

# L. NATE VELDT

Department of Computer Science & Engineering, Texas A&M University, College Station, TX

## ACADEMIC APPOINTMENTS

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<b>Assistant Professor</b> Department of Computer Science & Engineering Texas A&M University, College Station, TX	2021–now
<b>Postdoctoral Associate</b> Center for Applied Mathematics Cornell University, Ithaca, NY	2019–2021

## EDUCATION

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<b>PhD in Mathematics, Concentration: Computational Science</b> Purdue University, West Lafayette, IN Dissertation: Optimization Frameworks for Graph Clustering	2019
<b>M.S. in Mathematics</b> Purdue University, West Lafayette, IN	2017
<b>B.S. in Mathematics</b> Summa Cum Laude Wheaton College, Wheaton, IL	2013

## PROFESSIONAL EXPERIENCE

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<i>Computer Science Research Assistant</i> , Purdue University Computer Science Department	2016–2019
<i>Computation Intern</i> , Lawrence Livermore National Lab	Summer 2017
<i>Visiting Researcher</i> , School of Computing and Information Systems, The University of Melbourne	Summer 2016
<i>Mathematics Instructor</i> , Purdue University Mathematics Department	2013–2016

## AWARDS AND HONORS

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Best Reviewer Award, The ACM 2023 Web Conference	April 2023
SIAM Applied and Computational Discrete Algorithms (ACDA) Early Career Prize	January 2023
Texas A&M Institute of Data Science Career Initiation Fellowship	April 2022
Chorafas Award, Dimitris N. Chorafas Foundation	August 2019
Session Best Talk Award, Purdue SIAM CSE Student Conference	April 2017
NSF East Asia and Pacific Summer Institute Fellowship	Summer 2016
Excellence in Teaching Award, Purdue University Mathematics Department	November 2015
Wheaton College Scholastic Honors Society, Wheaton College	May 2013
Angelina Brandt Memorial Award for Excellence in Mathematics, Wheaton College	May 2013

## PUBLICATIONS

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### Journal Publications

- Augmented Sparsifiers for Generalized Hypergraph Cuts\*  
Nate Veldt, Austin R. Benson, Jon Kleinberg  
*Journal of Machine Learning Research (JMLR)*, 2023  
<https://jmlr.org/papers/v24/22-0305.html>  
*\*Adapted and expanded version of a NeurIPS 2021 paper.*

2. Seven open problems in applied combinatorics  
Sinan G. Aksoy, Ryan Bennink, Yuzhou Chen, José Frías, Yulia R. Gel, Bill Kay, Uwe Naumann, Carlos Ortiz Marrero, Anthony V. Petyuk, Sandip Roy, Ignacio Segovia-Dominguez, Nate Veldt, Stephen J. Young  
*Journal of Combinatorics*, April 2023  
<https://www.intlpress.com/site/pub/pages/journals/items/joc/content/vols/0014/0004/a008/>
3. Combinatorial characterizations and impossibilities for higher-order homophily  
Nate Veldt, Austin R. Benson, Jon Kleinberg  
*Science Advances*, January 2023  
<https://www.science.org/doi/full/10.1126/sciadv.abq3200>
4. Hypergraph Cuts with General Splitting Functions  
Nate Veldt, Austin R. Benson, Jon Kleinberg  
*SIAM Review (SIREV)*, August 2022  
<https://epubs.siam.org/doi/10.1137/20M1321048>
5. Generative hypergraph clustering: from blockmodels to modularity  
Philip S. Chodrow, Nate Veldt, Austin R. Benson  
*Science Advances*, July 2021  
<https://advances.sciencemag.org/content/7/28/eabh1303.full>
6. Metric-Constrained Optimization for Graph Clustering Algorithms  
Nate Veldt, David F. Gleich, Anthony Wirth, James Saunderson  
*SIAM Journal on Mathematics of Data Science (SIMODS)*, June 2019  
<https://epubs.siam.org/doi/10.1137/18M1217152>

