

Benjamin (Ben) W. Priest

CONTACT INFORMATION	Graduate Student Thayer School of Engineering Dartmouth College	Cell: +1-937-681-1935 Fax: +1-603-646-3856 E-mail: benjamin.w.priest.th@dartmouth.edu
RESEARCH INTERESTS	Efficient analysis of large, dynamic datasets: streaming algorithms, sketching, machine learning, graph algorithms, numerical linear algebra, compressed sensing, high performance computing, graph theory, optimization, network analysis, and natural language processing	
EDUCATION	Thayer School of Engineering at Dartmouth College , Hanover, VT, USA Ph.D., Engineering (GPA 4.0) 09/2015 – 12/2018 (Projected) <ul style="list-style-type: none">- Advisor: Professor George Cybenko- Thesis: Sublinear Approximations of Vertex Centrality in Evolving Graphs- Demonstrated novel, sublinear-space sketching algorithms to efficiently estimate local triangle counts and vertex centrality on large, distributed graphs- Implemented novel HPC algorithms on cutting-edge architectures The Ohio State University , Columbus, OH, USA B.S., Mathematics, (GPA 3.62 <i>Cum Laude</i>) 09/2011 – 06/2011 B.S., Computer and Information Science, (GPA 3.62 <i>Cum Laude</i>) 09/2011 – 06/2011	
RESEARCH EXPERIENCE	Dartmouth College , Hanover, NH, USA Thayer School of Engineering . Advisor: Professor George Cybenko Research and Teaching Assistant 09/2015 – 12/2018 (Projected) <ul style="list-style-type: none">- Developed novel sublinear-space sketching algorithms to estimate popular centrality indices and local structural features including triangle counts in large distributed graphs- Contributed to Moving Target and Adaptive Cyber Defense research, designing game- and graph-theoretic models to quantify and track advanced persistent threats- Taught courses in applied machine learning, with an emphasis on deep learning while leading a team of TAs Lawrence Livermore National Laboratory , Livermore, CA, USA Center for Applied Scientific Computing . Supervisor: Dr. Roger Pearce Computation Student Intern 05/2018 – 12/2018 (Projected) <ul style="list-style-type: none">- Built novel distributed codes for estimating local triangle counts using cardinality sketches- Developed sophisticated communication protocols in a big-data environment- Improved performance of distributed algorithms with irregular computational load MIT Lincoln Laboratory , Lexington, MA, USA Cyber Analytics and Decision Systems. Supervisor: Dr. Kevin M. Carter Assistant Research Scientist 08/2011 – 07/2015 <ul style="list-style-type: none">- Designed and implemented novel machine learning algorithms to deduce human and machine behavior from network protocol traffic- Planned and implemented cognitive multi-agent systems to perform high-fidelity network traffic generation for network-scale simulation experiments- Evaluated moving target cyber defenses by building a multi-agent simulation platform Air Force Institute of Technology , Wright-Patterson Air Force Base, OH, USA Program Encryption Group. Supervisor: Professor J. Todd McDonald Engineering Technician GS-05 Summer, 2008 & 2009 <ul style="list-style-type: none">- Developed encryption metrics for circuits using abstract interpretation semantic models	

TECHNICAL
EXPERTISE

Mathematics

Applied Mathematics
Real Analysis
Measure Theory
Graph Theory
Combinatorics

Computer Science and Engineering

Distributed & parallel algorithms
Streaming algorithms & sketching
Data structures

Data Science and Processing

Probability & Random Variables
Statistics & Estimation
Machine learning & deep learning
Numerical Optimization
Stochastic Processes
Information Theory
Communication Theory

Programming Languages

C/C++, Java, MATLAB, R

Scripting Languages

Python, Bash, Julia

Distributed Computing

MPI, Hadoop MapReduce, Lustre

Analytical Software

Keras, TensorFlow, Mathematica

Utility Software

Git, GitHub/Bitbucket

L^AT_EX, B_IB_TE_X

Operating Systems

Apple OS X

Linux, RedHat, and other UNIX variants

Interpersonal

Teamwork and communication
Leadership and mentoring
Public and technical speaking

