EricBridgeford

Statistician

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languages

English, basic French

programming

Python, R, UNIX
Java, Matlab, SQL
C++, C, solidity, fabric
Javascript, CSS & HTML

tools

Rmarkdown, FSL, Git
jupyter, Docker, AWS,
Android, Django,
tidyverse

education

2018 – now **Ph.D.** in the Department of Biostatistics — Johns Hopkins University, Baltimore, MD
Principal Investigators: Joshua Vogelstein, Brian Caffo, Carey Priebe
Current work focuses on measurement error and measurement replicability; particularly, optimal strategies for maximizing replicability and mitigating batch effects in multivariate data
Coursework Includes: Probability Theory, Statistical Theory, Advanced Data Science, Bayesian Statistics, Graph Statistics, Statistical Methods, Financial Derivatives

2013 – 2017 **B.S.** in Biomedical Engineering and Computer Science
minor in Mathematics — Johns Hopkins University, Baltimore, MD
Thesis work supervised by Dr. Joshua T. Vogelstein on project entitled: Functional Neurodata Graphs Service: a One-Click Pipeline for the Reliable Estimation of Functional Connectomes.
Coursework Includes: High Dimensional Approximation, Statistical Learning and Signal Processing, Machine Learning, Probability and Statistics, Algorithms, Discrete Mathematics, Automata and Computation Theory, Systems Bioengineering, Statistical Mechanics and Thermodynamics, Object Oriented Software Engineering, Data Structures

2009 – 2013 **High School** La Salle College High School — Wyndmoor, PA

experience

Academic Experience

Positions

10/17 – now **Center for Imaging Science, Johns Hopkins University** — Baltimore, MD
Graduate Research Assistant under Joshua T. Vogelstein and Brian Caffo
Statistical work focusing on quantifying batch-effects and maximizing predictive inferences from graphs with applications to fMRI and dMRI connectomes.

08/14 – 05/17 **Center for Imaging Science, Johns Hopkins University** — Baltimore, MD
Undergraduate Researcher under Joshua T. Vogelstein
Design and implementation of an open-source, cloud-deployable fMRI and DWI pipeline for robust one-click analysis.

05/14 – 02/16 **Complex Systems Group, University of Pennsylvania** — Philadelphia, PA
Undergraduate Researcher under Danielle S. Bassett
Assisted in the development of novel network theory statistic and code package to compare the small worldness of weighted, real world networks.

Teaching

01/21 – now **School of Public Health, Johns Hopkins University** — Baltimore, MD
Project Advisor for Master's Capstone Projects under Dr. Marie Diener-West.

01/22 – 05/22 **Whiting School of Engineering, Johns Hopkins University** — Baltimore, MD
Provided lectures on network-valued data and applications to connectomics as part of Introduction to Computational Medicine undergraduate course.

08/20 – 12/20 **Department of Biostatistics, Johns Hopkins University** Baltimore, MD
Teaching Assistant for Advanced Data Science I/II, under Drs. Jeff Leek and Roger Peng.

08/17 – 05/18 **Biomedical Engineering Department, Johns Hopkins University** Baltimore, MD
Teaching Assistant for 580.437/697 Neuro Data Design 1 under Dr. Joshua Vogelstein.

01/17 – 05/17 **Computer Science Department, Johns Hopkins University** Baltimore, MD
Course Assistant for 600.475 Introduction to Machine Learning under Dr. Raman Arora.

Professional Experience

01/18 – 09/18 **Atana, Inc.** Baltimore, MD
Vice President of Engineering
As the Vice President of Engineering, I was responsible for contributing technological vision, coauthoring technical documents, and managing the software and data analytics teams. We raised $500,000 dollars through pre-seed funding, and the team has since reconsolidated as Operator.io, a Y-Combinator backed venture focused on enterprise expense tracking and cost mitigation. Vacated due to conflicts with graduate school.

Organizations and Volunteer Work

03/08 – 05/17 **Special Olympics Male Gymnastics Coach, Hatboro YMCA** Hatboro, PA
Volunteer work mentoring & coaching special needs gymnasts. Head male gymnastics coach from 03/11 – 05/14.