## Conference Proceedings

7. Faster Approximation Algorithms for Parameterized Graph Clustering and Edge Labeling  
Vedangi Bengali, Nate Veldt, 2023  
*ACM Conference on Knowledge and Information Management (CIKM)*, to appear October 2023  
Preprint: <https://arxiv.org/abs/2306.04884>
8. On the Optimal Recovery of Graph Signals  
Simon Foucart, Chunyang Liao, Nate Veldt  
*Sampling Theory and Applications Conference (SampTA)*, July 2023  
<https://openreview.net/forum?id=KK-mUYF9dm>
9. Optimal LP Rounding and Linear-Time Approximation Algorithms for Clustering Edge-Colored Hypergraphs  
Nate Veldt  
*International Conference on Machine Learning (ICML)*, July 2023  
<https://proceedings.mlr.press/v202/veldt23a.html>
10. Cut-matching Games for Generalized Hypergraph Ratio Cuts  
Nate Veldt  
*International World Wide Web Conference (WebConf)*, May 2023  
<https://dl.acm.org/doi/10.1145/3543507.3583539>
11. Correlation Clustering via Strong Triadic Closure Labeling:  
Fast Approximation Algorithms and Practical Lower Bounds  
Nate Veldt  
*International Conference on Machine Learning (ICML)*, July 2022  
<https://proceedings.mlr.press/v162/veldt22a.html>
12. fauci-email: a json digest of Anthony Fauci's released emails  
Austin R. Benson, Nate Veldt, David Gleich  
*International Conference on Web and Social Media (ICWSM)*, June 2022  
<https://ojs.aaai.org/index.php/ICWSM/article/view/19371>

13. Diverse and Experienced Group Discovery via Hypergraph Clustering  
Ilya Amburg, Nate Veldt, Austin R. Benson  
*SIAM International Conference on Data Mining (SDM)*, April 2022  
<https://epubs.siam.org/doi/pdf/10.1137/1.9781611977172.17>
14. Approximate Decomposable Submodular Function Minimization for Cardinality-Based Components  
Nate Veldt, Austin R. Benson, Jon Kleinberg  
*Conference on Neural Information Processing Systems (NeurIPS)*, December 2021  
<https://papers.nips.cc/paper/2021/hash/1e8a19426224ca89e83cef47f1e7f53b-Abstract.html>
15. The Generalized Mean Densest Subgraph Problem  
Nate Veldt, Austin R. Benson, Jon Kleinberg  
*ACM Conference on Knowledge Discovery and Data Mining (KDD)*, August 2021  
<https://dl.acm.org/doi/10.1145/3447548.3467398>
16. Strongly Local Hypergraph Diffusions for Clustering and Semi-supervised Learning  
Meng Liu, Nate Veldt, Haoyu Song, Pan Li, and David F. Gleich  
*International World Wide Web Conference (WebConf)*, May 2021  
<https://arxiv.org/abs/2011.07752>
17. Graph Clustering in All Parameter Regimes  
Junhao Gan, David F. Gleich, Nate Veldt, Anthony Wirth, Xin Zhang  
*International Symposium on Mathematical Foundations of Computer Science (MFCS)*, August 2020  
<https://drops.dagstuhl.de/opus/volltexte/2020/12706/>
18. Minimizing Localized Ratio Cut Objectives in Hypergraphs  
Nate Veldt, Austin R. Benson, Jon Kleinberg  
*ACM Conference on Knowledge Discovery and Data Mining (KDD)*, August 2020  
<https://dl.acm.org/doi/10.1145/3394486.3403222>
19. Parameterized Correlation Clustering in Hypergraphs and Bipartite Graphs  
Nate Veldt, Anthony Wirth, David F. Gleich  
*ACM Conference on Knowledge Discovery and Data Mining (KDD)*, August 2020  
<https://dl.acm.org/doi/abs/10.1145/3394486.3403238>
20. Clustering in graphs and hypergraphs with categorical edge labels  
Ilya Amburg, Nate Veldt, Austin R. Benson  
*International World Wide Web Conference (WebConf)*, May 2020  
<https://dl.acm.org/doi/fullHtml/10.1145/3366423.3380152>
21. Learning Resolution Parameters for Graph Clustering  
Nate Veldt, David F. Gleich, Anthony Wirth  
*International World Wide Web Conference (WebConf)*, May 2019  
<https://dl.acm.org/citation.cfm?id=3313471>
22. Flow-Based Local Graph Clustering with Better Seed Set Inclusion  
Nate Veldt, Christine Klymko, David F. Gleich  
*SIAM International Conference on Data Mining (SDM)*, May 2019  
<https://epubs.siam.org/doi/abs/10.1137/1.9781611975673.43>
23. Correlation Clustering Generalized  
David F. Gleich, Nate Veldt, Anthony Wirth  
*International Symposium on Algorithms and Computation (ISAAC)*, December 2018  
[http://drops.dagstuhl.de/opus/frontdoor.php?source\\_opus=9992](http://drops.dagstuhl.de/opus/frontdoor.php?source_opus=9992)
24. A Correlation Clustering Framework for Community Detection  
Nate Veldt, David F. Gleich, Anthony Wirth  
*International World Wide Web Conference (WebConf)*, April 2018  
[doi:10.1145/3038912.3052586](https://doi.org/10.1145/3038912.3052586)

