

## Benjamin (Ben) W. Priest

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

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<sup>A</sup>T<sub>E</sub>X, B<sub>I</sub>B<sub>T</sub>E<sub>X</sub>

**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.

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

	[23] <b>Ben Priest</b> and Kevin Gold Utility discounting explains informational website traffic patterns before a hurricane. At: <i>22nd International World Wide Web Conference, WWW</i> . 2013. Rio de Janeiro, Brazil, 13–17 May 2013.	
BOOK CHAPTERS	[24] <b>Bejamin W. Priest</b> , George Cybenko, Satinder Singh, Massimiliano Albanese and Peng Liu. Online and Scalable Adaptive Cyber Defense. In: Michael Wellman (Ed.), <i>Adversarial and Uncertain Reasoning in Adaptive Cyber-Defense</i> , ch. 11, pp. xxx–xxx. 2019. Anticipated.	
PROFESSIONAL SERVICE	<b>Conference Service</b> <ul style="list-style-type: none"> <li>- Program Committee: 28th International AAAI Florida Artificial Intelligence Research Symposium Conference (FLAIRS-28). Hollywood, Florida, USA. May 18-20, 2015.</li> </ul>	
TEACHING EXPERIENCE	<b>Thayer School of Engineering at Dartmouth College</b> , Hanover, VT, USA <i>Teaching Assistant</i> <p>Instructor for ENGS/QBS 108: Applied Machine Learning <b>Autumn 2017</b></p> <ul style="list-style-type: none"> <li>- Collaborated with instructors to develop course curriculum aimed at graduate engineering and computer science students</li> <li>- Designed and taught approximately twenty-five percent of the course lecture content, including all practical implementation content</li> <li>- Led team of 4 teaching assistants</li> <li>- Provided one-on-one assistance to students covering lecture topics</li> <li>- Planned, wrote, and graded all student assignments</li> </ul> <p>Instructor for ENGS 177: Decision Making Under Risk and Uncertainty <b>Winter 2017</b></p> <ul style="list-style-type: none"> <li>- Planned and taught a weekly recitation covering practical machine learning topics</li> <li>- Provided ground and one-on-one assistance to students covering lecture topics</li> <li>- Wrote student assignments with the assistance of the instructor and provided grading</li> </ul> <b>The Ohio State University</b> , Columbus, OH, USA <i>Teaching Assistant</i> <p>Instructor for CSE 625: Automata and Formal Languages <b>Summer &amp; Autumn 2010</b></p> <ul style="list-style-type: none"> <li>- Planned and taught a weekly recitation covering details and proofs of lecture topics</li> <li>- Graded student assignments</li> </ul> <p>Grader for CSE 560: System Software Design and Development <b>Summer 2010</b></p> <ul style="list-style-type: none"> <li>- Graded student assignments and held office hours</li> </ul>	
AWARDS	<b>SECRYPT</b> Best Paper Award, 2018  <b>MIT Lincoln Laboratory</b> Lincoln Scholar Program recipient, 2015 - (declined)	<b>The Ohio State University</b> - 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	