

MIAO QIAO

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EDUCATION AND EMPLOYMENT

Senior Lecturer (above the bar) School of Computer Science University of Auckland, New Zealand	<i>2023 - present</i>
Senior Lecturer equivalent to Associate Professor in Tenure Track systems School of Computer Science University of Auckland, New Zealand	<i>2021 - 2022</i>
Lecturer School of Computer Science University of Auckland, New Zealand	<i>2018 - 2020</i>
Lecturer School of Engineering and Advanced Technology Massey University, New Zealand	<i>2016 - 2018</i>
Postdoctoral Fellow Department of Computer Science and Engineering The Chinese University of Hong Kong, Hong Kong	<i>2013 - 2015</i>
Doctor of Philosophy Systems Engineering and Engineering Management The Chinese University of Hong Kong, Hong Kong	<i>2009 - 2013</i>
Bachelor of Engineering Computer Science and Engineering Shanghai Jiao Tong University, China	<i>2005 - 2009</i>

FUNDING

- Principal Investigator of the project “Advanced Graph Analytics for Human Brain Connectivity”, supported by New Zealand Singapore Data Science Programme, the Ministry of Business Innovation and Employment (MBIE) New Zealand, **NZD 3,000,000.** *2020 - 2024*
- Principal Investigator of project “Subgraph Matching: Theory and Practice”, supported by Marsden Fast-Start, Royal Society of New Zealand, **NZD 300,000.** *2018 - 2024*

LEADERSHIP AND SERVICES

Program Committee Chair:

- Australasian Database Conference (ADC) *2021*
- Doctoral Consortium of International Semantic Web Conference (ISWC), Core rank A *2019*

Review Board Member:

- Proceedings of the ACM Symposium on Principles of Database Systems (PODS), Core rank A* *2023*
- Proceedings of the Very Large Database Endowment (PVLDB), Core rank A* *2020-2021*

Program Committee Member:

- International Joint Conferences on Artificial Intelligence (IJCAI), Core rank A* *2019-2021*

- Association for the Advancement of Artificial Intelligence (AAAI), Core rank A* 2020

Reviewer:

- Symposium on Computational Geometry, Core rank A, 2019
- Transactions on Database Systems (TODS), Core rank A* 2015, 2018, 2019
- Transactions on Knowledge and Data Engineering (TKDE), Core rank A* 2018
- International Conference on Knowledge Discovery & Data Mining (KDD), Core rank A* 2016
- International Conference on Data Mining (ICDM), Core rank A* 2013, 2014
- Web Information Systems Engineering (WISE), Core rank A 2013
- International Journal on Very Large Data Bases (VLDBJ), Core rank A* 2013, 2018, 2019

Vice President of South Pacific Competition Programming Association in 2023.

University Services:

- **School-level** PhD coordinator (deputy) 2019-2020
- **School-level** ACM International Collegiate Programming Contest coordinator 2018-2023
- **University-level** Member of the University of Auckland Human Participants Ethics Committee (UAHPEC) 2021-2023

TALKS

- 2024, Scalable Query Processing with Graphs. Data Systems Seminar Series, University of Waterloo

AWARDS

- VLDB 2013 Travel Fellowship 2013
- Doctor Scholarship, The Chinese University of Hong Kong 2009-2013
- Shanghai Jiao Tong University 1st Class Scholarship 2008
- ACM International Collegiate Programming Contest (ICPC), 3rd Place, Singapore 2007
- Computer World Scholarship 2007
- Singapore Technology Engineering Scholarship 2006
- ACM International Collegiate Programming Contest (ICPC), 1st Place, Korea 2005
- Silver medal nationwide, National Olympiad in Informatics, China 2004

TEACHING

- COMPSCI751, Advanced Topics in Database Systems (2019-2023)
- SOFTENG351, Fundamentals of Database Systems (2019-2023)
- COMPSCI351, Fundamentals of Database Systems (2019-2023)
- COMPSCI753, Algorithms for Massive Data (2018-2019)
- 158.347, Database Paradigms (2017)
- 159.172, Computational Thinking and Algorithms (2017)

- 158.247, Database Design (2017-2018)
- 158.225, Systems Analysis and Modelling (2017-2018)
- 158.258, Web Development (2016)
- 158.172, Computational Thinking and Algorithms (2016)
- 158.225, Systems Analysis and Modelling (2016)

Graduated:

- Wentao Li. PhD 2021. He was selected as 2021 Global Top 100 Chinese Rising Stars in Artificial Intelligence. The Hong Kong University of Science and Technology (Guangzhou).
- Zijin Feng. PhD 2024. Huawei Hong Kong.

