, representing each node as a Gaussian distribution to disentangle the true embedding position and the uncertainty from the graph. With a Mixture of Gaussian (MoG) prior, VGECLE is capable of learning an interpretable clustering by the variational inference and generative process. In order to learn the pairwise relationships better, we propose a Teacher-Student mechanism encouraging node to learn a better Gaussian from its instant neighbors in the stochastic gradient descent (SGD) training fashion. The manuscript is accepted by IJCAI 2019.
- [Apr. 2019 - present] We are working on a more general model to deal with attributed network on a similar situation. The manuscript is ongoing.

Graph Neural Network for Multilayer Networks Clustering — *In Progress*

Advisor: Dr. Chuan Chen — *Jun. 2018 - Present*

- We explore the possible of the graph neural network (GNN) model on unsupervised task. Since GNN is well-known in extracting the feature map of graph data w.r.t. the graph structure, we try to improve the clustering performance on the multilayer networks data, which is full of attributes in a unknown distribution.

SINE: Side information Network Embedding *DASFAA 2019*

Advisor: Dr. Chuan Chen and Guohui Ling from WeChat *May. 2018 - Oct. 2018*

- We explore a network embedding method with side information, namely attributes and labels. Network embedding, learning low-dimensional features for nodes in a network, benefits the downstream tasks like link prediction and node classification. As the effects of different attributes vary with nodes and the unlabeled nodes can be influenced by diverse labeled neighbors, SINE defines a flexible and semantical neighborhood to model such nature of each node and designs a random walk scheme to explore this neighborhood. The manuscript is published in DAFSAA 2019. This work is collaborated with WeChat.

Tensor decomposition for Multilayer Networks *AAAI 2019*

Advisor: Dr. Chuan Chen *Sep. 2017 - Jun. 2018*

- We explore a new clustering method in this work. In multilayer networks, some networks might follow the same cluster distribution while the others not. In such multiple distribution case, we proposed a tensor decomposition based method to simultaneously group the networks and cluster the nodes in different groups, taking the advantages of tensor representation and analysis. Numerically, the purposed optimization problem is a constrained non-convex nonlinear least square problem and solved by a Trust Region method. The manuscript is published in AAAI 2019.
- [Sep. 2018 - Jan. 2019] On the same problem, we extend the former model to a more robust model and the corresponding manuscript is under review.

Publications

Under Review Manuscript

- **Zitai Chen**, Chuan Chen, Zibin Zheng, Nong Xiao (2019). Block Term Decomposition for Multilayer Networks Clustering.

Working Manuscript

- **Zitai Chen**, Zhebin Wu, Chaun Chen, Zibin Zheng, (2019). Robust Tensor Completion with Tensor-Train Rank for Image Recovery.
- **Zibin Chen**, Zong Zhang, Chuan Chen, Zibin Zheng, Qingsong Zou (2019). Attributed Network Clustering by Variational Inference.

Refereed Publications

- **Zitai Chen**, Chuan Chen, Zong Zhang, Zibin Zheng, Qingsong Zou (2019). Variational Graph Embedding and Clustering with Laplacian Eigenmaps. *Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence*, 1-1. IJCAI 2019. **(Accepted Rate: 850/4,752, Oral Presentation)**
- **Zitai Chen***, Tongzhao Cai*, Chuan Chen, Zibin Zheng, Guohui Ling (2019). SINE: Side Information Network Embedding. *Database Systems for Advanced Applications (1) 2019*, 692-708. DASFAA 2019. **(Oral Presentation)**
- **Zitai Chen**, Chuan Chen, Zibin Zheng, Yi Zhu (2019). Tensor Decomposition for Multilayer Networks Clustering. *Proceedings of the AAAI Conference on Artificial Intelligence, 33(01)*, 3371-3378. AAAI 2019. **(Accepted Rate:1,150/7095, Oral Presentation)**
- Fanghua Ye, **Zitai Chen**, Hui Qian, Rui Li, Chuan Chen and Zibin Zheng(2018). New Approaches in Multi-View Clustering. *Recent Applications in Data Clustering.*
- Rui Qin, Shengjun Liu, **Zitai Chen**, Weixiong Yuan, Fan Zhang, Xinru Liu (2017). Fast construction of 2D offset curve based on distance field. *Journal of Zhejiang University (Science Edition), 2017, 44(1)*, 10-21.

Technical Skills

- **Languages**: Mandarin, English, and Cantonese.
- **Programming Languages**: Matlab, Python, C++, Tensorflow, LaTeX, and HTML.
- **Specialty**: Convex Optimization, Multilinear Algebra, Mathematic Analysis, Numerical Calculation
- **Operating Systems**: Windows, Linux, and Mac OS