CURRICULUM VITAE

Darren Jeffrey Strash

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HIGHLIGHTS

Due to the length of my CV, I briefly list here my most significant accomplishments from just the last two years: I served on the program committees of the two top algorithm engineering conferences (ALENEX 2016, ESA 2018), and published ten papers in peer-reviewed venues, including top-tier conferences sponsored by the ACM, SIAM, and IEEE societies. My paper at GECCO 2017 (an ACM-sponsored conference on evolutionary algorithms) was nominated for the best paper award.

In addition to teaching five courses/year at Colgate, I have supervised five bachelor's theses and 4 master's theses and I am currently supervising a bachelor's thesis. I have also supervised eight undergraduates in other research-related projects in the last year. I am faculty supervisor to the *Colgate Coders*, a diverse campus club that fosters programming creative student-driven projects and I currently train Colgate's ACM ICPC Programming Contest team.

EDUCATION

Ph.D.	2011	Algorithms for Sparse Geometric Graphs and Social Networks	
		Computer Science, University of California, Irvine	
		(with David Eppstein and Mike Goodrich, advisors), GPA: 3.99	
M.S.	2008	Computer Science, University of California, Irvine	
B.S.	2006	Computer Science, California State Polytechnic University, Pomona	
		Honors: Summa Cum Laude, Valedictorian of the College of Science	

RESEARCH

I develop efficient algorithms to solve real-world scalability problems in network analysis with applications to computational sociology, biology, and chemistry (to name a few). Through interdisciplinary collaboration and the algorithm engineering paradigm, I explore algorithm efficiency in both theory and practice, with the ultimate goal of designing algorithms that are practical. Some items from my active research agenda include subgraph enumeration, network visualization, and exact and heuristic algorithms for combinatorial optimization problems.

POST-GRAD PROFESSIONAL EXPERIENCE

Visiting Assistant Professor, Colgate University

Jul. 2016—Present

5 courses/year, including: Intro. to Computing; Algorithms; Advanced Algorithms Scaling up combinatorial optimization to massive data sets

Postdoctoral Researcher, Karlsruhe Institute of Technology Oct. 2014—Aug. 2016

Large-scale combinatorial optimization algorithms, with Peter Sanders

Software Engineer (R&D), Intel Corporation

Jul. 2011—Sep. 2014

Algorithms for massively parallel lithographic simulations, Lithography Algorithms Group

HONORS AND AWARDS

Fellowships/Scholarships

• Graduate Assistance in Areas of National Need (GAANN) Fellowship, 2008-2009

Research Awards

- Best Paper Nominee, IEEE International Parallel & Distributed Processing Symposium (IPDPS 2018)
- Best Paper Nominee, The Genetic and Evolutionary Computation Conference (GECCO 2017)
- Best Paper, International Symposium on Experimental Algorithms (SEA 2011)

Selective Research Programs

- NASA Partnership Awards for the Integration of Research into Undergraduate Education (PAIR) Project, 2005–2006
- NSF Research Experience for Undergraduates (REU), Harvey Mudd College, 2005

Academic Awards

• Julian A. McPhee Scholar (valedictorian), Cal Poly Pomona, College of Science, 2006

PUBLICATIONS

All authors are listed in alphabetical order, except those marked with *.

Book Chapters

B-1 C. Schulz and D. Strash, "Graph Partitioning: Formulations and Applications to Big Data," *Encyclopedia on Big Data Technologies*, 2018, Springer, doi:10.1007/978-3-319-63962-8_312-2

Papers in Refereed Journals

- J-7 M. Korman, M. Löffler, R. I. Silveira, and D. Strash, "On the Complexity of Barrier Resilience for Fat Regions," *Computational Geometry Theory & Algorithms*, **72**, 2018, pp. 34–51 doi:10.1016/j.comgeo.2018.02.006.
- J-6 P. San Segundo, J. Artieda, and D. Strash*, "Efficiently Enumerating all Maximal Cliques with Bit-Parallelism," *Computer & Operations Research*, **92**, 2017, pp. 37–46, doi:10.1016/j.cor.2017.12.006.
- J-5 S. Lamm, P. Sanders, C. Schulz, D. Strash, R. F. Werneck, "Finding Near-Optimal Independent Sets at Scale," *Journal of Heuristics*, 23(4), 2017, pp. 207–229, doi:10.1007/s10732-017-9337-x.
- J-4 D. Eppstein, M. Löffler, and D. Strash, "Listing All Maximal Cliques in Large Sparse Real-World Graphs in Near-Optimal Time," ACM Journal of Experimental Algorithmics, 18(3): 3.1, 2013, doi:10.1145/2543629. Special issue for SEA 2011.
- J-3 D. Eppstein, M.T. Goodrich, M. Löffler, D. Strash, and L. Trott, "Category-Based Routing in Social Networks: Membership Dimension and the Small-World Phenomenon," *Theoretical Computer Science*, **514**, 2013, pp. 96–104, doi:10.1016/j.tcs.2013.04.027. Special issue for GA 2011.

