

NAIREN CAO

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RESEARCH INTERESTS

I am a “Theory+Parallel” guy. My research interest lies in algorithm design and analysis of combinatorial optimization problems, focusing on the intricacies of graph algorithms in parallel and distributed models.

EDUCATION

Ph.D. in Computer Science, Georgetown University *Sept 2016 - Aug 2022*

- Advisors: Jeremy T. Fineman and Ophir Frieder
- Thesis: Single-source Shortest Paths for Digraphs

M.S. in Software Engineering, Peking University *Sept 2013 - Jun 2016*

B.Eng. in Software Engineering, Sun Yat-sen University *Sept 2009 - Jun 2013*

PROFESSIONAL EXPERIENCE

Postdoc, Department of Computer Science, Boston College
Advisor: Hsin-Hao Su *Sept 2022 - Aug 2024*

Research Assistant, ITCS, Shanghai University of Finance and Economics
Host: Zhihao Tang *March 2019 - May 2019*

Research Assistant, Department of Computer Science, The University of Hong Kong
Advisor: Siu-Ming Yiu *Sept 2014 - Aug 2016*

CONFERENCE PAPERS

- Nairen Cao, Vincent Cohen-Addad, Euiwoong Lee, Shi Li, Alantha Newman and Lukas Vogl. “Understanding the Cluster Linear Program for Correlation Clustering.” In Proceedings of the 56th Annual ACM Symposium on Theory of Computing (STOC 2024).
- Nairen Cao, Shang-En Huang, and Hsin-Hao Su. “Breaking 3-Factor Approximation for Correlation Clustering in Polylogarithmic Rounds.” In Proceedings of the 35th ACM-SIAM Symposium on Discrete Algorithms (SODA 2024).
- Nairen Cao, Shang-En Huang, and Hsin-Hao Su. “Nearly Optimal Parallel Algorithms for Longest Increasing Subsequence.” In Proceedings of the 35th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2023). **Finalist**.
- Nairen Cao, Jeremy Fineman. “Parallel Exact Shortest Paths in Almost Linear Work and Square Root Depth.” In Proceedings of the 34th ACM-SIAM Symposium on Discrete Algorithms (SODA 2023).
- Nairen Cao, Jeremy T. Fineman, Shi Li, Julián Mestre, Katina Russell, and Seeun William Umboh: “Nested Active-Time Scheduling.” In Proceedings of the 33rd International Symposium on Algorithms and Computation (ISAAC 2022).
- Nairen Cao, Jeremy T. Fineman, Shi Li, Julián Mestre, Katina Russell, and Seeun William Umboh. “Brief Announcement: Nested Active-Time Scheduling.” In Proceedings of the 34th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2022).

- Nairen Cao, Jeremy T. Fineman, and Katina Russell. “Improved parallel shortest path with negative-weight edges.” In Proceedings of the 34th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2022). **Finalist**.
- Nairen Cao, Jeremy T. Fineman, and Katina Russell. “Brief announcement: An improved distributed approximate single source shortest paths algorithm.” In Proceedings of the 40th ACM Symposium on Principles of Distributed Computing (PODC 2021).
- Nairen Cao, Jeremy T. Fineman, and Katina Russell. “Brief announcement: Improved work span tradeoff for single source reachability and approximate shortest paths.” In Proceedings of the 32th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2020).
- Nairen Cao, Jeremy T. Fineman, and Katina Russell. “Efficient construction of directed hopsets and parallel approximate shortest paths.” In Proceedings of the 52nd ACM Symposium on Theory of Computing (STOC 2020).
- Nairen Cao, Adam O’Neill, and Mohammad Zaheri. “Toward RSA-OAEP without random oracles.” In Proceedings of the IACR International Conference on Practice and Theory of Public-Key Cryptography (PKC 2020).
- Nairen Cao, Jeremy Fineman, Katina Russell, and Eugene Yang. “I/O-Efficient algorithms for topological sort and related problems.” In Proceedings of the 30th ACM-SIAM Symposium on Discrete Algorithms (SODA 2019).

POSTERS AND WORKSHOP PAPERS

- Nairen Cao, Jeremy Fineman, and Katina Russell. “Efficient Construction of Directed Hopsets and Parallel Single-source Shortest Paths.” In Proceedings of Highlight of Parallel Computing (HOPC 2023).

WORKING PAPERS

- Vikrant Ashvinkumar, Aaron Bernstein, Nairen Cao, Christoph Grunau, Bernhard Haeupler, Yonggang Jiang, Danupon Nanongkai, and Hsin-Hao Su. “Parallel and Distributed Exact Single-Source Shortest Paths with Negative Edge Weights.”
- Hao-Ren Yao, Nairen Cao, Katina Russell, Der-Chen Chang, Ophir Frieder, and Jeremy Fineman. “Self-supervised Representation Learning on Electronic Health Records with Graph Kernel Infomax.”

TEACHING EXPERIENCES

- Database Management Systems, TA (Fall 2019, Spring 2020, Spring 2021, Ophir Frieder)
- Algorithms, TA (Fall 2020, Jeremy T. Fineman)

PROFESSIONAL SERVICES

- Reviewer for ICALP, SODA, ITCS, TKDE.

SKILLS

- Programming: Python, C++, JAVA, Julia, SQL, R, PHP
- Techniques: Monte Carlo Simulation, Data Analysis, Stochastic Methods, Dynamic Programming, Mathematical Programming, Bayesian Optimization, Linear Regression
- Tools: L^AT_EX, Jupyter Notebook, Pandas, Numpy, PyTorch, QGIS