

AUSTIN REILLEY BENSON

Quant finance researcher, New York City

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<https://scholar.google.com/citations?user=Bz0qNoQAAAAJ&hl=en>

Citizenship: USA

Professional experience

D. E. Shaw & Co., Equities Group	2021–2025
Vice President	2024–2025
Quant Researcher	2021–2023
Cornell University, Department of Computer Science	2017–2021
Assistant Professor	2018–2021
Field Memberships: Center for Applied Mathematics; Data Science	
Postdoctoral Associate	2017–2018
Internships	
Research Intern, Google	2016
Research Intern, Google	2015
Research Intern, Sandia National Laboratories	2014
Research Associate, HP Labs	2013
Software Engineering Intern, Google	2012
Software Engineering Intern, Google	2011

Education

Stanford University	2012–2017
PhD, Computational and Mathematical Engineering	
MS, Computational and Mathematical Engineering	
University of California, Berkeley	2008–2012
BS, Electrical Engineering and Computer Sciences (EECS)	
BA, Applied Mathematics	

Selected publications (complete list at end of CV)

1. Higher-order organization of complex networks.
Austin R. Benson, David F. Gleich, and Jure Leskovec.
Science, 2016.
2. Simplicial closure and higher-order link prediction.
Austin R. Benson, Rediet Abebe, Michael T. Schaub, Ali Jadbabaie, and Jon Kleinberg.
Proceedings of the National Academy of Sciences (PNAS), 2018.
3. A Unifying Generative Model for Graph Learning Algorithms: Label Propagation, Graph Convolutions, and Combinations.
Junteng Jia and Austin R. Benson.
SIAM Journal on Mathematics of Data Science (SIMODS), 2022.
4. Combining Label Propagation and Simple Models Out-performs Graph Neural Networks.
Qian Huang, Horace He, Abhay Singh, Ser-Nam Lim, and Austin R. Benson.
Proceedings of the International Conference on Learning Representations (ICLR), 2021.
5. Choosing to grow a graph: Modeling network formation as discrete choice.
Jan Overgoor, Austin R. Benson, and Johan Ugander.
Proceedings of the Web Conference (WWW), 2019.
6. Random Walks on Simplicial Complexes and the normalized Hodge 1-Laplacian.
Michael T. Schaub, Austin R. Benson, Paul Horn, Gabor Lippner, and Ali Jadbabaie.
SIAM Review, 2020.
7. Hypergraph Cuts with General Splitting Functions.
Nate Veldt, Austin R. Benson, and Jon Kleinberg.
SIAM Review, 2022.
8. 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. The spacey random walk: a stochastic process for higher-order data.
Austin R. Benson, David F. Gleich, and Lek-Heng Lim.
SIAM Review, 2017.
10. 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.

Academic awards

NSF Faculty Early Career Development Program (CAREER) Award	2021
Kavli Fellow, Kavli Frontiers of Science, National Academy of Sciences	2020
JPMorgan Chase Faculty AI Research Award	2020
Best Research Paper Award, KDD '19	2019
Best Research Paper Award Runner-up, ASONAM '19	2019
LAA Early Career Speaker, International Linear Algebra Society	2019
Outstanding program committee member, WSDM '19	2019
Stanford Gene Golub Doctoral Dissertation Award	2017
Teaching Fellow, ICME, Stanford University	2016
Office of Technology Licensing Stanford Graduate Fellowship	2012

Mentorship and advising

Students, postdocs, and interns from time at Cornell and DE Shaw. Next career stage indicated in parentheses.

Postdocs

Jonas Juul (Assistant Professor, IT University of Copenhagen, Computer Science Department)
Nate Veldt (Assistant Professor, Texas A&M, Department of Computer Science and Engineering)

PhD Students

Kiran Tomlinson (MSR)
Ilya Amburg (PNNL)
Junteng Jia (Meta)

Undergraduate Students

Qian Huang (MIT PhD)
Finalist, CRA Outstanding Undergraduate Researcher Award, 2020 & 2021
Recipient, Computer Science Department Prize for Academic Excellence
Abhay Singh (Citadel GQS)
Horace He (Meta)
Honorable Mention, CRA Outstanding Undergraduate Researcher Award, 2020
Derek Lim (MIT PhD)
Honorable Mention, CRA Outstanding Undergraduate Researcher Award, 2021
Leah Ajmani (Minnesota PhD)
Shangdi Yu (MIT PhD)
Recipient, Computer Science Department Prize for Academic Excellence
Xiang (Felix) Fu (MIT PhD)

