

Austin Reilley Benson

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Education

Ph.D. Computational and Mathematical Engineering, Stanford University, expected 2017

Dissertation committee: Jure Leskovec (advisor) · David Gleich · Johan Ugander

M.S. Computational and Mathematical Engineering, Stanford University, 2017

B.S. Electrical Engineering and Computer Sciences, University of California, Berkeley, 2012

B.A. Applied Mathematics, University of California, Berkeley, 2012

Professional Experience

Google Inc., Summer 2016

Research intern with Ravi Kumar and Andrew Tomkins

Google Inc., Summer 2015

Research intern with Ravi Kumar and Andrew Tomkins

Sandia National Laboratories, Summer 2014

Research intern with Grey Ballard

HP Labs, Summer 2013

Research intern with Rob Schreiber

Google Inc., Summer 2012

Software engineering intern on Google Chrome

Google Inc., Summer 2011

Software engineering intern on Google Chrome

PREPRINTS

1. Higher-order clustering in networks.
Hao Yin, Austin R. Benson, and Jure Leskovec.
arXiv preprint 1704.03913, submitted 2017.

Accepted and Published Peer-reviewed Publications

16. Local higher-order graph clustering.
Hao Yin, Austin R. Benson, Jure Leskovec, and David F. Gleich.
To appear at KDD, 2017.
15. Motifs in temporal networks.
Ashwin Paranjape, Austin R. Benson, and Jure Leskovec.
Proceedings of the International Conference on Web Search and Data Mining (WSDM), 2017.
Code and data available at <https://snap.stanford.edu/temporal-motifs/>.

14. The spacey random walk: a stochastic process for higher-order data.
Austin R. Benson, David F. Gleich, and Lek-Heng Lim.
SIAM Review (Research Spotlights), 59:2, 321–345, 2017.
Code available at <https://github.com/arbenson/spacey-random-walks>.
13. Higher-order organization of complex networks.
Austin R. Benson, David F. Gleich, and Jure Leskovec.
Science 353:6295, 163–166, 2016.
Code and data available at <https://snap.stanford.edu/higher-order/>.
12. General tensor spectral co-clustering for higher-order data.
Tao Wu, Austin R. Benson, and David F. Gleich.
Proceedings of Neural Information Processing Systems (NIPS), 2016.
Code available at <https://github.com/wutao27/GtensorSC>.
11. Modeling user consumption sequences.
Austin R. Benson, Ravi Kumar, and Andrew Tomkins.
Proceedings of the International World Wide Web Conference (WWW), 2016.
10. On the relevance of irrelevant alternatives.
Austin R. Benson, Ravi Kumar, and Andrew Tomkins.
Proceedings of the International World Wide Web Conference (WWW), 2016.
9. Improving the numerical stability of fast matrix multiplication.
Grey Ballard, Austin R. Benson, Alex Druinksy, Benjamin Lipshitz, and Oded Schwartz.
SIAM Journal on Matrix Analysis and Applications (SIMAX), 2016.
Code available at <https://github.com/arbenson/fast-matmul>.
8. Tensor spectral clustering for partitioning higher-order network structures.
Austin R. Benson, David F. Gleich, and Jure Leskovec.
Proceedings of the SIAM International Conference on Data Mining (SDM), 2015.
Code available at <https://github.com/arbenson/tensor-sc>.
7. A framework for practical parallel fast matrix multiplication.
Austin R. Benson and Grey Ballard.
Proceedings of the Symposium on Principles and Practice of Parallel Programming (PPoPP), 2015.
Code available at <https://github.com/arbenson/fast-matmul>.
6. Scalable methods for nonnegative matrix factorizations of near-separable tall-and-skinny matrices.
Austin R. Benson, Jason D. Lee, Bartek Rajwa, and David F. Gleich.
Proceedings of Neural Information Processing Systems (NIPS), 2014.
Selected for spotlight presentation.
Code available at <https://github.com/arbenson/mrnmf>.
5. Learning multifractal structure in large networks.
Austin R. Benson, Carlos Riquelme, and Sven Schmit.
Proceedings of the International Conference on Knowledge Discovery and Data Mining (KDD), 2014.
4. A parallel directional Fast Multipole Method.
Austin R. Benson, Jack Poulson, Kenneth Tran, Björn Engquist, and Lexing Ying.
SIAM Journal on Scientific Computing (SISC) 36:4, C335–C352, 2014.
Code available at <https://github.com/arbenson/ddfmm>.
3. Silent error detection in numerical time-stepping schemes.
Austin R. Benson, Sven Schmit, and Robert Schreiber.
International Journal of High Performance Computing Applications (IJHPCA), 29.4, 403–421, 2014.
Code available at <https://www.stanford.edu/~arbenson/silent.html>.
2. Direct QR factorizations for tall-and-skinny matrices in MapReduce architectures.
Austin R. Benson, David F. Gleich, and James Demmel.
Proceedings of the IEEE International Conference on Big Data (IEEE BigData), 2013.
Code available at <https://github.com/arbenson/mrtsqr>.