Last Updated: April 1, 2018

- J-2 D. Eppstein, M.T. Goodrich, D. Strash, and L. Trott, "Extended Dynamic Subgraph Statistics using h-index Parameterized Data Structures," *Theoretical Computer Science*, **447**, 2012, pp. 44–52, doi:10.1016/j.tcs.2011.11.034. Special issue for COCOA 2010.
- J-1 D. Eppstein, M.T. Goodrich, and D. Strash, "Linear-Time Algorithms for Geometric Graphs with Sublinearly Many Edge Crossings," *SIAM Journal on Computing*, **39**(8), 2010, pp. 3814–3829, doi:10.1137/090759112.

Papers Appearing in Refereed Proceedings

- C-20 D. Funke, S. Lamm, P. Sanders, C. Schulz, D. Strash, and M. von Looz, "Communication Agnostic Massively Parallel Graph Generation," *Proc. 32nd IEEE International Parallel and Distributed Processing Symposium (IPDPS 2018)*, accepted, **best paper nomination**. arXiv:1710.07565.
- C-19 M. Henzinger, A. Noe, C. Schulz, and D. Strash, "Practical Minimum Cut Algorithms," *Proc. 20th Meeting on Algorithm Engineering and Experiments* (ALENEX 2018), accepted, arXiv:1708.06127.
- C-18 D. Hespe, C. Schulz, and D. Strash, "Scalable Kernelization for Maximum Independent Sets," Proc. 20th Meeting on Algorithm Engineering and Experiments (ALENEX 2018), accepted, arXiv:1708.06151.
- C-17 N. Sitchinava and D. Strash, "Reconstructing Generalized Staircase Polygons with Uniform Step Length," Proc. 25th International Symposium on Graph Drawing and Network Visualization (GD 2017), to appear, arXiv:1708.09842.
- C-16 P. Sanders, C. Schulz, D. Strash, and R. Williger, "Distributed Evolutionary k-way Node Separators" *Proc. Conference on Genetic and Evolutionary Computing and Combinato-* rial Optimization (GECCO 2017), pp. 345-352, ACM, 2017, doi:10.1145/3071178.3071204, arXiv:1702.01692, best paper nomination.
- C-15 R. Kimmig, H. Meyerhenke, and D. Strash, "Shared Memory Parallel Subgraph Enumeration," Proc. 31st IEEE International Parallel and Distributed Processing Symposium Workshops (IEEE IPDPSW 2017): 7th IEEE Workshop on Parallel / Distributed Computing and Optimization (PDCO 2017), pp. 519–529, IEEE, 2017, doi:10.1109/IPDPSW.2017.133, arXiv:1705.09358.
- C-14 L. Barth, B. Niedermann, M. Nöllenburg, and D. Strash, "Temporal Map Labeling: A New Unified Framework with Experiments," *Proc. 24th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems* (ACM SIGSPATIAL 2016), pp. 23:1–23:10, ACM, 2016, doi:10.1145/2996913.2996957, arXiv:1609.06327.
- C-13 D. Strash, "On the Power of Simple Reductions for the Maximum Independent Set Problem," *Proc. 22nd International Computing and Combinatorics Conference* (COCOON 2016), LNCS, vol. 9797, 2016, pp. 345–356, doi:10.1007/978-3-319-42634-1-28, arXiv:1608.00724.
- C-12 J. Dahlum, S. Lamm, P. Sanders, C. Schulz, D. Strash, and R. F. Werneck, "Accelerating Local Search for the Maximum Independent Set Problem," Proc. 15th International Symposium on Experimental Algorithms (SEA 2016), LNCS, vol. 9685, 2016, pp. 118–133, doi:10.1007/978-3-319-38851-9_9, arXiv:1602.01659.

