Benjamin (Min) Wesley Priest (they/them)

CONTACT INFORMATION

Computing Scientist
Center for Applied Scientific Computing
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RESEARCH INTERESTS

Efficient analysis of large, dynamic datasets: sketching, streaming algorithms, machine learning, high performance computing, graph algorithms, numerical linear algebra, compressed sensing, graph theory, optimization, network analysis, and theory of deep learning.

EDUCATION

Thayer School of Engineering at **Dartmouth College**, Hanover, VT, USA
Ph.D., Engineering **09/2015 – 02/2019**
- Advisor: Professor George Cybenko
- Thesis: Sublinear Approximations of Vertex Centrality in Evolving Graphs

The Ohio State University, Columbus, OH, USA
B.S., Mathematics **09/2007 – 06/2011**
B.S., Computer and Information Science **09/2007 – 06/2011**

RESEARCH EXPERIENCE

Lawrence Livermore National Laboratory, Livermore, CA, USA
Center for Applied Scientific Computing. Supervisors: Geoff Sanders, Michael Schneider and Roger Pearce

Computing Scientist **02/2021 – present**
PI and Co-I of multiple research projects investigating scalable graph analytics, machine learning, and statistical modeling on High-Performance Computing (HPC) systems. Supervised 1 postdoc and more than a dozen graduate students. Selected research contributions include novel algorithms and software for scalable Gaussian process (GP) estimation [1], cosmology, climate, and space domain modeling [2], distributed subspace embedding and sketches [3], and distributed K nearest neighbors.

Postdoctoral Researcher **04/2019 – 02/2021**
Developed novel sketching algorithms to cluster [3] and perform local query approximation [4] massive graphs on HPC. Solved reinforcement learning [5], image classification [6], and quantum machine learning [7] problems using GPs and neural kernels.

Computation Student Intern **05/2018 – 01/2019**
Designed novel HPC communication library to accelerate non-traditional communications [8]. Used cardinality sketches to estimate local triangle counts in distributed graphs [9].

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

Research and Teaching Assistant **09/2015 – 02/2019**
Invented streaming approximation algorithms for several centrality indices on massive graphs using sketches. Designed game and graph-theoretic models for advanced persistent threats in cyber defense. Taught courses in machine learning and lead a team of TAs.

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

Assistant Research Scientist **08/2011 – 07/2015**
Modeled computer networks using novel machine learning algorithms. Developed multi-agent systems for high-fidelity network simulations and cyber defense evaluation.

AWARDS

- HPEC Graph Challenge Champion, 2020
- HPEC Graph Challenge Champion, 2019
- SECRYPT Best Paper Award, 2018

Most Closely Related Publications

[3] **Benjamin W Priest**, Alec Dunton, and Geoffrey Sanders. Scaling graph clustering with distributed sketches. In *2020 IEEE High Performance Extreme Computing Conference (HPEC)*, pages 1–7. IEEE, 2020

[4] **Benjamin W Priest**. Degreesketch: Distributed cardinality sketches on massive graphs with applications. *arXiv preprint arXiv:2004.04289*, 2020

[8] **Benjamin W Priest**, Trevor Steil, Geoffrey Sanders, and Roger Pearce. You've got mail (ygm): Building missing asynchronous communication primitives. In *2019 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, pages 221–230. IEEE, 2019

[10] Trevor Steil, Tahsin Reza, Keita Iwabuchi, **Benjamin W Priest**, Geoffrey Sanders, and Roger Pearce. TriPoll: computing surveys of triangles in massive-scale temporal graphs with metadata. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, pages 1–12, 2021

[11] Roger Pearce, Trevor Steil, **Benjamin W Priest**, and Geoffrey Sanders. One quadrillion triangles queried on one million processors. In *2019 IEEE High Performance Extreme Computing Conference (HPEC)*, pages 1–5. IEEE, 2019

Other Publications

[1] Amanda Muyskens, **Benjamin W Priest**, Imène Goumiri, and Michael Schneider. MuyGPs: Scalable Gaussian process hyperparameter estimation using local cross-validation. *arXiv preprint arXiv:2104.14581*, 2021

[2] Amanda L Muyskens, Imène R Goumiri, **Benjamin W Priest**, Michael D Schneider, Robert E Armstrong, Jason Bernstein, and Ryan Dana. Star–galaxy image separation with computationally efficient Gaussian process classification. *The Astronomical Journal*, 163(4):148, 2022

[9] **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 *2018 IEEE High Performance extreme Computing Conference (HPEC)*, pages 1–7. IEEE, 2018

[12] Alec M Dunton, **Benjamin W Priest**, and Amanda Muyskens. Fast Gaussian process posterior mean prediction via local cross validation and precomputation. *arXiv preprint arXiv:2205.10879*, 2022

[13] Trevor Steil, **Benjamin W Priest**, Geoffrey Sanders, Roger Pearce, Timothy La Fond, and Keita Iwabuchi. Distributed kronecker graph generation with ground truth of many graph properties. In *2019 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, pages 251–260. IEEE, 2019