Da Wei (David) Zheng

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PhD candidate researching algorithms and data structures involving geometry and graphs.

Education

- **University of Illinois Urbana-Champaign (GPA: 3.99)** Champaign, IL
  PhD Computer Science (Theory) *Aug 2020 - (expected) May 2025*
  Advisor: Timothy Chan

- **University of British Columbia** Vancouver, BC
  MSc Computer Science (Theory) *Sep 2018 - Aug 2020*
  Advisor: William Evans
  Thesis: Scheduling queries to moving entities to certify many are distant from a region

- **University of British Columbia** Vancouver, BC
  BSc Combined Honours Mathematics and Computer Science *Sep 2014 - May 2018*

Internships

- **Nuro** Mountain View, CA
  PhD Intern, "Occlusion-aware autonomous driving" *May 2022 - Aug 2022*
- **Google LLC** Mountain View, CA
  Software Engineering Intern, "Querying payments change history" *May 2018 - Aug 2018*
- **Facebook Inc.** Menlo Park, CA
  Software Engineering Intern, "Integrating VMs in container service" *Jun 2017 - Sep 2017*
- **Dr. Daniel Coomb's Applied Mathematics Lab** University of British Columbia
  USRA Research intern, "Graph based clustering for data analysis" *May 2016 - Aug 2016*

Publications

- (*In submission*) Da Wei Zheng. A simple approximation scheme for bipartite geometric many-to-many matching. 2024.
- (*In submission*) Adam Karczmarz and Da Wei Zheng. Subquadratic algorithms in minor-free digraphs: (weighted) distance oracles, decremental reachability, and more. 2024.
- (**ESA 2024**) Elfarouk Harb, Zhengcheng Huang, and Da Wei Zheng. Shortest path separators in unit disk graphs. *CoRR*, abs/2407.15980, 2024.
- (**ESA 2024**) Chandra Chekuri, Rhea Jain, Shubhang Kulkarni, Da Wei Zheng, and Weihao Zhu. From directed steiner tree to directed polymatroid steiner tree in planar graphs. *CoRR*, abs/2407.01904, 2024.
- (**CCCG 2024**) Eliot W. Robson, Jack Spalding-Jamieson, and Da Wei Zheng. Carving polytopes with saws in 3D. *CoRR*, abs/2407.15981, 2024.
- (**SoCG 2024**) Timothy M. Chan, Pingan Cheng, and Da Wei Zheng. Semialgebraic range stabbing, ray shooting, and intersection counting in the plane. *CoRR*, abs/2403.12303, 2024.
- (**SODA 2024**) Timothy M. Chan, Pingan Cheng, and Da Wei Zheng. An optimal algorithm for higher-order voronoi diagrams in the plane: The usefulness of nondeterminism. In David P. Woodruff, editor, *Proceedings of the 2024 ACM-SIAM Symposium on Discrete Algorithms, SODA 2024, Alexandria, VA, USA, January 7-10, 2024*, pages 4451–4463. SIAM, 2024.