- C-11 S. Lamm, P. Sanders, C. Schulz, D. Strash, and R. F. Werneck, "Finding Near-Optimal Independent Sets at Scale," Proc. 18th Meeting on Algorithm Engineering and Experiments (ALENEX 2016), 2016, pp. 138–150, doi:10.1137/1.9781611974317.12, arXiv:1509.00764.
- C-10 I. Kostitsyna, M. Nöllenburg, V. Polishchuk, A. Schulz, and D. Strash, "On Minimizing Crossings in Storyline Visualizations," Proc. 23rd International Symposium on Graph Drawing and Network Visualization (GD 2015), LNCS, vol. 9411, 2015, pp. 192–198, doi:10.1007/978-3-319-27261-0_16, arXiv:1509.00442.
- C-9 M. Korman, M. Löffler, R. I. Silveira, and D. Strash, "On the Complexity of Barrier Resilience for Fat Regions," *Proc. 9th International Symposium on Algorithms and Experiments for Sensor Systems, Wireless Networks and Distributed Robotics* (ALGOSENSORS 2013), LNCS, vol. 8243, 2014, pp. 201–216, doi:10.1007/978-3-642-45346-5_15, arXiv:1302.4707.
- C-8 M. Löffler, J. A. Simons, and D. Strash, "Dynamic Planar Point Location with Sub-logarithmic Local Updates," *Proc.* 13th International Symposium on Algorithms and Data Structures (WADS 2013), LNCS, vol. 8037, 2013, pp. 499–511, doi:10.1007/978-3-642-40104-6_43, arXiv:1204.4714.
- C-7 D. Eppstein, M.T. Goodrich, M. Löffler, D. Strash, and L. Trott, "Category-Based Routing in Social Networks: Membership Dimension and the Small-World Phenomenon," Proc. 3rd International Conference on Computational Aspects of Social Networks (CASoN 2011), 2011, pp. 102–107, doi:10.1109/CASON.2011.6085926, arXiv:1108.4675.
- C-6 D. Eppstein and D. Strash, "Listing All Maximal Cliques in Large Sparse Real-World Graphs," *Proc.* 10th International Symposium on Experimental Algorithms (SEA 2011), LNCS, vol. 6630, 2011, pp. 364–375, doi:10.1007/978-3-642-20662-7_31, arXiv:1103.0318, best paper.
- C-5 D. Eppstein, M. Löffler, and D. Strash, "Listing All Maximal Cliques in Sparse Graphs in Near-Optimal Time," *Proc. 21st International Symposium on Algorithms and Computation* (ISAAC 2010), LNCS, vol. 6506, 2010, pp. 403–414, doi:10.1007/978-3-642-17517-6_36, arXiv:1006.5440.
- C-4 D. Eppstein, M.T. Goodrich, D. Strash, and L. Trott, "Extended Dynamic Subgraph Statistics using h-index Parameterized Data Structures," *Proc. 4th International Conference on Combinatorial Optimization and Applications* (COCOA 2010), LNCS, vol. 6508, 2010, pp. 128–141, doi:10.1007/978-3-642-17458-2_12, arXiv:1009.0783.
- C-3 M.T. Goodrich and D. Strash, "Priority Range Trees," Proc. 21st International Symposium on Algorithms and Computation (ISAAC 2010), LNCS, vol. 6506, 2010, pp. 97–108, doi:10.1007/978-3-642-17517-6_11, arXiv:1009.3527.
- C-2 M.T. Goodrich and D. Strash, "Succinct Greedy Geometric Routing in the Euclidean Plane," *Proc. 20th International Symposium on Algorithms and Computation* (ISAAC 2009), LNCS, vol. 5878, 2009, pp. 781–791, doi:10.1007/978-3-642-10631-6_79, arXiv:0812.3893.
- C-1 D. Eppstein, M.T. Goodrich, and D. Strash, "Linear-Time Algorithms for Geometric Graphs with Sublinearly Many Crossings," *Proc. 20th ACM-SIAM Symposium on Discrete Algorithms* (SODA 2009), 2009, pp. 150–159, doi:10.1137/1.9781611973068.18, arXiv:0812.0893.

