Basic information

Name	SUN, Yahui
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Languages	Mandarin, English, C++, R, MATLAB
Current position	Research fellow, School of Computer Science and Engineering, Nanyang Technological University

Education and positions

2019-	**Research fellow, Nanyang Technological University, Singapore**
2018-2019	**Postdoctoral fellow, Australian National University, Australia**
2014-2018	**Ph.D. in *Steiner tree problems in graphs*, University of Melbourne, Australia**
	Thesis title: Classical, prize-collecting and node-weighted Steiner tree problems in graphs
2012-2014	**M.S. in *aerospace engineering*, Harbin Institute of Technology, China**
2008-2012	**B.S. in *aerospace engineering*, Harbin Institute of Technology, China**

Research interests

- graph mining $\subset$ data mining/analytics

- network optimization $\subset$ networking $\subset$ Internet of things

Career profile

Motivated by China's first crewed space mission in 2003, I studied aerospace engineering for my bachelor and master degrees in the Harbin Institute of Technology. Then, I studied Steiner tree problems in graphs for my PhD degree in the University of Melbourne. My current research interests originated from my PhD study.

Selected publications

<mark>Yahui Sun</mark>, Marcus Brazil, Doreen Thomas, and Saman Halgamuge. "The Fast Heuristic Algorithms and Post-Processing Techniques to Design Large and Low-Cost Communication Networks." **IEEE/ACM Transactions on Networking** (2019).
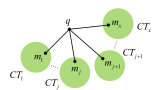[**PDF**] [**Codes&Datasets**]

We propose two fast algorithms for the Prize-Collecting Steiner Tree Problem: the first one is a quasilinear-time heuristic algorithm that is faster and consumes less memory than the other algorithms; and the second one is an improvement of a state-of-the-art polynomial-time approximation algorithm that can produce near-optimal solutions at a speed that is only inferior to the first one. We demonstrate the competitiveness of our algorithms by comparing them with the state-of-the-art ones in large graphs with up to 1,000,000 vertices and 10,000,000 edges. We also propose some post-processing techniques to update the best-known solution for a notoriously difficult benchmark instance.

<mark>Yahui Sun</mark>, Chenkai Ma, and Saman Halgamuge. "The node-weighted Steiner tree approach to identify elements of cancer-related signaling pathways." **International Conference on Bioinformatics** (published in BMC Bioinformatics) (2017).
[**PDF**] [**Codes&Datasets**]

We propose the node-weighted Steiner tree approach to identifying important elements of cancer-related signaling pathways at the level of proteins. We apply this approach to identify important elements of two well-known cancer-related signaling pathways: PI3K/Akt and MAPK. On a commonly used personal computer, this new approach takes less than 2s to identify the important elements of PI3K/Akt and MAPK signaling pathways in a large node-weighted protein-protein interaction network with 16,843 vertices and 1,736,922 edges.

The other publications

Yahui Sun, and Saman Halgamuge. "Minimum-cost heterogeneous node placement in wireless sensor networks." IEEE Access (2019).
[**PDF**] [**Codes&Datasets**]

Yahui Sun, Pathima Nusrath Hameed, Karin Verspoor, and Saman Halgamuge. "A physarum-inspired prize-collecting steiner tree approach to identify subnetworks for drug repositioning." International Conference on Bioinformatics (published in BMC Systems Biology) (2016).
[**PDF**] [**Codes&Datasets**]

Yahui Sun, and Saman Halgamuge. "Fast algorithms inspired by physarum polycephalum for node weighted steiner tree problem with multiple terminals." In 2016 IEEE Congress on Evolutionary Computation (CEC), pp. 3254-3260. IEEE, (2016).
[**PDF**] [**Codes&Datasets**]

Yahui Sun, Yunhai Geng, and Shuang Wang. "Analysis and calibration of star sensor's image plane displacement." Infrared and Laser Engineering 10 (2014): 26.
[**PDF**]

Yahui Sun, Yingying Xiao, and Yunhai Geng. "On-orbit calibration of star sensor based on a new lens distortion model." In Proceedings of the 32nd Chinese Control Conference, pp. 4989-4994. IEEE, (2013).
[**PDF**]

Submitted manuscripts

Yahui Sun, Marcus Brazil, Daniel Rehfeldt, Doreen Thomas, and Saman Halgamuge. "A Physarum-inspired algorithm for minimum-cost relay node placement in wireless sensor networks", IEEE/ACM Transactions on Networking, (submitted in 03/2018; under the third round of review)

Scholarships and awards

2014-2018	Melbourne International Research Scholarship, University of Melbourne, Australia
2014-2018	Melbourne International Fee Remission Scholarship, University of Melbourne, Australia
2013	National Scholarship, China
2008-2014	First-level Scholarship (multiple), Harbin Institute of Technology, China

(timestamp: 09/2019)