- (**SODA 2024**) Yi-Jun Chang and Da Wei Zheng. Fully scalable massively parallel algorithms for embedded planar graphs. In David P. Woodruff, editor, *Proceedings of the 2024 ACM-SIAM Symposium on Discrete Algorithms, SODA 2024, Alexandria, VA, USA, January 7-10, 2024*, pages 4410–4450. SIAM, 2024.
- (**ICALP 2023**) Monika Henzinger, Paul Liu, Jan Vondrák, and Da Wei Zheng. Faster submodular maximization for several classes of matroids. In Kousha Etessami, Uriel Feige, and Gabriele Puppis, editors, *50th International Colloquium on Automata, Languages, and Programming, ICALP 2023, July 10-14, 2023, Paderborn, Germany*, volume 261 of *LIPIcs*, pages 74:1–74:18. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2023.
- (**IPCO 2023**) Da Wei Zheng and Monika Henzinger. Multiplicative auction algorithm for approximate maximum weight bipartite matching. In Alberto Del Pia and Volker Kaibel, editors, *Integer Programming and Combinatorial Optimization - 24th International Conference, IPCO 2023, Madison, WI, USA, June 21-23, 2023, Proceedings*, volume 13904 of *Lecture Notes in Computer Science*, pages 453–465. Springer, 2023.
- (**SODA 2023**) Timothy M. Chan and Da Wei Zheng. Simplex range searching revisited: How to shave logs in multi-level data structures. In Nikhil Bansal and Viswanath Nagarajan, editors, *Proceedings of the 2023 ACM-SIAM Symposium on Discrete Algorithms, SODA 2023, Florence, Italy, January 22-25, 2023*, pages 1493–1511. SIAM, 2023.
- (**SODA 2023**) Sariel Har-Peled and Da Wei Zheng. Halving by a thousand cuts or punctures. In Nikhil Bansal and Viswanath Nagarajan, editors, *Proceedings of the 2023 ACM-SIAM Symposium on Discrete Algorithms, SODA 2023, Florence, Italy, January 22-25, 2023*, pages 1385–1397. SIAM, 2023.
- (**SoCG 2022**) Jack Spalding-Jamieson, Brandon Zhang, and Da Wei Zheng. Conflict-Based Local Search for Minimum Partition into Plane Subgraphs. In Xavier Goaoc and Michael Kerber, editors, *38th International Symposium on Computational Geometry (SoCG 2022)*, volume 224 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 72:1–72:6, Dagstuhl, Germany, 2022. Schloss Dagstuhl – Leibniz-Zentrum für Informatik.
- (**SODA 2022**) Timothy M. Chan and Da Wei Zheng. Hopcroft's problem, log-star shaving, 2d fractional cascading, and decision trees. In Joseph (Seffi) Naor and Niv Buchbinder, editors, *Proceedings of the 2022 ACM-SIAM Symposium on Discrete Algorithms, SODA 2022, Virtual Conference / Alexandria, VA, USA, January 9 - 12, 2022*, pages 190–210. SIAM, 2022.
- (**SoCG 2021**) Paul Liu, Jack Spalding-Jamieson, Brandon Zhang, and Da Wei Zheng. Coordinated motion planning through randomized k-opt (CG challenge). In Kevin Buchin and Éric Colin de Verdière, editors, *37th International Symposium on Computational Geometry, SoCG 2021, June 7-11, 2021, Buffalo, NY, USA (Virtual Conference)*, volume 189 of *LIPIcs*, pages 64:1–64:8. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2021.
- (**SoCG 2020**) Da Wei Zheng, Jack Spalding-Jamieson, and Brandon Zhang. Computing low-cost convex partitions for planar point sets with randomized local search and constraint programming (CG challenge). In Sergio Cabello and Danny Z. Chen, editors, *36th International Symposium on Computational Geometry, SoCG 2020, June 23-26, 2020, Zürich, Switzerland*, volume 164 of *LIPIcs*, pages 83:1–83:7. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2020.

Awards

- NSERC PGS-D Scholarship 2022-2025

- NSERC Undergrad Summer Research Award 2016
- Trek Excellence Scholarship 2015
- Stanley M Grant Scholarship in Mathematics 2015
- Chancellor's Scholar Award 2014
- BC Provincial Scholarship 2014

Teaching

- **Department of Computer Science** University of Illinois Urbana-Champaign
  Teaching Assistant
  - CS 374 - Algorithms and Models of Computation *Aug 2021 - Apr 2022*
- **Department of Computer Science and Mathematics** University of British Columbia
  Instructor
  - CPSC 490 - Problem Solving in Computer Science *Jan 2017 - Apr 2017*

  Teaching Assistant
  - CPSC 420 - Advanced Algorithms and Data Structures *Sep 2018 - May 2019*
  - CPSC 221 - Algorithms and Data Structures *Jun 2016 - Apr 2017*
  - MATH 180 - Differential Calculus with Physical Applications *Sep 2015 - Dec 2015*

Other

- **Competitive Programming** University of Illinois Urbana-Champaign
  Coach
  - *Coach* - Ran local practices, problem discussion, and coached teams. *Aug 2022 - now*
- **Competitive Programming Club** University of British Columbia
  Coach and Participant
  - *Coach* - Ran local practices, problem discussion, and coached teams. *Sep 2017 - Dec 2020*
    - Coached team to 1st in PacNW 2019, 2nd PacNW 2020. 25th place in ICPC WF 2020. Qualified for ICPC WF 2021
    - Created questions and hosted the UBC Programing Contest 2019 and 2020.
  - *Participant* - Worked as a team of three in competitions. *Jan 2015 - Jul 2019*
    - 1st place in PacNW 2018 and 41st place in ICPC World Finals 2019 in Porto.
    - 3rd place in PacNW 2017 and 56th place in ACM-ICPC World Finals 2018 in Beijing.
- **UBC Math Circle** University of British Columbia
  Organizer - weekly lectures and problems for high school students. *Sep 2017 - Nov 2017*
- **Capture the Flag (CTF) Competitions** Maple Bacon (UBC) & SIGPwny (UIUC)
  Participant *Aug 2021 - Sept 2022*