1. The Gamma-Ray Imaging Framework.

Austin R. Benson, Mark S. Bandstra, Daniel H. Chivers, Timothy Aucott, Ben Augarten, Cameron Bates, Adam Midvidy, Ryan Pavlovsky, James Siegrist, Kai Vetter, and Ben Yee.

IEEE Transactions on Nuclear Science. 60(2), 528–532, 2013.

Code available at <https://github.com/bearing/grif>.

Teaching Experience

Teaching assistant, Stanford University, Fall 2016

CS 224W: Social and Information Network Analysis

Instructor, Stanford University, Summer 2014

Discrete Mathematics and Algorithms ICME refresher course

Lecture notes available at <http://bit.ly/algs-refresher>.

Teaching assistant, Stanford University, Winter 2014

CME 181: Projects in Applied and Computational Mathematics

Instructor, Stanford University, Spring 2013

CME 193: Introduction to Scientific Python

Course material available at <http://stanford.edu/~arbenson/cme193.html>.

Instructor and course creator, Stanford University, Winter 2013

CME 193: Introduction to Scientific Python

Student Mentoring

Hao Yin (Stanford ICME Ph.D. student), Fall 2016–Spring 2017

Ashwin Paranjape (Stanford CS M.S. student), Spring 2016

Invited and Contributed Talks

This list does not include talks for conference publications.

07/2017	SIAM Network Science	Pittsburgh, PA
06/2017	Householder Symposium on Numerical Linear Algebra	Blacksburg, VA
04/2017	AMS Spring Western Sectional Meeting	Pullman, WA
02/2017	SIAM Computational Science & Engineering	Atlanta, GA
01/2017	University of Chicago Scientific Computing Seminar	Chicago, IL
06/2016	Lawrence Livermore National Laboratory Seminar	Livermore, CA
05/2016	UC-Davis MX16 Workshop	Davis, CA
05/2016	Purdue Center for the Science of Information Seminar	West Lafayette, IN
03/2016	Copper Mountain Linear Algebra for Data Mining Workshop	Copper Mountain, CO
02/2016	Stanford Linear Algebra & Optimization Seminar	Stanford, CA
12/2015	Santa Fe Institute Inference on Networks Workshop	Santa Fe, NM
12/2015	NIPS Multiresolution Methods Workshop	Montreal, Canada
10/2015	SIAM Applied Linear Algebra	Atlanta, GA
10/2015	UC-Berkeley DMML Workshop	Berkeley, CA
10/2015	Allerton Conference	Monticello, IL
09/2015	Lawrence Livermore National Laboratory Seminar	Livermore, CA
06/2015	Higher-order Models NetSci Satellite	Zaragoza, Spain
05/2015	SIAM Computational Science & Engineering	Salt Lake City, UT
10/2014	Sandia National Laboratories Seminar	Livermore, CA
10/2014	Stanford ICME Colloquium	Stanford, CA
09/2014	UT-Austin BLIS Retreat	Austin, TX

09/2014	Purdue Machine Learning Seminar	West Lafayette, IN
02/2014	SIAM Parallel Processing	Portland, OR
05/2013	Stanford ICME Colloquium	Stanford, CA
04/2013	Stanford MapReduce Workshop	Stanford, CA
02/2013	SIAM Computational Science & Engineering	Boston, MA
05/2012	Stanford MapReduce Workshop	Stanford, CA

Awards

Stanford Graduate Fellowship (SGF), 2012-2016 (12 quarters of tuition and stipend).

Teaching Fellow, Institute for Computational and Mathematical Engineering, 2016–Present.

Student Travel Award, WWW 2016.

Student Travel Award, NIPS 2014.

Student Travel Award, KDD 2014.

Student Travel Award, SIAM Conference Parallel Processing for Scientific Computing, 2014.

Service

Workshops organized

- Eigenvectors and Decompositions of Structured Tensors, SIAM CS&E '17

Conference program committees

- ASONAM '16
- DSAA '16
- IJCAI '16
- NIPS '17
- KDD '16, '17
- WSDM '17
- WWW '17

Journal reviewing

- ACM Transactions on Knowledge Discovery in Data (TKDD)
- ACM Transactions on Parallel Computing (TOPC)
- IEEE Transactions on Parallel and Distributed Systems (TPDPS)
- Journal of Complex Networks
- Journal of Machine Learning Research (JMLR)
- Journal of Statistical Mechanics: Theory and Experiment (JSTAT)
- Linear and Multilinear Algebra
- Nature Scientific Reports
- Network Science
- PLOS ONE
- Parallel Computing (PARCO)
- SIAM Journal on Scientific Computing (SISC)
- SIAM Journal on Matrix Analysis and Applications (SIMAX)
- Statistical Analysis and Data Mining: The ASA Data Science Journal

Press

Coverage of the *Science* article “Higher-order organization of complex networks”:

- [Stanford News](#)
- [Phys.org](#)
- [DARPA](#)

Coverage of my internship work on fault-tolerant algorithms at HP Labs:

- [HP Blogs](#).