Summer Interns

Jennifer Sun (DE Shaw)
Raghav Somani (DE Shaw)
Feicheng Wang (Citadel Securities)

Complete list of papers and publications

76. Graph neural network modeling of grain-scale anisotropic elastic behavior using simulated and measured microscale data.
Darren C. Pagan, Calvin R. Pash, Austin R. Benson, and Matthew P. Kasemer.
npj Computational Materials, 2024.
75. Hypergraph patterns and collaboration structure.
Jonas L. Juul, Austin R. Benson, and Jon Kleinberg.
Frontiers in Physics, 2024.
74. Graph-based methods for discrete choice.
Kiran Tomlinson and Austin R. Benson.
Network Science, 2023.
73. A Unifying Generative Model for Graph Learning Algorithms: Label Propagation, Graph Convolutions, and Combinations.
Junteng Jia and Austin R. Benson.
SIAM Journal on Mathematics of Data Science (SIMODS), 2022.
72. Nonlinear Feature Diffusion on Hypergraphs.
Francesco Tudisco, Konstantin Prokopchik, and Austin R. Benson.
Proceedings of the International Conference on Machine Learning (ICML), 2022.
71. fauci-email: a JSON Digest of Anthony Fauci’s Released Emails.
Austin R. Benson, Nate Veldt, and David F. Gleich.
Proceedings of the International AAAI Conference on Web and Social Media (ICWSM), 2022.
70. Understanding non-linearity in graph neural networks from the Bayesian-inference perspective.
Rongzhe Wei, Haoteng Yin, Junteng Jia, Austin R. Benson, and Pan Li.
Advances in Neural Information Processing Systems (NeurIPS), 2022.
69. Combinatorial characterizations and impossibilities for higher-order homophily.
Nate Veldt, Austin R. Benson, and Jon Kleinberg.
Science Advances, 2023.
68. Diverse and Experienced Group Discovery via Hypergraph Clustering.
Ilya Amburg, Nate Veldt, and Austin R. Benson.
SIAM International Conference on Data Mining (SDM), 2022.
67. Augmented Sparsifiers for Generalized Hypergraph Cuts.
Austin R. Benson, Jon Kleinberg, and Nate Veldt.
Journal of Machine Learning Research (JMLR), 2023.
66. Hypergraph Cuts with General Splitting Functions.
Nate Veldt, Austin R. Benson, and Jon Kleinberg.
SIAM Review, 2022.
65. Approximate Decomposable Submodular Function Minimization for Cardinality-Based Components.
Austin R. Benson, Jon Kleinberg, and Nate Veldt.
Advances in Neural Information Processing Systems (NeurIPS), 2021.
64. Communication-efficient distributed eigenspace estimation.
Vasileios Charisopoulos, Austin R. Benson, and Anil Damle.
SIAM Journal on Mathematics of Data Science (SIMODS), 2021.
63. Hypergraph clustering: from blockmodels to modularity.
Philip S. Chodrow, Nate Veldt, and Austin R. Benson.
Science Advances, 2021.