PEER-REVIEWED
CONFERENCE
PUBLICATIONS

- [1] **Benjamin W. Priest**, Roger Pearce, and Geoffrey Sanders. Estimating edge-local triangle count heavy hitters in edge-linear time and almost-vertex-linear space In *Proceedings of the IEEE High Performance Extreme Computing Conference*, HPEC. 2018.
- [2] Luan Hoy Pham, Massimiliano Albanese, and **Benjamin W. Priest**. A quantitative framework to model advanced persistent threats. In *Proceedings of the 15th International Conference on Security and Cryptography*, SECRIPT. 2018.
- [3] **Ben W. Priest**, Era Vuksani, Neal Wagner, Brady Tello, Kevin M. Carter, and William W. Streilein. Agent-based simulation in support of moving target cyber defense technology development and evaluation. In *Proceedings of the 18th Symposium on Communications & Networking, 2015 ACM Spring Simulation Multi-Conference*, CNS/SpringSim. 2015.
- [4] **Ben Priest** and Kevin M. Carter. Characterizing latent user interests on enterprise networks. In *Proceedings of the Twenty-Seventh International Florida Artificial Intelligence Research Society Conference*, FLAIRS. 2014.
- [5] Kevin M. Carter, Rajmonda S. Caceres, and **Ben Priest**. Latent community discovery through enterprise user search query modeling. In *Proceedings of the 37th International ACM SIGIR Conference on Research & Development in Information Retrieval*, SIGIR. 2014.
- [6] Kevin Gold, Zachary J. Weber, **Ben Priest**, Josh Ziegler, Karen Sittig, William W. Streilein, and Mark Mazumder. Modeling how thinking about the past and future impacts network traffic with the GOSMR architecture. In *International conference on Autonomous Agents and Multi-Agent Systems*, AAMAS. 2013.
- [7] **Ben Priest** and Kevin Gold. Utility discounting explains informational website traffic patterns before a hurricane. In *Proceedings of the 22nd International World Wide Web Conference*, WWW. 2013.
- [8] Kevin Gold, **Ben Priest**, and Kevin M. Carter An expectation maximization approach to detecting compromised remote access accounts. In *Proceedings of the Twenty-Sixth International Florida Artificial Intelligence Research Society Conference*, FLAIRS. 2013.

- PAPERS IN PREPARATION
- [9] **Benjamin W. Priest**, Roger Pearce, and Geoffrey Sanders. DegreeSketch: Distributed cardinality sketches on graphs, with applications to counting triangles. In *Proceedings of the 2018 World Wide Web Conference, WWW*. 2019. [Anticipated]
- [10] **Benjamin W. Priest**, Roger Pearce, and Geoffrey Sanders. You’ve Got Mail: Boosting performance of irregular distributed workloads using asynchronous collectives.
- OTHER CONFERENCE PUBLICATIONS
- [11] **Benjamin W. Priest** and George Cybenko. Approximating centrality in evolving graphs: toward sublinearity. In *Proceedings of the 2017 SPIE Defense + Security Conference, SPIE D+S*. 2017.
- [12] **Benjamin W. Priest** and George Cybenko. Efficient inference of hidden Markov models from large observation sequences. In *Proceedings of the 2016 SPIE Defense + Security Conference, SPIE D+S*. 2016.
- [13] Kevin M. Carter, Ramona S. Caceres and **Ben Priest**. Characterization of latent social networks discovered through computer network logs. In *Networks in the Social and Information Sciences workshop of the 29th Annual Conference on Neural Information Processing Systems, NIPS*. 2015.
- BOOK CHAPTERS
- [14] **Benjamin W. Priest**, George Cybenko, Satinder Singh, Massimiliano Albanese and Peng Liu. Online and Scalable Adaptive Cyber Defense. In: Michael Wellman (Ed.), *Adversarial and Uncertain Reasoning in Adaptive Cyber-Defense*, ch. 11, pp. xxx–xxx. 2019. Anticipated.
- CONFERENCE TALKS
- [15] **Benjamin W. Priest**, Roger Pearce, and Geoffrey Sanders. DegreeSketch: Distributed Cardinality Sketches on Graphs, with Applications to Counting Triangles. At: *2019 World Web Conference, WWW*. San Francisco, CA, USA, 13–17 May 2018. [Anticipated]
- [16] **Benjamin W. Priest** and George Cybenko Approximating centrality in evolving graphs: toward sublinearity. At: *2017 SPIE Defense + Security Conference, SPIE D+S*. Anaheim, CA, USA, 9–13 April 2017.
- [17] **Benjamin W. Priest** and George Cybenko Efficient Inference of hidden Markov models from large observations sequences. At: *2016 SPIE Defense + Security Conference, SPIE D+S*. Anaheim, CA, USA, 17–21 April 2016.
- [18] **Benjamin W. Priest**, Era Vuksani and Neal Wagner. Agent-based simulation in support of moving target cyber defense technology development and evaluation. At: *18th Symposium on Communications & Networking, 2015 ACM Spring Simulation Multi-Conference, CNS/SpringSim*. Alexandria, VA, USA, 12–15 April 2015.
- [19] **Benjamin W. Priest** and Kevin M. Carter. Characterizing latent user interests on enterprise networks. At: *2014 International Florida Artificial Intelligence Research Society Conference, FLAIRS*. Pensacola Beach, FL, USA, 21–23 May 2014.
- INVITED TALKS
- [20] **Benjamin W. Priest**. High-fidelity enterprise network emulation using the GOSMR architecture. In: *2014 MIT Lincoln Laboratory Cyber and Net-Centric Workshop, CNW*. June, 2014.
- CONFERENCE POSTER PRESENTATIONS
- [21] **Benjamin W. Priest**, Roger Pearce, and Geoffrey Sanders. Estimating edge-local triangle count heavy hitters in edge-linear time and almost-vertex-linear space. At: *GraphChallenge Workshop at the IEEE High Performance Extreme Computing Conference, HPEC*. 25–27 September 2018.
- [22] **Benjamin W. Priest**, Roger Pearce, and Geoffrey Sanders. Efficient Sublinear Estimation of Local Triangle Count Heavy Hitters. At: *2018 Summer Student Poster Symposium at Lawrence Livermore National Laboratory*. 9 August 2018.