Ongoing:

- Yizhou Dai
- Grace Wen
- Yunhan Yang

RESEARCH INTERESTS

My expertise lies in database research such as indexing, query optimization, graph analytics and its applications in brain networks. Specifically, my research covers three main categories:

- Finding explainable and efficient algorithms for big data processing and analysis. The goal is to find big data algorithms that are empirically efficient with an efficiency theoretically explainable. Under this category, we have explored the computation of graph metrics, densest subgraph search, community detection, hypergraph clustering, I/O-efficient algorithm design and streaming algorithms.
- Indexing and query optimization. The goal is to design data indexing to optimize online query performances. My past and ongoing research span over topics including graph distance queries, nearest neighbor search in high dimensional space, range thresholding queries on streams, multi-way join queries in traditional relational databases, local dense subgraph search, etc.
- Brain network analysis. This interdisciplinary (with medical and health science) research aims at understanding and explaining the functions of the human brain, and bettering the predictions of the malfunctioning of the human brain with graph analytical techniques. We have created and are actively maintaining a large graph dataset constructed by transforming both publicly available and locally collected brain images (fMRI + T1) to graph data (we are planning to expand the data set to DTI data in the following year). The dataset is released to the public.

CONFERENCE PUBLICATIONS

- Jiaxing Xu, Kai He, Mengcheng Lan, Qingtian Bian, Wei Li, Tieying Li, Yiping Ke, **Miao Qiao**. Contrasformer: A Brain Network Contrastive Transformer for Neurodegenerative Condition Identification. *Proceedings of the 33rd ACM International Conference on Information and Knowledge Management 2024*.
- Chaoji Zuo, **Miao Qiao**, Wenchao Zhou, Feifei Li, Dong Deng. SeRF: Segment Graph for Range-Filtering Approximate Nearest Neighbor Search. *Proceedings of the International Conference on Management of Data (SIGMOD) 2(1): 69:1-69:26 (2024)*
- *Yizhou Dai, **Miao Qiao**, Rong-Hua Li. On Density-based Local Community Search. *Proceedings of the 34th ACM Symposium on Principles of Database Systems (PODS) 2(2): 88, 2024*

- *Zijin Feng, **Miao Qiao**, Hong Cheng. Modularity-based Hypergraph Clustering: Random Hypergraph Model, Hyperedge-cluster Relation, and Computation. *Proceedings of the International Conference on Management of Data (SIGMOD)*, 1(3): 215:1-215:25, 2024.
- Jiaying Xu, Yunhan Yang, David Tse Jung Huang, Sophi Shilpa Gururajapathy, Yiping Ke, **Miao Qiao**, Alan Wang, Haribalan Kumar, Josh McGeown, Eryn Kwon. Data-Driven Network Neuroscience: On Data Collection and Benchmark. *NIPS*, 2023.
- Yiping Liu, Jiamou Liu, Bakh Khoussainov, **Miao Qiao**, Bo Yan, Mengxiao Zhang, Centralization Problem for Opinion Convergence in Decentralized Networks. *Proceedings of the International Conference on Advances in Social Networks Analysis and Mining*, Pages 658-665, 2023.
- *Yizhou Dai, **Miao Qiao**, Lijun Chang. Anchored Densest Subgraph. *Proceedings of the International Conference on Management of Data (SIGMOD)*, pages 1200-1213, 2022.
- *Wentao Li, **Miao Qiao**, Lu Qin, Ying Zhang, Lijun Chang, Xuemin Lin. On Scalable Computation of Graph Eccentricities. *Proceedings of the International Conference on Management of Data (SIGMOD)*, pages 904-916, 2022.
- *Zijin Feng, **Miao Qiao**, Hong Cheng. Clustering Activation Networks. *Proceedings of the 34th International Conference on Data Engineering (ICDE)*, pages 780-792, 2022.
- **Miao Qiao**, Yufei Tao. Two-Attribute Skew Free, Isolated CP Theorem, and Massively Parallel Joins. *Proceedings of the 40th ACM Symposium on Principles of Database Systems (PODS)*, pages 166-180, 2021.
- *Wentao Li, **Miao Qiao**, Lu Qin, Ying Zhang, Lijun Chang, Xuemin Lin. Scale Distance Labeling on Graphs with Core-Periphery Properties. *Proceedings of the International Conference on Management of Data (SIGMOD)*, pages 1367-1381, 2020.
- Lijun Chang, **Miao Qiao**. Deconstruct Densest Subgraphs. *Proceedings of the World Wide Web Conference (WWW)*, pages 2747-2753, 2020.
- *Wentao Li, **Miao Qiao**, Lu Qin, Ying Zhang, Lijun Chang, Xuemin Lin. Scaling Distance Labeling on Small-World Networks *Proceedings of the International Conference on Management of Data (SIGMOD)*, pages 1060-1077, 2019.
- *Wentao Li, **Miao Qiao**, Lu Qin, Ying Zhang, Lijun Chang, Xuemin Lin. Exacting Eccentricity for Small-World Networks. *Proceedings of the 34th International Conference on Data Engineering (ICDE)*, pages 785-796, 2018.
- **Miao Qiao**, Hao Zhang, Hong Cheng. Subgraph Matching: on Compression and Computation. *Proceedings of the Very Large Database Endowment (PVLDB)*, 11(2): 176-188, 2017.
- **Miao Qiao**, Junhao Gan, Yufei Tao. Range Thresholding on Streams. *Proceedings of the International Conference on Management of Data (SIGMOD)*, pages 571-582, 2016.
- ** Xiaocheng Hu, **Miao Qiao**, Yufei Tao. Join Dependency Testing, Loomis-Whitney Join, and Triangle Enumeration. *Proceedings of the 34th ACM Symposium on Principles of Database Systems (PODS)*, pages 291-301, 2015.
- ** Xiaocheng Hu, **Miao Qiao**, Yufei Tao. External Memory Stream Sampling. *Proceedings of the 34th ACM Symposium on Principles of Database Systems (PODS)*, pages 229-239, 2015.
- ** Xiaocheng Hu, **Miao Qiao**, Yufei Tao. Independent Range Sampling. *Proceedings of the 33rd ACM Symposium on Principles of Database Systems (PODS)*, pages 246-255, 2014.
- **Miao Qiao**, Lu Qin, Hong Cheng, Jeffrey Xu Yu. Top-K Nearest Keyword Search on Large Graphs. *Proceedings of the Very Large Database Endowment (PVLDB)*, 6(10): 901-912, 2013.

