Zuobai Zhang

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Education

School of Computer Science, Fudan University — **Shanghai, China**

Bachelor of Computer Science (Honor Class) — *Sept. 2017 – Jul. 2021 (expected)*

- Cumulative GPA: 3.93/4.0 (98.2%), School Rank: 1/145
- Cumulative Major GPA: 3.99/4.0 (99.7%)

Publications

- Nearly Linear Time Algorithm for Mean Hitting Times of Random Walks on a Graph.
  Zuobai Zhang, Wanyue Xu, Zhongzhi Zhang
  WSDM 2020
- Fast Approximation of Coherence for Second-Order Noisy Consensus Networks.
  Zuobai Zhang, Wanyue Xu, Yuhao Yi, Zhongzhi Zhang
  IEEE Transactions on Cybernetics
- Power-Law Graphs Have Minimal Scaling of Kemeny Constant for Random Walks.
  Wanyue Xu, Yibin Sheng, **Zuobai Zhang**, Haibin Kan, Zhongzhi Zhang
  The Web Conference 2020

Working Papers

- Opinion Dynamics Incorporating Higher-Order Interactions.
  Zuobai Zhang, Wanyue Xu, Zhongzhi Zhang, Guanrong Chen
  Submitted to *ICDM 2020*
- Minimizing Spectral Radius of Non-Backtracking Matrix by Edge Removal.
  Zuobai Zhang, Zhongzhi Zhang, Guanrong Chen
  Submitted to *IEEE Transactions on Information Forensics and Security*
- Fast Estimation of the Diagonal of Pseudoinverse of Graph Laplacian.
  Qi Bao, **Zuobai Zhang**, Wanyue Xu, Zhongzhi Zhang
  Submitted to *IEEE Transactions on Knowledge and Data Engineering*
- Coherence Scaling of Noisy Second-Order Scale-Free Consensus Networks.
  Wanyue Xu, Bin Wu, **Zuobai Zhang**, Zhongzhi Zhang, Haibin Kan, Guanrong Chen
  Submitted to *IEEE Transactions on Cybernetics*
- Biharmonic Distance-Based Performance Metric for Second-Order Noisy Consensus Networks.
  Yuhao Yi, Bingjia Yang, **Zuobai Zhang**, Wanyue Xu, Zhongzhi Zhang, Stacy Patterson
  Submitted to *IEEE Transactions on Information Theory*

Research Experience

Fast Algorithms on Graph Mining — **Fudan University**

Advisor: Prof. Zhongzhi Zhang — *Apr. 2018 - Feb. 2019*

- Presented a series of approximation algorithms with nearly linear time for computing graph mining quantities based on Laplacian Solvers and provided approximation guarantees for these algorithms.
- Conducted experiments on several model networks and a large set of realistic networks from different domains.
- Contributed to two first-author papers accpeted by **WSDM 2020** and **TCYB**.
- Supported by Fudan's Undergraduate Research Opportunities Program (FDUROP) under Grant No.19914.

Minimizing Spectral Radius of Non-Backtracking Matrix by Edge Removal **Fudan University**
Advisor: Prof. Zhongzhi Zhang *Mar. 2019 - May 2020*

- Studied the problem of minimizing the spectral radius of the non-backtracking matrix of a graph by deleting edges and showed the non-submodularness of the objective function.
- Presented an effective, scalable approximation algorithm with linear complexity with respect to the number of edges.
- Verified the effectiveness and efficiency of our algorithm on a large set of real-world networks, and demonstrated that our algorithm outperforms several baseline schemes.

Opinion Dynamics Incorporating Higher-Order Interactions **Fudan University**
Advisor: Prof. Zhongzhi Zhang *Nov. 2019 - Feb. 2020*

- Developed a new model for opinion dynamics by incorporating long-range interactions with high-order random walk.
- Designed a theoretically convergence-guaranteed estimation algorithm that approximates the equilibrium opinion vector nearly linearly in both space and time with respect to the number of edges in the graph.
- Conducted extensive experiments on social networks, demonstrating the efficiency and effectiveness of the new algorithm.

Optimizing Kirchhoff Index via Edge Addition **Fudan University**
Advisor: Prof. Zhongzhi Zhang *Jul. 2019 - present*

- Proved the NP-Hardness of the problem of optimizing Kirchhoff index by adding edges.
- Proposed a sub-quadratic approximation algorithm for the special case of single edge addition which significantly reduces the cubic time complexity of the exact algorithm.

Network Medicine Framework Using Semantic Subgraph Matching **Mila**
Advisor: Prof. Jian Tang *Feb. 2020 - present*

- Proposed an approach for learning intepretable representations of subgraphs for drug repurposing and combinations.
- Showed that the proposed approach is effective and interpretable for both drug repurposing and combinations on integrated biomedical datasets experimentally.

Honors & Awards

SenseTime Scholarship (29 undergrads from China) **Jan. 2020**
Chinese National Scholarship (Top 1%) **Oct. 2019**
Chun Tsung Scholar Program **Apr. 2019**
Wish Scholarship **May 2019**
Chinese National Scholarship (Top 1%) **Oct. 2018**
Gold Medal, ACM-ICPC Asia Regional Contest EC-Final **Dec. 2017**
Gold Medal, ACM-ICPC Asia Regional Contest Qingdao Site **Nov. 2017**
Silver Medal, National Olympiad in Informatics, National Finals **Jul. 2016**
Gold Medal, Winter Camp of National Olympiad in Informatics **Jan. 2016**
First Prize (2nd place), National Olympiad in Informatics, Shandong Division **Nov. 2015**

Skills

- **Programming Languages:** Python, C/C++, LaTeX, Julia, JavaScript, MATLAB, HTML
- **Language:** Chinese-Native, English-Fluent (**GRE**: 162+169+4.0)