Papers in Workshops with Informal Proceedings

- W-6 H.-K. Ahn, E. Oh, L. Schipf, F. Stehn, and D. Strash, "Quickest Pair-Visibility Problems: How to Minimize Distance-to-Sight,", *Proc. 34th European Workshop on Computational Geometry* (EuroCG 2018), accepted.
- W-5 L. Kleist, B. Klemz, A. Lubiw, L. Schlipf, F. Staals, and D. Strash, "Convexity-Increasing Morphs of Planar Graphs," *Proc.* 34th European Workshop on Computational Geometry (EuroCG 2018), accepted.
- W-4 N. Sitchinava and D. Strash, "Reconstructing a Unit-Length Orthogonally Convex Polygon from its Visibility Graph," *Proc. 32nd European Workshop on Computational Geometry* (EuroCG 2016), Lugano, Switzerland, March 2016.
- W-3 D. Eppstein, M.T. Goodrich, M. Löffler, D. Strash, and L. Trott, "Category-Based Routing in Social Networks: Membership Dimension and the Small-World Phenomenon." *Proc. Workshop on Graph Algorithms and Applications* (GA 2011), Zürich, Switzerland, July 2011.
- W-2 L. Effinger-Dean, C. Erickson, M. O'Neill, and D. Strash, "Extending Garbage Collection to Complex Data Structures," *Proc. 3rd Workshop on Semantics, Program Analysis and Computing Environments for Memory Management* (SPACE 2006), pp. 91–97.
- W-1 L. Effinger-Dean, C. Erickson, M. O'Neill, and D. Strash, "Garbage Collection for Trailer Arrays," Proc. 3rd Workshop on Semantics, Program Analysis and Computing Environments for Memory Management (SPACE 2006), pp. 83–90.

Manuscripts in Preparation and Under Submission

- M-3 H.-K. Ahn, E. Oh, L. Schipf, F. Stehn, and D. Strash, "Quickest Pair-Visibility Problems: How to Minimize Distance-to-Sight." (submitted to SWAT 2018).
- M-2 L. Kleist, B. Klemz, A. Lubiw, L. Schlipf, F. Staals, and D. Strash, "Convexity-Increasing Morphs of Planar Graphs," (submitted to WG 2018).
- M-1 N. Sitchinava and D. Strash, "Reconstructing Generalized Staircase Polygons with Uniform Step Length," (invited to Journal of Graph Algorithms and Applications).

TALKS GIVEN

Invited Talks

• Computing Near-Optimal Independent Sets in Huge Complex Networks, Tohoku University, Sendai, Japan, July 21, 2016

Conference/Workshop Talks

- Reconstructing Generalized Staircase Polygons with Uniform Step Length, GD 2017
- On the Power of Simple Reductions for the Maximum Independent Set Problem, COCOON 2016
- Reconstructing a Unit-Length Orthogonally Convex Polygon from its Visibility Graph, EuroCG 2016
- Finding Near-Optimal Independent Sets at Scale, ALENEX 2016

- On Minimizing Crossings in Storyline Visualizations, GD 2015
- Listing All Maximal Cliques in Large Sparse Real-World Graphs, SEA 2011
- Listing All Maximal Cliques in Sparse Graphs in Near-Optimal Time, ISAAC 2010
- Priority Range Trees, ISAAC 2010
- Succinct Greedy Geometric Routing in the Euclidean Plane, ISAAC 2009

OPEN SOURCE SOFTWARE DEVELOPED FOR RESEARCH

- **TemporalLabeling**: Computing non-overlapping labels efficiently for GPS navigation: http://illwww.iti.kit.edu/temporallabeling/
- **OpenPLS**: An open implementation of PLS algorithms for maximum clique and related problems: https://github.com/darrenstrash/open-pls
- **KernelMIS**: Computing a maximum independent set exactly through kernelization: https://github.com/darrenstrash/kernel-mis
- **OpenMCS**: An open implementation of the MC* family of maximum clique algorithms: https://github.com/darrenstrash/open-mcs
- KaMIS: Karlsruhe Maximum Independent Sets:

http://algo2.iti.kit.edu/kamis/

• QuickCliques: Efficiently list all maximal cliques of a graph: https://github.com/darrenstrash/quick-cliques

INVITATION-ONLY RESEARCH WORKSHOPS ATTENDED

2017: 1st Hawaiian Workshop on Parallel Algorithms and Data Structures

2017: Dagstuhl Seminar: Applications of Topology to the Analysis of 1-Dimensional Objects

2016: 19th Korean Workshop on Computational Geometry (KWCG)

2015: 2nd Dynamic Algorithms for Networks in Changing Environments (DANCE)

RESEARCH VISITS

2017: *Hamilton College*; Clinton, NY, USA. Host: David Perkins 2016: *Tohoku University*; Sendai, Japan. Host: Matias Korman

2014: Utrecht University; Utrecht, the Netherlands. Host: Maarten Löffler

COURSES TAUGHT

Colgate University

Spring	2018	Analysis of Algorithms	2 sections/2 labs
Fall	2017	Advanced Algorithms: Algorithms for Big Data	1 section
Fall	2017	Analysis of Algorithms	1 section/1 lab
Spring	2017	Analysis of Algorithms	2 sections/2 labs
Fall	2016	Introduction to Computing I	2 sections/1 lab