62. The Generalized Mean Densest Subgraph Problem.
Nate Veldt, Austin R. Benson, and Jon Kleinberg.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2021.
61. Choice Set Confounding in Discrete Choice.
Kiran Tomlinson, Johan Ugander, and Austin R. Benson.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2021.
60. Learning Interpretable Feature Context Effects in Discrete Choice.
Kiran Tomlinson and Austin R. Benson.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2021.
59. Expertise and Dynamics within Crowdsourced Musical Knowledge Curation: A Case Study of the Genius Platform.
Derek Lim and Austin R. Benson.
Proceedings of the International AAAI Conference on Web and Social Media (ICWSM), 2021.
58. Higher-order Network Analysis Takes Off, Fueled by Old Ideas and New Data.
Austin R. Benson, David F. Gleich, and Desmond J. Higham.
SIAM News, 2021 (online).
57. Combining Label Propagation and Simple Models Out-performs Graph Neural Networks.
Qian Huang, Horace He, Abhay Singh, Ser-Nam Lim, and Austin R. Benson.
Proceedings of the International Conference on Learning Representations (ICLR), 2021.
56. Planted Hitting Set Recovery in Hypergraphs.
Ilya Amburg, Jon Kleinberg, and Austin R. Benson.
Journal of Physics: Complexity, 2021.
55. Nonlinear Higher-Order Label Spreading.
Francesco Tudisco, Austin R. Benson, and Konstantin Prokopchik.
Proceedings of the Web Conference (WWW), 2021.
54. Random Graphs with Prescribed K-Core Sequences: A New Null Model for Network Analysis.
Katherine Van Koeveering, Austin R. Benson, and Jon Kleinberg.
Proceedings of the Web Conference (WWW), 2021.
53. Capturing Tie Strength with Algebraic Topology.
Arnab Sarker, Jean-Baptiste Seby, Austin R. Benson, and Ali Jadbabaie.
arXiv:2108.02091, 2021.
52. Edge Proposal Sets for Link Prediction.
Abhay Singh, Qian Huang, Sijia Linda Huang, Omkar Bhalerao, Horace He, Ser-Nam Lim, and Austin R. Benson.
arXiv:2106.15810, 2021.
51. Graph Belief Propagation Networks.
Junteng Jia, Cenk Baykal, Vamsi K. Potluru, and Austin R. Benson.
arXiv:2106.03033, 2021.
50. Better Set Representations For Relational Reasoning.
Qian Huang, Horace He, Abhay Singh, Yan Zhang, Ser-Nam Lim, and Austin R. Benson.
Advances in Neural Information Processing Systems (NeurIPS), 2020.
49. Entrywise convergence of iterative methods for eigenproblems.
Vasileios Charisopoulos, Austin R. Benson, Anil Damle.
Advances in Neural Information Processing Systems (NeurIPS), 2020.

48. Residual Correlation in Graph Neural Network Regression.
Junteng Jia and Austin R. Benson.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2020.
47. Minimizing Localized Ratio Cut Objectives in Hypergraphs.
Nate Veldt, Austin R. Benson, and Jon Kleinberg.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2020.
46. Choice Set Optimization Under Discrete Choice Models of Group Decisions.
Kiran Tomlinson and Austin R. Benson.
Proceedings of the International Conference on Machine Learning (ICML), 2020.
45. Neighborhood and PageRank methods for pairwise link prediction.
Huda Nassar, Austin Benson, and David F. Gleich.
Social Network Analysis and Mining (SNAM), 2020.
44. Network Interpolation.
Thomas Reeves, Anil Damle, and Austin R. Benson.
SIAM Journal on Mathematics of Data Science (SIMODS), 2020.
43. Measuring Directed Triadic Closure with Closure Coefficients.
Hao Yin, Austin R. Benson, and Johan Ugander.
Network Science, 2020.
42. Random Walks on Simplicial Complexes and the normalized Hodge 1-Laplacian.
Michael T. Schaub, Austin R. Benson, Paul Horn, Gabor Lippner, and Ali Jadbabaie.
SIAM Review, 2020.
41. Clustering in graphs and hypergraphs with categorical edge labels.
Ilya Amburg, Nate Veldt, and Austin R. Benson.
Proceedings of the Web Conference (WWW), 2020.
40. Frozen Binomials on the Web: Word Ordering and Language Conventions in Online Text.
Katherine Van Koeveering, Austin R. Benson and Jon Kleinberg.
Proceedings of the Web Conference (WWW), 2020.
39. Using cliques with higher-order spectral embeddings improves graph visualizations.
Huda Nassar, David Gleich, Austin R. Benson, Shweta Jain and Caitlin Kennedy.
Proceedings of the Web Conference (WWW), 2020.
38. Retrieving Top Weighted Triangles in Graphs.
Raunak Kumar, Paul Liu, Moses Charikar, and Austin R. Benson.
Proceedings of the International Conference on Web Search and Data Mining (WSDM), 2020.
37. Over-parametrized neural networks as under-determined linear systems.
Austin R. Benson, Anil Damle, and Alex Townsend.
arXiv:2010.15959, 2020.
36. Neural Jump Stochastic Differential Equations.
Junteng Jia and Austin R. Benson.
Advances in Neural Information Processing Systems (NeurIPS), 2019.
35. Modeling and Analysis of Tagging Networks in Stack Exchange Communities.
Xiang Fu, Shangdi Yu, and Austin R. Benson.
Journal of Complex Networks, 2019.
34. Unsupervised learning of dislocation motion.
Darren C. Pagan, Thien Q. Phan, Jordan S. Weaver, Austin R. Benson, and Armand J. Beaudoin.
Acta Materialia, 2019.