- [23] Kevin M. Carter, Rajmonda Caceres and **Ben Priest** Characterization of latent social networks discovered through computer network logs. At: *Networks in the Social and Information Sciences workshop of the 29th Annual Conference on Neural Information Processing Systems*, NIPS. Montreal, Canada, 12 December 2015.
- [24] **Ben Priest** and Kevin Gold Utility discounting explains informational website traffic patterns before a hurricane. At: *22nd International World Wide Web Conference*, WWW. 2013. Rio de Janeiro, Brazil, 13–17 May 2013.

PROFESSIONAL
SERVICE

Conference Service

- Program Committee: 28th International AAAI Florida Artificial Intelligence Research Symposium Conference, FLAIRS-28. Hollywood, Florida, USA. May 18-20, 2015.

TEACHING
EXPERIENCE

Thayer School of Engineering at Dartmouth College, Hanover, VT, USA

Teaching Assistant

Instructor for ENGS/QBS 108: Applied Machine Learning **Autumn 2017**

- Collaborated with instructors to develop course curriculum aimed at graduate engineering and computer science students
- Designed and taught approximately twenty-five percent of the course lecture content, including all practical implementation content
- Led team of 4 teaching assistants
- Provided one-on-one assistance to students covering lecture topics
- Planned, wrote, and graded all student assignments

Instructor for ENGS 177: Decision Making Under Risk and Uncertainty **Winter 2017**

- Planned and taught a weekly recitation covering practical machine learning topics
- Provided ground and one-on-one assistance to students covering lecture topics
- Wrote student assignments with the assistance of the instructor and provided grading

The Ohio State University, Columbus, OH, USA

Teaching Assistant

Instructor for CSE 625: Automata and Formal Languages **Summer & Autumn 2010**

- Planned and taught a weekly recitation covering details and proofs of lecture topics
- Graded student assignments

Grader for CSE 560: System Software Design and Development **Summer 2010**

- Graded student assignments and held office hours

AWARDS

SECRYPT

Best Paper Award, 2018

MIT Lincoln Laboratory

Lincoln Scholar Program recipient, 2015
- (declined)

The Ohio State University

- Phi Beta Kappa Inductee, 2010
- Bingham Award in Philosophy, 2010
- Kenneth Cummings Scholarship, 2008–2011
- Distinguished Merit Scholarship, 2007–2011
- Ohio Academic Scholarship, 2007–2011

CITIZENSHIP

USA