04/14 – 05/17 **Sigma Chi Fraternity, $\mathrm{K\Upsilon}$ Chapter** JHU, Baltimore, MD
Chapter Risk manager from 09/14 – 05/15.

awards

02/18 **b0x Sponsor Prize** ETHDenver, Denver, CO
developed Delphi, a framework for a decentralized oracle service between Hyperledger Fabric private networks and the Ethereum public network.

09/17 **JP Morgan and Booz Allen Hamilton Sponsor Prizes** JHU Hophacks, Baltimore, MD
developed Illuminate, an application that empowers verifiable, frictionless donations for worldwide disaster relief by leveraging the Ethereum public network at Hop Hacks.

05/17 **CS Departmental Honors with Thesis** JHU, Baltimore, MD
awarded for maintaining a cumulative GPA of 3.5 or higher within courses specific to the computer science department and acceptance of senior research thesis.

05/17 **BME Departmental Honors** JHU, Baltimore, MD
awarded for maintaining a cumulative GPA of 3.5 or higher within courses specific to the Biomedical Engineering department.

05/17 **General Honors** JHU, Baltimore, MD
awarded for maintaining cumulative GPA of 3.5 or higher.

09/14 – 05/17 **Martha A. Laverty Scholar** JHU, Baltimore, MD
Grant awarded for merit achievement.

05/15 – 05/17 **Dean's List** JHU, Baltimore, MD
Awarded for maintaining a GPA above a 3.5/4.0.

09/15 **Pennapps Everyblock Sponsor Prize** UPenn, Philadelphia, PA
Awarded for development of Strollsafe, an application that enables users to seamlessly view crime risk for a given area while maneuvering Philadelphia at University of Pennsylvania's PennApps.

05/13 **National Merit Finalist** LSCHS, Wyndmoor, PA
Awarded to the top 15,000 high school students nationally on basis of PSAT scores and academic achievement while a student La Salle College High School.

interests

professional: omics statistics, machine learning, graph classification, mixed-effects modeling, pipeline engineering, cloud computing, data analysis, neuroscience, reproducibility, timeseries analysis, semi-parametric modeling, blockchain, financial analysis, financial modelling, accounting.
personal: guitar, cooking, hiking, biking, rock climbing.

publications

Books

1. Hands on Network Machine Learning with Scikit-Learn and Graspologic

   Eric W. Bridgeford, Alex Loftus, Joshua T. Vogelstein

   In preparation (2022).

Under Review

1. Ting Xu, Jae Wook Cho, Gregory Kiar, **Eric W. Bridgeford**, Joshua T. Vogelstein, Michael P. Milham. "A Guide for Quantifying and Optimizing Measurement Reliability for the Study of Individual Differences". Jan. 2022.
2. Vivek Gopalakrishnan, Jaewon Chung, **Eric W. Bridgeford**, Benjamin D. Pedigo, Jess Arroyo, Lucy Upchurch, G. Allan Johnson, Nian Wang, Youngser Park, Carey E. Priebe, Joshua T. Vogelstein. "Discovery of Multi-Level Network Differences Across Populations of Heterogeneous Connectomes". Nov. 2020.
3. Zeyi Wang, **Eric W. Bridgeford**, Shangsi Wang, Joshua T. Vogelstein, Brian Caffo. "Statistical Analysis of Data Repeatability Measures". May 2020.
4. Gregory Kiar[†], **Eric W Bridgeford**[†], Will Gray Roncal[†], Consortium Reliability Reproducibility (CoRR), Vikram Chandrashakar, Disa Mhembere, Sephira Ryman, Xi-Nian Zuo, Daniel S Marguiles, R Cameron Craddock, Carey E Priebe, Rex Jung, Vince D Calhoun, Brian Caffo, Randal Burns, Michael P Milham, Joshua T Vogelstein. "A High-Throughput Pipeline Identifies Robust Connectomes But Troublesome Variability". 2018.

Articles Accepted to Peer-Reviewed Journals

1. Statistical Connectomics

   Jaewon Chung, **Eric W. Bridgeford**, Jess Arroyo, Benjamin D. Pedigo, Ali Saad-Eldin, Vivek Gopalakrishnan, Liang Xiang, Carey E. Priebe, Joshua T. Vogelstein

   Annu. Rev. Stat. Appl. 8.1 (Mar. 2021) pp. 463–492. Annual Reviews.