33. Automated Grain Yield Behavior Classification.
Darren C. Pagan, Jakob Kaminsky, Wesley A. Tayon, Kelly E. Nygren, Armand J. Beaudoin, and Austin R. Benson.
The Journal of The Minerals, Metals & Materials Society (JOM), 2019.
32. Computing Tensor Z-eigenvectors with Dynamical Systems.
Austin R. Benson and David F. Gleich.
SIAM Journal on Matrix Analysis and Applications (SIMAX), 2019.
31. Pairwise Link Prediction.
Huda Nassar, Austin R. Benson, and David F. Gleich.
Proceedings of the International Conference on Advances in Social Networks Analysis and Mining (ASONAM), 2019.
30. Graph-based Semi-Supervised & Active Learning for Edge Flows.
Junteng Jia, Michael T. Schaub, Santiago Segarra, and Austin R. Benson.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2019.
29. Network Density of States.
Kun Dong, Austin R. Benson, and David Bindel.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2019.
28. Three hypergraph eigenvector centralities.
Austin R. Benson.
SIAM Journal on Mathematics of Data Science (SIMODS), 2019.
27. Link Prediction in Networks with Core-Fringe Data.
Austin R. Benson and Jon Kleinberg.
Proceedings of the Web Conference (WWW), 2019.
26. Choosing to grow a graph: Modeling network formation as discrete choice.
Jan Overgoor, Austin R. Benson, and Johan Ugander.
Proceedings of the Web Conference (WWW), 2019.
25. Random Spatial Network Models with Core-Periphery Structure.
Junteng Jia and Austin R. Benson.
Proceedings of the International Conference on Web Search and Data Mining (WSDM), 2019.
24. Sampling Methods for Counting Temporal Motifs.
Paul Liu, Austin R. Benson, and Moses Charikar.
Proceedings of the International Conference on Web Search and Data Mining (WSDM), 2019.
23. The Local Closure Coefficient: A New Perspective On Network Clustering.
Hao Yin, Austin R. Benson, and Jure Leskovec.
Proceedings of the International Conference on Web Search and Data Mining (WSDM), 2019.
22. Incrementally Updated Spectral Embeddings.
Vasileios Charisopoulos, Austin R. Benson, and Anil Damle.
arXiv:1909.01188, 2019.
21. Simplicial closure and higher-order link prediction.
Austin R. Benson, Rediet Abebe, Michael T. Schaub, Ali Jadbabaie, and Jon Kleinberg.
Proceedings of the National Academy of Sciences (PNAS), 2018.
20. Found Graph Data and Planted Vertex Covers.
Austin R. Benson and Jon Kleinberg.
Advances in Neural Information Processing Systems (NeurIPS), 2018.

19. Sequences of Sets.
Austin R. Benson, Ravi Kumar, and Andrew Tomkins.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (KDD), 2018.
18. Higher-order clustering in networks.
Hao Yin, Austin R. Benson, and Jure Leskovec.
Physical Review E, 2018.
17. A discrete choice model for subset selection.
Austin R. Benson, Ravi Kumar, and Andrew Tomkins.
Proceedings of the International Conference on Web Search and Data Mining (WSDM), 2018.
16. Local higher-order graph clustering.
Hao Yin, Austin R. Benson, Jure Leskovec, and David F. Gleich.
Proceedings of the International Conference on Knowledge Discovery & Data Mining (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.
14. The spacey random walk: a stochastic process for higher-order data.
Austin R. Benson, David F. Gleich, and Lek-Heng Lim.
SIAM Review, 2017.
13. Higher-order organization of complex networks.
Austin R. Benson, David F. Gleich, and Jure Leskovec.
Science, 2016.
12. General tensor spectral co-clustering for higher-order data.
Tao Wu, Austin R. Benson, and David F. Gleich.
Advances in Neural Information Processing Systems (NeurIPS), 2016.
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 Druinsky, Benjamin Lipshitz, and Oded Schwartz.
SIAM Journal on Matrix Analysis and Applications (SIMAX), 2016.
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.
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.
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.
Advances in Neural Information Processing Systems (NeurIPS), 2014.
5. Learning multifractal structure in large networks.
Austin R. Benson, Carlos Riquelme, and Sven Schmit.
Proceedings of the International Conference on Knowledge Discovery & 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), 2014.
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), 2014.
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 (BigData), 2013.
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, 2013.