25. Low-rank Spectral Network Alignment  
Huda Nassar, Nate Veldt, Shahin Mohammadi, Ananth Grama, David F. Gleich  
*International World Wide Web Conference (WebConf)*, April 2018  
doi:10.1145/3178876.3186128
26. Correlation Clustering with Low-Rank Matrices  
Nate Veldt, Anthony Wirth, David F. Gleich  
*International World Wide Web Conference (WebConf)*, April 2017  
doi:10.1145/3178876.3186110
27. A Simple and Strongly-Local Flow-Based Method for Cut Improvement  
Nate Veldt, David F. Gleich, Michael Mahoney  
*International Conference on Machine Learning (ICML)*, June 2016  
<http://jmlr.org/proceedings/papers/v48/veldt16.html>

### Refereed Workshop Publications

28. Coordinated Botnet Detection in Social Networks via Clustering Analysis  
Preston Piercey, Roger Pearce, Nate Veldt  
*Workshop Proceedings of the International Conference on Parallel Processing, accepted*, August 2023
29. A Parallel Projection Method for Metric-Constrained Optimization  
Cameron Ruggles, Nate Veldt, David F. Gleich  
*SIAM Workshop on Combinatorial Scientific Computing*, February 2020  
<https://epubs.siam.org/doi/abs/10.1137/1.9781611976229.5>

### Preprints

1. Overlapping and Robust Edge-Colored Clustering in Hypergraphs  
Alex Crane, Brian Lavalley, Blair D. Sullivan, Nate Veldt, 2023  
<https://arxiv.org/abs/2305.17598>
2. Growing a Random Maximal Independent Set Produces a 2-approximate Vertex Cover  
Nate Veldt, 2022  
<https://arxiv.org/abs/2209.04673>

### Thesis

1. Optimization Frameworks for Graph Clustering  
Nate Veldt, PhD Thesis, Purdue University, May 2019  
[https://hammer.figshare.com/articles/Optimization\\_Frameworks\\_for\\_Graph\\_Clustering/8044592](https://hammer.figshare.com/articles/Optimization_Frameworks_for_Graph_Clustering/8044592)

## PRESENTATIONS

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### Invited Seminar and Plenary Talks

SIAM Conference on Applied and Computational Discrete Algorithms · Seattle, WA	June 2023
University of Utah Data Science Seminar · Salt Lake City, Utah	March 2023
College of William and Mary CS Colloquium · Virtual Online	Mar 2021
Texas A&M University CS Seminar · Virtual Online	Mar 2021
George Mason University CS Seminar · Virtual Online	Feb 2021
Cornell University Center for Applied Mathematics Colloquium · Ithaca, NY	Sept 2019
North Carolina State University CS Seminar · Raleigh, NC	Feb 2019
The University of Melbourne Computing and Information Systems Seminar · Parkville, Australia	Dec 2018
Monash University Discrete Mathematics Group Seminar · Clayton, Australia	Dec 2018
University of Utah Data Science Seminar · Salt Lake City, UT	Sept 2018
Rose-Hulman Institute of Technology Mathematics Seminar · Terre Haute, IN	Sept 2018
University of Illinois Chicago Graduate Computational Algebraic Geometry Seminar · Chicago, IL	Apr 2017

