RICHARD C. SPENCE

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Website: `https://richardcspence.github.io`

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Interests

Analysis of algorithms, graph theory, theory of computation, data visualization, mathematics and computer science education.

Education

Ph.D. Computer Science, University of Arizona   *2021*
Advisor: Stephen Kobourov

M.S. Computer Science, University of Arizona   *2019*

B.S. Mathematics with Computer Science, Massachusetts Institute of Technology   *2016*

Experience

University of Arizona   *Aug. 2016 - present*
- Research specialist (*Fall 2021 - present*)
- Graduate associate (*Fall 2020 - Spring 2021*)
- Research assistant (*Fall 2017 - Spring 2020*) under NSF TRIPODS
  (Transdisciplinary Research in Principles of Data Science)
- Teaching assistant (*Fall 2016 - Spring 2017*)

AlphaStar Academy   *Summer 2012 - present*
- Instructor at A* Summer/Winter Math Camps and year-round courses, which prepare advanced
  students for math Olympiads and other competitions
- Developed lecture notes, assessments, and mock exams

Raytheon Missile Systems   *Jun. 2015 - Jul. 2017*
- Summer intern on SeeMe (Space Enabled Effects for Military Engagements). Wrote and tested system
  interface tests using JavaScript. (*Summer 2015*)
- Summer intern on SDB II (Small Diameter Bomb, Increment II). Wrote test scripts for UAI Certification
  (*Summer 2016*). Assisted with formal qualification testing, documentation, and post-telemetry scripts
  using MATLAB® and C++ (*Summer 2017*)

Publications

Conference Publications

C1. F. Darabi Sahneh, S. Kobourov, and **R. Spence**. Approximation algorithms for the priority Steiner tree problem. *27th International Computing and Combinatorics Conference (COCOON) (to appear)*, 2021

C2. R. Ahmed, G. Bodwin, K. Hamm, S. Kobourov, and **R. Spence**. On additive spanners in weighted graphs with local error. *47th International Workshop on Graph-Theoretic Concepts in Computer Science (WG)*, 2021

C3. R. Ahmed, G. Bodwin, F. Darabi Sahneh, K. Hamm, S. Kobourov, and **R. Spence**. Multi-level weighted additive spanners. *19th International Symposium on Experimental Algorithms (SEA)*, 2021

C4. R. Ahmed, F. Darabi Sahneh, K. Hamm, S. Kobourov, and **R. Spence**. Kruskal-based approximation algorithm for the multi-level Steiner tree problem. In F. Grandoni, G. Herman, and P. Sanders, editors, *28th Annual European Symposium on Algorithms (ESA)*, volume 173 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 4:1–4:21, Dagstuhl, Germany, 2020. Schloss Dagstuhl–Leibniz-Zentrum für Informatik

C5. R. Ahmed, G. Bodwin, F. Darabi Sahneh, S. Kobourov, and **R. Spence**. Weighted additive spanners. *46th International Workshop on Graph-Theoretic Concepts in Computer Science (WG)*, 2020

C6. R. Ahmed, K. Hamm, M. Jebelli, S. Kobourov, F. Sahneh, and **R. Spence**. Approximation algorithms and an integer program for multi-level graph spanners. *Special Event on Analysis of Experimental Algorithms*, 2019

Journal Publications

J1. R. Ahmed, G. Bodwin, F. Darabi Sahneh, K. Hamm, M. J. Latifi Jebelli, S. Kobourov, and **R. Spence**. Graph spanners: A tutorial review. *Computer Science Review*, 37:100–253, 2020

J2. R. Ahmed, P. Angelini, F. Darabi Sahneh, A. Efrat, D. Glickenstein, M. Gronemann, N. Heinsohn, S. Kobourov, **R. Spence**, J. Watkins, and A. Wolff. Multi-level steiner trees. *ACM J. Exp. Algorithmics*, 24, December 2019

Books

B1. S. Kanbir and **R. Spence**. *High School Mathematics Challenge: 10 Practice Tests with Full Detailed Solutions (AMC 10/12 and MathCON)*. MathTopia Press, 2020

Dissertation

D1. **R. Spence**. *Graph Sparsification with Priority*. PhD thesis, University of Arizona, Tucson, AZ, August 2021

Presentations

- 47$^{\text{th}}$ Intl. Workshop on Graph-Theoretic Concepts in Computer Science (WG)   *Jun. 2021*
  Warsaw, Poland (virtual)
  Sparse and lightweight spanners in weighted graphs with local additive error
- 28$^{\text{th}}$ European Symposium on Algorithms (ESA)   *Sep. 2020*
  Pisa, Italy (virtual)
  Kruskal-based approximation algorithm for the multi-level Steiner tree problem
- 2$^{\text{nd}}$ TRIPODS Southwest Summer Conference   *May 2019*
  Oracle, AZ
  Approximation algorithms for the priority Steiner tree problem
- 17$^{\text{th}}$ Symposium on Experimental Algorithms (SEA)   *Jun. 2018*
  L'Aquila, Italy
  Multi-level Steiner trees

Teaching

University of Arizona

- CSC 245 - Discrete Structures (Graduate teaching assistant)   *Summer 2021*
- CSC 345 - Analysis of Discrete Structures (GTA)   *Spring 2017*
- CSC 445 - Algorithms (GTA)   *Fall 2016, Summer 2021*
- CSC 573 - Theory of Computation (TA)   *Fall 2021*

Massachusetts Institute of Technology

- 6.042 - Mathematics for Computer Science (Lab assistant)   *Spring 2016*
- 6.006 - Introduction to Algorithms (Grader)   *Fall 2014 - Fall 2015*

AlphaStar Academy

- MC25C/MC30C - Counting, Probability (Instructor)   *multiple times*
- MC25N/MC30N - Number Theory (Instructor)   *multiple times*

Other

- Peer reviewed for conferences including ACDA, ALENEX, ICALP, ISAAC, and SoCG.
- Experience in Java, JavaScript, C++, Python, MATLAB®, LaTeX
- MathCON Editorial Board   *2020 - present*

- TRIPODS Machine Learning Literacy Project, volunteer *Mar. 2020*
- National SCRABBLE® Championship Div. 2 Champion *2011*
- United States of America Mathematical Olympiad qualifier *2010*

References

- Prof. Stephen Kobourov, `kobourov@cs.arizona.edu`

- Prof. Greg Bodwin, `bodwin@umich.edu`

- Prof. John Kececioglu, `kece@cs.arizona.edu`