2. Eliminating accidental deviations to minimize generalization error and maximize replicability: applications in connectomics and genomics

   Eric W. Bridgeford, Shangsi Wang, Zhi Yang, Zeyi Wang, Ting Xu, Cameron Craddock, Jayanta Dey, Gregory Kiar, William Gray-Roncal, Carlo Colantuoni, Christopher Douville, Stephanie Noble, Carey E. Priebe, Brian Caffo, Michael Milham, Xi-Nian Zuo, Consortium for Reliability and Reproducibility, Joshua T. Vogelstein

   PLoS Computational Biology (July 2021) p. 802629.

[†] *co-first author*

3. The phantom alignment strength conjecture: practical use of graph matching alignment strength to indicate a meaningful graph match

   Donniell E. Fishkind, Felix Parker, Hamilton Sawczuk, Lingyao Meng, **Eric W. Bridgeford**, Avanti Athreya, Carey Priebe, Vince Lyzinski

   Appl. Network Sci. 6.1 (Dec. 2021) pp. 1–27. SpringerOpen.

4. Standardizing human brain parcellations

   Ross M. Lawrence, **Eric W. Bridgeford**, Patrick E. Myers, Ganesh C. Arvapalli, Sandhya C. Ramachandran, Derek A. Pisner, Paige F. Frank, Allison D. Lemmer, Aki Nikolaidis, Joshua T. Vogelstein

   Sci. Data 8.78 (Mar. 2021) pp. 1–9. Nature Publishing Group.

5. Diagnosing Data Analytic Problems in the Classroom

   Roger Peng, Athena Chen, **Eric W. Bridgeford**, Jeff Leek, Stephanie Hicks

   Journal of Statistics and Data Science Education (Aug. 2021).

6. Supervised dimensionality reduction for big data

   Joshua T. Vogelstein†, **Eric W. Bridgeford**†, Minh Tang, Da Zheng, Christopher Douville, Randal Burns, Mauro Maggioni

   Nat. Commun. 12.2872 (May 2021) pp. 1–9. Nature Publishing Group.

7. Vertex nomination: The canonical sampling and the extended spectral nomination schemes

   Jordan Yoder, Li Chen, Henry Pao, **Eric W. Bridgeford**, Keith Levin, Donniell E. Fishkind, Carey Priebe, Vince Lyzinski

   Comput. Statist. Data Anal. 145 (May 2020) p. 106916. North-Holland.

8. GraSPy: Graph Statistics in Python

   Jaewon Chung, Benjamin D. Pedigo, **Eric W. Bridgeford**, Bijan K. Varjavand, Hayden S. Helm, Joshua T. Vogelstein

   Journal of Machine Learning Research (JMLR) (Jan. 2019).

9. On a two-truths phenomenon in spectral graph clustering

   Carey E. Priebe, Youngser Park, Joshua T. Vogelstein, John M. Conroy, Vince Lyzinski, Minh Tang, Avanti Athreya, Joshua Cape, **Eric W. Bridgeford**

   Proc. Natl. Acad. Sci. U.S.A. 116.13 (Mar. 2019) pp. 5995–6000. National Academy of Sciences.

10. Connectal coding: discovering the structures linking cognitive phenotypes to individual histories

    Joshua T. Vogelstein, Eric W. Bridgeford, Benjamin D. Pedigo, Jaewon Chung, Keith Levin, Brett Mensh, Carey E. Priebe

    Curr. Opin. Neurobiol. 55 (Apr. 2019) pp. 199–212. Elsevier Current Trends.

11. Discovering and deciphering relationships across disparate data modalities

    Joshua T. Vogelstein, **Eric W. Bridgeford**, Qing Wang, Carey E. Priebe, Mauro Maggioni, Cencheng Shen

    eLife (Jan. 2019). eLife Sciences Publications, Ltd.