**Conference Talks**

The ACM Web Conference · Austin, TX	April 2023
SIAM Conference on Applied and Computational Discrete Algorithms · Virtual Online	Jul 2021
ACM SIGKDD Conference · Virtual Online	Aug 2020
SIAM International Conference on Data Mining · Calgary, Alberta, Canada	May 2019
International World Wide Web Conference · Lyon, France	Apr 2018
International World Wide Web Conference · Perth, Australia	Apr 2017
International Conference on Machine Learning · New York, NY	Jun 2016

**Workshop and Minisymposium Talks**

Workshop on Applied and Computational Discrete Algorithms · Aussois, France	Sept 2022
SIAM Conference on Discrete Mathematics · Pittsburgh, PA	Jun 2022
European Conference on Operations Research · Virtual Online	Jul 2021
International Conference on Continuous Optimization · Berlin, Germany	Aug 2019
International Council for Industrial and Applied Mathematics · Valencia, Spain	Jul 2019
SIAM Network Science Workshop · Portland, OR	Jul 2018
Joint Mathematics Meetings · San Diego, CA	Jan 2018
AMS Spring Western Sectional Meeting · Pullman, WA	Apr 2017

**TEACHING EXPERIENCE**

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**Texas A&M University Courses**

Spring 2023 · CSCE 411: Design and Analysis of Algorithms
Fall 2022 · CSCE 689: Special Topics in Advanced Graph Algorithms
Spring 2022 · CSCE 411: Design and Analysis of Algorithms
Fall 2021 · CSCE 689: Special Topics in Algorithms and Optimization for Graph Mining

**Cornell University Courses**

Fall 2020 · MATH 2210: Linear Algebra
Spring 2020 · CS 1132: Short Course on Matlab

**Purdue University Courses**

Fall 2015 · Applied Calculus II
Summer 2015 · Applied Calculus II
Spring 2015 · Applied Calculus II
Fall 2014 · Precalculus

**ADVISING**

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Thomas Stanley · TAMU CS PhD student	Fall 2023 - current
Vedangi Bengali · TAMU CS PhD student	Fall 2021 - current
Nicholus Campbell · TAMU CS undergraduate	Fall 2023 - current
Octavio Almanza · TAMU CS undergraduate	Fall 2023 - current
Preston Piercy · TAMU CS undergraduate, <i>Completed Bachelor's Thesis, Spring 2023</i>	Fall 2022 - current
Sijing Yu · TAMU CS Master's student, <i>Graduated Summer 2023</i>	Fall 2021 - Summer 2023

**SERVICE**

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**Workshop organizer:** Texas A&M Institute for Data Science  
Workshop title: *TAMIDS Workshop on Network Science*

April 2023

**Workshop co-organizer:** IEEE International Conference on Data Mining (ICDM)  
Workshop title: *Machine Learning on Higher-Order Structured data (ML-HOS)*

November 2022

### Conference Program Committees

The Web Conference: 2019, 2020, 2021, 2022, 2023 (Best Reviewer Award)

NeurIPS: 2020, 2021

WSDM: 2022, 2023

KDD: 2022

AAAI (Senior PC Member): 2023, 2024

### Conference External Refereeing

ICALP: 2023

SODA: 2024

### Journal Reviewing

Science Advances

SIAM Journal on Matrix Analysis and Applications (SIMAX)

SIAM Journal on Scientific Computing (SISC)

SIAM Journal on Optimization (SIOPT)

Journal of Machine Learning Research (JMLR)

Signal Processing

Theoretical Computer Science

Mathematical Modelling and Numerical Analysis (ESAIM: M2NA)

Mathematics of Operations Research

Data Mining and Knowledge Discovery (DAMI)

IEEE Transactions of Knowledge and Data Engineering (TKDE)

Applied Network Science

## PRESS

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Coverage of our work on hypergraph data analysis:

A Group Effort (Communications of the ACM )

Coverage of our work on generalized hypergraph cut problems (co-author Austin Benson interviewed):

How Big Data Carried Graph Theory Into New Dimensions (Quanta Magazine)

Coverage about the SIAM ACDA Early Career Prize:

Veldt receives early career prize for notable contributions (TAMU CSE Department Article)

June Prize Spotlight (SIAM News Blog)

Coverage about our *Science Advances* paper on hypergraph homophily:

Gaining a deeper understanding of how we connect (Phys.org)