Karlsruhe Institute of Technology

Spring	2016	Graph Algorithms (seminar)
Fall	2015	Computational Geometry, Master's level
Spring	2015	Algorithms for Large Social Networks in Theory and Practice (seminar)

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University of California, Irvine

2008–2011 Invited Lecturer for: Graph Algorithms, Computational Geometry, Practical Computer Security, and Fundamental Data Structures and Algorithms

2007–2008 Teaching Assistant for: Data Structures and Algorithms (3), Fundamental

Data Structures and Algorithms

NON-THESIS STUDENT PROJECTS SUPERVISED

• Fall 2017: Accelerating branch-and-reduce search for minimum vertex cover

▶ with Michael Rapaport '18

• Summer 2017: Fast maximum clique computation using graph partitioning

▶ with Rohan Chaudhari '19

• Summer 2017: Auto-generating pretty tables of experimental data

▶ with Daniel Gathogo '21

• Spring 2017: Solving linear programming relaxations with the Hopcroft-Karp algorithm

▶ with Armando Belardo '18

• Spring 2017: Real-time visualization of trajectory grouping algorithms

▶ with Abeneazer Chafamo '17, Rohan Chaudhari '19, Mark Ma '18, Peter Olson '18, Nianyi Wang '18

THESES SUPERVISED

In Progress (Colgate)

• 2018: Nianyi Wang '18: Fast Subgraph Enumeration with Graph Partitioning (Bachelor's)

Completed (Colgate)

• 2017: Haonan (Drew) Zhong '17: Engineering an Efficient Branch-and-Reduce Algorithm for the Minimum Vertex Cover Problem (Bachelor's)

Completed (KIT)

- 2017: Sebastian Lamm: Communication Efficient Algorithms for Generating Massive Networks (Master's)
- 2017: Demian Hespe: Scalable Kernelization for the Maximum Independent Set Problem (Master's)
- 2016: Robert Williger: Evolutionary k-way Node Separators (Bachelor's)
- 2016: Marvin Williams: Evolutionary Graph Coloring (Bachelor's)
- 2016: Raphael Kimmig: Parallel Algorithm Engineering for Subgraph Isomorphism Problems (Diplom: Bachelor's/Master's)
- 2016: Michael Vollmer: Recognizing Simultaneous Proper Interval Graphs (Master's)
- 2015: Jan Ebbing: How to Partition a Graph When You Think Like a Vertex (Bachelor's)
- 2015: Jakob Dahlum: Boosting Local Search for Maximum Independent Sets (Bachelor's)

PROFESSIONAL SERVICE

Service to Students (Colgate University)

- 2017—present: Faculty advisor for ACM ICPC programming contest preparation
- 2017—present: Faculty advisor for Colgate Coders club

Program Committees

- GD 2018: 26th International Symposium on Graph Drawing and Network Visualization
- ESA 2018: 25th Annual European Symposium on Algorithms, Experimental Track
- SoCG 2017 Multimedia Track: 33rd International Symposium on Computational Geometry
- ALENEX 2016: 18th Workshop on Algorithm Engineering and Experiments

External Reviewing

I frequently review submissions for journals and refereed conferences. These include:

Journal of the ACM (JACM), Algorithmica, Theoretical Computer Science (TCS), Journal of Experimental Algorithmics (ACM JEA), Computational Geometry: Theory and Applications (CGTA), ACM Transactions on Parallel Computing (ACM TOPC), INFORMS Journal on Computing (IJOC), Journal of Graph Algorithms and Applications (JGAA), IEEE Transactions on Parallel and Distributed Systems (IEEE TPDS), Journal of Computational Geometry (JoCG), The Electronic Journal of Combinatorics (E-JC), Journal of Computational Science, ACM-SIAM Symposium on Discrete Algorithms (SODA), Canadian Conference on Computational Geometry (CCCG), International Symposium on Experimental Algorithms (SEA), European Symposium on Algorithms (ESA), Symposium on Theoretical Aspects of Computer Science (STACS), International Symposium on Graph Drawing (GD), International Colloquium on Automata, Languages and Programming (ICALP), and ACM International Conference on Computing Frontiers (CF), Computational Geometry: Young Researchers Forum (CG:YRF), Scandinavian Symposium and Workshops on Algorithm Theory (SWAT), International Joint Conference on Artificial Intelligence (IJCAI), International Symposium on Algorithms and Computation (ISAAC), Algorithms, Applied Network Science, IEEE Transactions on Knowledge and Data Engineering (IEEE TKDE).

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REFERENCES

Teaching References

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William Cipolli, Assistant Professor

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Research References

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Research References (continued)

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