12. A community-developed open-source computational ecosystem for big neuro data

    Joshua T. Vogelstein, Eric Perlman, Benjamin Falk, Alex Baden, William Gray Roncal, Vikram Chandrashekhar, Forrest Collman, Sharmishtaa Seshamani, Jesse L. Patsolic, Kunal Lillaney, Michael Kazhdan, Robert Hider, Derek Pryor, Jordan Matelsky, Timothy Gion, Priya Manavalan, Brock Wester, Mark Chevillet, Eric T. Trautman, Khaled Khairy, **Eric W. Bridgeford**, Dean M. Kleissas, Daniel J. Tward, Ailey K. Crow, Brian Hsueh, Matthew A. Wright, Michael I. Miller, Stephen J. Smith, R. Jacob Vogelstein, Karl Deisseroth, Randal Burns

Nat. Methods 15.11 (Nov. 2018) pp. 846–847. Nature Publishing Group.

13. Small-World Propensity and Weighted Brain Networks

    Sarah Feldt Muldoon, **Eric W. Bridgeford**, Danielle S. Bassett

    Sci. Rep. 6.22057 (Feb. 2016) pp. 1–13. Nature Publishing Group.

Conference Posters

1. A Principled Approach to Statistical Connectomics and Mega-Analysis

   Gregory Kiar, William R Gray Roncal, Disa Mhembere, **Eric W Bridgeford**, Shan gsi Wang, Carey Priebe, Randal Burns, Joshua T Vogelstein

   Organization for Human Brain Mapping (OHBM) (June 2018).

2. MRImages to Graphs: A One Click Community Pipeline for MR Connectome Analysis

   Eric W Bridgeford, Gregory Kiar, Will Gray Roncal, Disa Mehembre, Randal Burns, Joshua T Vogelstein

   Institute for Computational Medicine Poster Session (2015).

3. Community Connectomics via Cloud Computing Utilizing m2g - a Reference Pipeline

   Gregory Kiar, et al.

   Organization for Human Brain Mapping (OHBM) (2015).

4. Quantifying Small Worldness in Weighted Brain Networks: Small-World Propensity

   Sarah Muldoon, **Eric W Bridgeford**, Danielle Bassett

   Society for Neuroscience (SfN) (Oct. 2015).

5. The Open Connectome Project & NeuroData: Enabling Data Driven Neuroscience at Scale

   Joshua T. Vogelstein, et al.

   Society for Neuroscience (SfN) (Oct. 2015).

Talks

1. Hands on Network Machine Learning with Scikit-Learn and Graspologic

   Institute of Computational Medicine Invited Speaker (2022).

2. Unsupervised Machine Learning with Connectomics Data

   ABCD Reproducible Neuroimaging Course (2022).

3. Neurodata MRI Graphs Pipeline

   Organization of Human Brain Mapping (2018).

4. A Principled Approach to Statistical Connectomics and Mega-Analysis

   Organization of Human Brain Mapping (2018).

5. Cross Modality Connectome Properties

   Joshua T Vogelstein, **Eric W. Bridgeford**

   (2017).

6. From the Functional Brain to the Connectome: An Introduction to Neuroscience Research in the 21st Century

   JHU Splash (2016).

Software Packages

1. GraSPy: Graph Statistics in Python

   Jaewon Chung, Benjamin D Pedigo, **Eric W Bridgeford**, Bijan K Varjavand, Hayden Helm, Joshua T Vogelstein

   Pypi (May 2018).

2. Multiscale Graph Correlation

   Eric W Bridgeford, Censheng Shen, Shangsi Wang, Joshua Vogelstein

   CRAN Package (May 2018).

3. Linear Optimal Low-Rank Projection

   Eric W Bridgeford, Minh Tang, Jason Yim, Joshua T Vogelstein

   CRAN Package (May 2018).

4. Statistical Learning Benchmarks

   Eric W. Bridgeford, Joshua Vogelstein

   R package (2018).

5. Graphstats

   Eric W. Bridgeford, Joshua Vogelstein

   R package (2017).

6. Neurodata MRI Graphs

   Gregory Kiar†, **Eric Bridgeford**†, Will Gray Roncal, Vikram Chandrashekhar, Disa Mhembere, Joshua Vogelstein

   python package (2017).