- **Miao Qiao**, Hong Cheng, Lijun Chang, Jeffrey Xu Yu. Approximate shortest distance computing: a query-dependent local landmark scheme. *Proceedings of the 28th International Conference on Data Engineering (ICDE)*, pages 462-473, 2012.
- **Miao Qiao**, Hong Cheng, Jeffrey Xu Yu. Querying Shortest Path Distance with Bounded Errors in Large Graphs. *Proceedings of the 23rd International Conference on Scientific and Statistical Database Management (SSDBM)*, pages 255-273, 2011.

JOURNAL PUBLICATIONS

- Jiaxing Xu, Qingtian Bian, Xinhang Li, Aihu Zhang, Yiping Ke, **Miao Qiao**, Wei Zhang, Wei Khang Jeremy Sim, Balazs Gulyas. Contrastive Graph Pooling for Explainable Classification of Brain Networks. *IEEE Transactions on Medical Imaging (TMI)*, 2024, **PREMIA Best Student Paper Honourable Mention Award. Impact factor 11.037.**
- *Wen, Grace, Vickie Shim, Samantha Jane Holdsworth, Justin Fernandez, **Miao Qiao**, Nikola Kasabov, and Alan Wang. Machine Learning for Brain MRI Data Harmonisation: A Systematic Review, 2023. *Bioengineering*, 10(4):397, 2023. **Impact factor 5.046.**
- *Wentao Li, **Miao Qiao**, Lu Qin, Ying Zhang, Lijun Chang, Xuemin Lin. Distance labeling: on parallelism, compression, and ordering. *Very Large Data Base Journal (VLDBJ)*, 31(1): 129-155, 2022. **Impact factor 4.243.**
- *Wentao Li, **Miao Qiao**, Lu Qin, Ying Zhang, Lijun Chang, Xuemin Lin. Eccentricities on small-world networks. *Very Large Data Base Journal (VLDBJ)*, 28(8): 1-28, 2019. **Impact factor 4.243.**
- Yufei Tao, Xiaocheng Hu, **Miao Qiao**. Stream Sampling over Windows with Worst-Case Optimality and l -Overlap Independence. *Very Large Data Base Journal (VLDBJ)*, 26(4): 493-510, 2017. **Impact factor 4.243.**
- ** Xiaocheng Hu, **Miao Qiao**, Yufei Tao. I/O-efficient join dependency testing, Loomis-Whitney join, and triangle enumeration. *Journal of Computer and System Sciences* 82(8): 1300-1315 (2016)
- ** Xiaocheng Hu, **Miao Qiao**, Yufei Tao. Independent Range Sampling on a RAM. *IEEE Data Engineering Bulletin* 38(3): 76-83 (2015)
- **Miao Qiao**, Hong Cheng, Lijun Chang and Jeffrey Xu Yu. Approximate Shortest Distance Computing: A Query-Dependent Local Landmark Scheme. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 26(1): 55-68, 2014. **Impact factor 7.05.**
- **Miao Qiao**, Hong Cheng, Lu Qin, Jeffrey Xu Yu, Philip S. Yu and Lijun Chang. Computing Weight Constraint Reachability in Large Networks. *International Journal on Very Large Data Bases (VLDBJ)*, 22(3): 275-294, 2012. **Impact factor 4.243.**
- Lijun Chang, Jeffrey Xu Yu, Lu Qin, Hong Cheng, **Miao Qiao**. The Exact Distance to Destination in Undirected World. *International Journal on Very Large Data Bases (VLDBJ)*, 21(6): 869-888, 2012. **Impact factor 4.243.**