Xuankun LIAO Ph.D.

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⌂ https://liaoxuankun.github.io · 🔗 Liao Xuankun

Computer science PhD candidate with proven experience in designing and implementing various high-performance distributed/parallel and incremental graph algorithms. Strong expertise in directed graph algorithms, with good coding skills and experience in deploying distributed graph computation systems.

PROFESSIONAL EXPERIENCE

D-core Maintenance over Dynamic Directed Graphs — HKBU & NUS
First author — *Aug 2023 – Present*

- Studied the problem of incrementally maintaining D-core over dynamic directed graphs. Proposed new theoretical results to bound the affected area. Introduced two efficient algorithms that outperform the baseline by up to 5 orders of magnitude. These algorithms demonstrated the capability to process batch updates of 1,000 edges on real-world networks with over 200 million edges within one minute.
- Resulted in one research paper (in submission to *PVLDB' 25*).

Distributed Distance-generalized Core Decomposition over Large Graphs — HKBU
First author — *Feb 2023 – Present*

- Studied distributed distance-generalized core decomposition over large graphs. Proposed distributed H-index-based algorithms that reduce the decomposition time by 1-3 orders of magnitude on real-world graphs with billions of edges.
- Resulted in one research paper (in submission to *VLDBJ*).

Community Search over Streaming Directed Graphs — HKBU
First author — *Oct 2022 – Dec 2023*

- Studied the problem of retrieving dense subgraphs containing query vertices over streaming graphs based on the sliding window model. Proposed two efficient algorithms that outperform the baseline up to two orders of magnitude. These algorithms demonstrated a high throughput of up to 10 million edges per second.
- Resulted in one research paper (*PVLDB' 24*).

Distributed (α, β)-core Decomposition over Bipartite Graphs — HKBU
Second author — *Feb 2022 – Nov 2022*

- Studied distributed (α, β)-core decomposition over bipartite graphs. Analyzed local properties of (α, β)-core and defined n-order bi-indexes for the vertex. Proposed an H-index-based algorithm with two optimizations for (α, β)-core decomposition by iteratively calculating n-order bi-indexes.
- Resulted in one research paper (*ICDE' 23*).

Distributed D-core Decomposition over Large Directed Graphs — HKBU
Co-First author — *Sep 2020 – Feb 2022*

- Studied distributed d-core decomposition over large directed graphs. Proposed two novel H-index-based distributed algorithms, which outperform the baseline up to three orders of magnitude over real-world graphs with billions of edges.
- Resulted in one research paper (*PVLDB' 22*).

EDUCATION

Hong Kong Baptist University — Hong Kong, China
Ph.D. in Computer Science — *Sep 2020 – Present*
Advisor: Prof. Jianliang Xu

Huazhong University of Science and Technology — Wuhan, China
Bachelor of Engineering in Communication Engineering — *Sep 2016 – Jun 2020*
GPA: 87.4 / 100

Skills	**Programming** C++, Java, Python, Matlab, LaTeX, Bash
	Tools Gnuplot, Microsoft Visio, Tmux, Git, Linux
	Languages English, Mandarin

Research Interests

- Distributed and parallel graph computation.
- Incremental graph computation.
- Streaming graph processing.

Selected Publications

Complete List: Google Scholar · DBLP

1. **X. Liao**, Q. Liu, X. Huang, and J. Xu, "Truss-based community search over streaming directed graphs," *Proceedings of the VLDB Endowment (**PVLDB '24**)*, vol. 17, no. 8, pp. 1816–1829, 2024, Full Paper.
2. Q. Liu, **X. Liao**, X. Huang, J. Xu, and Y. Gao, "Distributed (α, β)-core decomposition over bipartite graphs," in *2023 IEEE 39th International Conference on Data Engineering (**ICDE '23**)*, IEEE, 2023, pp. 909–921, Full Paper.
3. **X. Liao**†, Q. Liu†, J. Jiang, X. Huang, J. Xu, and B. Choi, "Distributed d-core decomposition over large directed graphs," *Proceedings of the VLDB Endowment (**PVLDB '22**)*, vol. 15, no. 8, pp. 1546–1558, 2022, Full Paper.

†These authors contributed equally.

Talks

1. Distributed d-core decomposition over large directed graphs, *48th International Conference on Very Large Databases*, Sydney, Australia (online), Sep. 2022.

Awards

- Excellent Teaching Assistant Performance Award, Hong Kong Baptist University
  2021,2022,2023
- Department RPg Performance Award, Hong Kong Baptist University *2022*
- Outstanding Graduate, Huazhong University of Science and Technology *2020*