

Education

- 2023 – 2028 📖 **Ph.D. in Computer Science, UT Austin.** Advisor: Aditya Akella and Daehyeok Kim. Research interest: Computer networks, systems for machine learning.
- 2019 – 2023 📖 **(Summa Cum Laude) B.S. in Computer Science, Turing Class, Peking University.** GPA: 3.869/4 (**rank 2/200**). Advisor: Tong Yang. Research interest: Databases and theoretical computer science. Thesis: “Chainedfilter: Combining membership filters by chain rule” (**Outstanding Undergraduate Thesis (3%)**).

Research Experience

- 2023 📖 Graduate Research Assistant @ **UT Austin**, advised by Prof. **Daehyeok Kim** and **Aditya Akella**. Since training large language models requires aggregating very large scale gradients, network communication has become a key bottle neck for throughput. To reduce the communication traffic, existing works either target at lossy compressions with performance drop, or fine grained host level compressions at expense of longer processing latency. This semester, I worked on a networked system to reduce the communication overhead of distributed machine learning. I develop an elastic and very fast homomorphic compression algorithm, which has an asymptotic optimal theoretical guarantee, to achieve low (or zero) accuracy loss and up to $3.54\times$ training speedup.
- 2023 📖 Research Assistant @ **UT Austin**, advised by Prof. **Aditya Akella**. Membership (to determine whether an element belongs to a given set) is a fundamental problem for over fifty years, playing an important role in databases, networks and security. However, previous research has primarily focused on either approximate memberships, such as Bloom Filters, or exact memberships, like perfect hashing and dictionaries, without attempting to unify them together. During this period, I study and integrate approximate and exact membership into one unified and complete theory for general static membership problems, which provides an elegant mathematical tool and solid theoretical ground for future research. This work is accepted by SIGMOD’24.
- 2022 📖 Research Assistant @ **Harvard University**, advised by Prof. **Minlan Yu**. During this period, I worked on a switch architecture project to introduce 2d-mesh structure into programmable switches. I write verilog code of a NetCache instance and verify its correctness with simulator.
- 2021 – 2022 📖 Research Assistant @ **Peking University**, advised by Prof. **Tong Yang**. I worked on probabilistic structures for data streams. To be more specific, I focus on fundamental algorithms including (1) frequency estimation, where I propose a fast and accurate sketch framework which outperforms SOTAs in both speed and accuracy (accepted by VLDB’22) (2) a novel relational query index for Neo4j database (accepted by ICDE’23), (3) fast index encoder for range query (accepted by ICDE’23) and (4) quantile estimation algorithms (in submission to ICDE’24).

Honors and Awards



Undergraduate

- Scholarships 📖 **Zhongying Moral Education Scholarship (CNY 16,000)**, 2020-2023.
- 📖 **SenseTime Scholarship (30 in China, CNY 20,000)**, 2022.
- 📖 **Arawana Scholarship (CNY 12,000)**, 2022.

Honors and Awards (continued)

Honors	■ National Scholarship (1%, CNY 16,000), 2021.
	■ National Scholarship (1%, CNY 16,000), 2020.
	■ Outstanding Graduate, Beijing (5%), 2023.
	■ Outstanding Graduate, Peking University, 2023.
	■ Weiming Scholar (CNY 10,000), 2023.
	■ Merit Student (1/26), 2023.
	■ Outstanding Undergraduate Thesis, Peking University (3%), 2023.
Awards	■ Merit Student Pacesetter (1/26), 2021.
	■ Merit Student (1/30), 2020.
	■ Outstanding Undergraduate Research Project (4,000 CNY), 2023.
	■ Academic Innovation Award (1%), 2022.
	■ First Prize of Challenge Cup Research Competition (1/11, 3,000 CNY), 2022.
	■ First Prize of Huawei Cup Innovation Competition (1/16, 4,000 CNY), 2022.

Publications

- 1 H. Li, Q. Chen, Y. Zhang, T. Yang, and B. Cui, "Stingy sketch: A sketch framework for accurate and fast frequency estimation," *Proc. VLDB Endow.*, vol. 15, no. 7, pp. 1426–1438, Mar. 2022 (**Top conference in databases**), ISSN: 2150-8097.  DOI: 10.14778/3523210.3523220.
- 2 H. Li, L. Wang, Q. Chen, *et al.*, "Chainedfilter: Combining membership filters by chain rule," *Proc. ACM Manag. Data*, vol. 1, no. 4, Dec. 2023 (**Top conference in databases**).  DOI: 10.1145/3626721.
- 3 J. Guo, Q. Lyu, Y. Wu, *et al.*, "Qsketch: Per-key quantile estimation centered at one point," in *submission to ICDE'24*.
- 4 H. Li, D. Kim, Y. Xu, W. Wu, and A. Akella, "Towards minimum in-network aggregation bandwidth with homomorphic compression algorithm," in *progress*.
- 5 X. Li, Z. Fan, H. Li, *et al.*, "Steadysketch: Finding steady flows in data streams," in *2023 IEEE/ACM 31st International Symposium on Quality of Service (IWQoS)*, IEEE, 2023, pp. 01–09.
- 6 R. Qiu, Y. Ming, Y. Hong, H. Li, and T. Yang, "Wind-bell index: Towards ultra-fast edge query for graph databases," in *2023 IEEE 39th International Conference on Data Engineering (ICDE)*, IEEE, 2023, pp. 2090–2098.
- 7 Z. Wang, Z. Zhong, J. Guo, *et al.*, "Rencoder: A space-time efficient range filter with local encoder," in *2023 IEEE 39th International Conference on Data Engineering (ICDE)*, IEEE, 2023, pp. 2036–2049.

Miscellaneous Experience

Undergraduate

2020 – 2023	■ Turing Class Monitor.
2022	■ Chair of Turing Student Research Forum.
2021	■ Teaching Assistant for Introduction to Computer Systems.
	■ Freshmen Counselor.
	■ Leader of the College Debating Team.
	■ Minister of the Zhongying Public Welfare Association.