RICHARD C. SPENCE

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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 *Expected: 2021*
Dissertation: *Graph Sparsification with Priority*
Advisor: Prof. 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*

- Graduate associate (*Fall 2020 - present*)
- Research assistant (*Fall 2017 - Spring 2020*) under NSF TRIPODS (Transdisciplinary Research in Principles of Data Science)
- Teaching assistant for CSC 445 (Algorithms) (*Fall 2016, Summer 2021*)
- Teaching assistant for CSC 345 (Data Structures) (*Spring 2017*)
- Teaching assistant for CSC 245 (Introduction to Discrete Structures) (*Summer 2021*)

Massachusetts Institute of Technology *Sep. 2014 - May 2016*

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

AlphaStar Academy *Summer 2012 - present*

- Instructor at A* Summer/Winter Math Camps and year-round courses (by AlphaStar Academy since 2017), which specialize in contest prep for MATHCOUNTS®, AMC 10/12, and AIME
- Instructor for MC25C (Combinatorics/Probability) (*multiple times*)
- Instructor for MC30N (Number Theory) (*Spring 2021*)
- 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 and Preprints

Conference Publications

C1. R. Ahmed, G. Bodwin, K. Hamm, S. Kobourov, and **R. Spence**. Sparse and lightweight spanners in weighted graphs with local additive error. *47th International Workshop on Graph-Theoretic Concepts (WG) (to appear)*, 2021

C2. R. Ahmed, G. Bodwin, F. Darabi Sahneh, K. Hamm, S. Kobourov, and **R. Spence**. Multi-level weighted additive spanners. *Symposium on Experimental Algorithms (to appear)*, 2021

C3. 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 2020)*, volume 173 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 4:1–4:21, Dagstuhl, Germany, 2020. Schloss Dagstuhl–Leibniz-Zentrum für Informatik

C4. R. Ahmed, G. Bodwin, F. Darabi Sahneh, S. Kobourov, and **R. Spence**. Weighted additive spanners. *46th International Workshop on Graph-Theoretic Concepts (WG)*, 2020

C5. 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

Preprints

P1. F. Darabi Sahneh, S. Kobourov, and **R. Spence**. Approximation algorithms for the priority Steiner tree problem. *arXiv preprint https://arxiv.org/abs/1811.11700*, 2021

Presentations

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

Other

- Peer reviewed for conferences including ACDA, ALENEX, ICALP, and SoCG.
- 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*
- Proficient in LaTeX and Microsoft Office (Word, Excel, PowerPoint)
- Experience in Java, JavaScript, C++, Python, MATLAB®

References

- Prof. Stephen Kobourov, `kobourov@cs.arizona.edu`
- Prof. John Kececioglu, `kece@cs.arizona.edu`
- Dr. Ali Gurel, `agurel@alphastar.academy`