# Benjamin (Ben) W. Priest

CONTACT
INFORMATION

Graduate Student
Thayer School of Engineering
Dartmouth College
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PROFESSIONAL
INTERESTS

**Space-efficient analysis of large, evolving datasets, especially graphs:** streaming algorithms, sketching, machine learning, network analysis, numerical linear algebra, compressed sensing, high performance computing, graph theory, optimization, and natural language processing

RESEARCH
EXPERIENCE

**Lawrence Livermore National Laboratory**, Livermore, CA, USA
**Center for Applied Scientific Computing**. Supervisor: Dr. Roger Pearce

*Computation Student Intern*      **April 2018 to September 2018 (Projected)**

- Developed an efficient software kernel for massively parallel sampling of random walks from large distributed graphs
- Improved scalability of existing analytics that depend on the sampling of random walks as a subroutine
- Implemented distributed, sublinear-space top-$k$ centrality estimation algorithms for several popular centrality indices
- Communicated research to professional audiences at conferences and seminars

**Dartmouth College**, Hanover, VT, USA
**Thayer School of Engineering**. Advisor: Professor George Cybenko

*Research Assistant*      **September 2015 to Present**

- Developed novel sublinear-space sketching-based algorithms to estimate popular centrality indices in large distributed graphs
- Proved linear communication-theoretic lower space bounds for bounded approximation of several popular centrality indices
- Communicated research to professional audiences at conferences and seminars

**MIT Lincoln Laboratory**, Lexington, MA, USA
Cyber Analytics and Decision Systems Group. Supervisor: Dr. Kevin M. Carter

*Assistant Research Scientist*      **August 2011 to July 2015**

- Developed novel machine learning algorithms to educe human and machine behavior from computer network protocol traffic
- Implemented cognitive multi-agent systems to perform high-fidelity network traffic generation for cyber range experiments
- Evaluated the network-level efficacy of "moving target" computer network defenses against modeled adversaries by developing a multi-agent simulation platform
- Integrated developed algorithms and analytics into a big data environment
- Communicated research to professional audiences at conferences and seminars

**Air Force Institute of Technology**, Wright-Patterson Air Force Base, OH, USA
Program Encryption Group. Supervisor: Professor J. Todd McDonald

*Engineering Technician GS-05*      **June to September, 2008 & 2009**

- Developed obfuscation metrics for combinatorial circuits using abstract interpretation-based software semantic models

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

Ph.D., Engineering **September 2015 to Present**
- Adviser: Professor George Cybenko
- Thesis: Sublinear Approximations of Vertex Centrality in Evolving Graphs

**The Ohio State University**, Columbus, OH, USA

B.S., Mathematics, *Cum Laude* **September 2011 to June 2011**

B.S., Computer and Information Science, *Cum Laude* **September 2011 to June 2011**

TECHNICAL
SKILLS

Big Data Ecosystems: Hadoop, MapReduce, HDFS and Elemental

Programming Languages: C/C++, Java

Scripting Languages: Python, XML and Bash

Numerical Analysis: MATLAB, Mathematica and R

Version Control: Git and VCS (CVS, SVN)

Editors: Emacs, Eclipse, IntelliJ and Vim

Typesetting: TEX (LaTeX, BIBTEX)

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
  - Provided ground and one-on-one assistance to students covering lecture topics
  - Planned, wrote, and graded 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
  - Graded student assignments

**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 Devlopment **Summer 2010**
  - Graded student assignments

PEER-REVIEWED
CONFERENCE
PUBLICATIONS

[1] Luan Hoy Pham, Massimiliano Albanese, and Benjamin W. Priest. Quantifying APT Malware. [In Preparation]. March, 2018.

[2] Luan Hoy Pham, Massimiliano Albanese, and Benjamin W. Priest. Dynamic Defense Placement Against Advanced Persistent Threats. [In Preparation]. March, 2018.

[3] Benjamin 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 2015 ACM Spring Simulation Multi-Conference - Communications and Networking Simulation Symposium*, SpringSim '15, 2015

[4] Benjamin 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, Pensacola Beach, Florida, May 21-23, 2014.*, 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 &#38; Development in Information Retrieval*, SIGIR '14, pages 871–874, 2014. ISBN 978-1-4503-2257-7

[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 '13, Saint Paul, MN, USA, May 6-10, 2013*, pages 127–134, 2013b

[7] 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, St. Pete Beach, Florida. May 22-24, 2013.*, 2013a

OTHER
CONFERENCE
PUBLICATIONS

[8] Benjamin W. Priest and George Cybenko. Approximating centrality in evolving graphs: toward sublinearity. In *Proceedings of the 2017 SPIE Defense and Security Conference*, SPIE '17. SPIE, 2017

[9] Benjamin W. Priest and George Cybenko. Efficient inference of hidden Markov models from large observation sequences. In *Proceedings of the 2016 SPIE Defense and Security Conference*, SPIE '16. SPIE, 2016

[10] Kevin M. Carter, Ramona S. Caceres and Benjamin W. 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)*, Montreal, Canada, December, 2015.

[11] Ben Priest and Kevin Gold. Utility discounting explains informational website traffic patterns before a hurricane. In *22nd International World Wide Web Conference, WWW '13, Rio de Janeiro, Brazil, May 13-17, 2013, Companion Volume*, pages 53–54, 2013

AWARDS

**MIT Lincoln Laboratory**
- Lincoln Scholar Program recipient, 2015 (declined)

**The Ohio State University**
- Phi Beta Kappa Inductee, 2010
- Mathematics Kenneth Cummings Scholarship, 2008–2011
- Distinguished Merit Scholarship, 2007–2011
- Ohio Academic Scholarhship, 2007-2011
- Bingham Award in Philosophy, 2010