

Assistant Professor,
Department of Biomedical Engineering
Johns Hopkins University
✉ jovo@jhu.edu
📄 jovo.me

Joshua T. Vogelstein

Personal Information

Primary Appointment

08/14 – **Assistant Professor**, Department of Biomedical Engineering, JHU.

Joint Appointments

09/19 – **Joint Appointment**, Department of Biostatistics, Johns Hopkins University (JHU).

08/15 – **Joint Appointment**, Department of Applied Mathematics and Statistics, JHU.

08/14 – **Joint Appointment**, Department of Neuroscience, JHU.

08/14 – **Joint Appointment**, Department of Computer Science, JHU.

Institutional and Center Appointments

08/15 – **Steering Committee**, Kavli Neuroscience Discovery Institute (KNDI).

08/14 – **Core Faculty**, Institute for Computational Medicine, JHU.

08/14 – **Core Faculty**, Center for Imaging Science, JHU.

08/14 – **Assistant Research Faculty**, Human Language Technology Center of Excellence, JHU.

10/12 – **Affiliated Faculty**, Institute for Data Intensive Engineering and Sciences, JHU.

Education & Training

2003 – 2009 **Ph.D in Neuroscience**, Johns Hopkins School of Medicine,

Advisor: Eric Young,

Thesis: OOPSI: a family of optical spike inference algorithms for inferring neural connectivity from population calcium imaging .

2009 – 2009 **M.S. in Applied Mathematics & Statistics**, Johns Hopkins University.

1998 – 2002 **B.A. in Biomedical Engineering**, Washington University, St. Louis.

Academic Experience

08/18 – **Director of Biomedical Data Science Focus Area**, Department of Biomedical Engineering, Johns Hopkins University.

05/16 – **Visiting Scientist**, Howard Hughes Medical Institute, Janelia Research Campus.

10/12 – 08/14 **Endeavor Scientist**, Child Mind Institute.

08/12 – 08/14 **Affiliated Faculty**, Kenan Institute for Ethics.
Duke University

08/12 – 08/14 **Adjunct Faculty**, Department of Computer Science, Johns Hopkins University.

12/09 – 01/11 **Post-Doctoral Fellow**, Department of Applied Mathematics and Statistics, Supervised by Carey E. Priebe, Johns Hopkins University.
Research Statistics of populations of networks.

06/01 – 09/01 **Research Assistant**, Prof. Randy O'Reilly, Dept. of Psychology.
University of Colorado

06/00 – 09/00 **Clinical Engineer**, Johns Hopkins Hospital.

06/99 – 08/99 **Research Assistant under Dr. Jeffrey Williams**, Dept. of Neurosurgery, Johns Hopkins Hospital.

06/98 – 08/98 **Research Assistant under Professor Kathy Cho**, Dept. of Pathology, Johns Hopkins School of Medicine.

Publications

Published (Peer-Reviewed Research Articles)

Note: CV author in bold; Trainees in italics,

(55 papers; top 10 cited 3,128 times; H-index 30; 11 first, 10 last, 55 middle authorships) as of 2020/01/28

- [55] *Shangsi Wang, Jesús Arroyo, Joshua T Vogelstein*, and Carey E Priebe. “Joint Embedding of Graphs”. In: *Transactions on Pattern Analysis and Machine Intelligence* in press (Oct. 2019). URL: <http://arxiv.org/abs/1703.03862>.
- [54] *Youjin Lee, Cencheng Shen*, Carey E Priebe, and **Joshua T Vogelstein**. “Network dependence testing via diffusion maps and distance-based correlations”. In: *Biometrika* (Sept. 2019). ISSN: 0006-3444. DOI: [10.1093/biomet/asz045](https://doi.org/10.1093/biomet/asz045). arXiv: [1703.10136](https://arxiv.org/abs/1703.10136). URL: <https://doi.org/10.1093/biomet/asz045>.
- [53] *Jaewon Chung, Benjamin D. Pedigo, Eric W. Bridgeford, Bijan K. Varjavand*, and **Joshua T. Vogelstein**. “GraSPy: Graph Statistics in Python”. In: *Journal of Machine Learning Research* 20.158 (Apr. 2019), pp. 1–7. eprint: <https://arxiv.org/abs/1904.05329>. URL: <http://jmlr.org/papers/v20/19-490.html>.
- [52] **Joshua T. Vogelstein**, *Eric W. Bridgeford, Benjamin D. Pedigo, Jaewon Chung*, Keith Levin, Brett Mensh, and Carey E. Priebe. “Connectal Coding: Discovering the Structures Linking Cognitive Phenotypes to Individual Histories”. In: *Current Opinion in Neurobiology* 55 (Apr. 2019), pp. 199–212. ISSN: 18736882. DOI: [10.1016/j.conb.2019.04.005](https://doi.org/10.1016/j.conb.2019.04.005). URL: <https://doi.org/10.1016/j.conb.2019.04.005>.
- [51] Jake J. Son, Jon C. Clucas, Curt White, Anirudh Krishnakumar, **Joshua T. Vogelstein**, Michael P. Milham, and Arno Klein. “Thermal sensors improve wrist-worn position tracking”. In: *npj digital medicine* 2.1 (Feb. 2019). ISSN: 2398-6352. DOI: [10.1038/s41746-019-0092-2](https://doi.org/10.1038/s41746-019-0092-2). URL: <https://doi.org/10.1038/s41746-019-0092-2>.
- [50] Carey E. Priebe, Youngser Park, **Joshua T. Vogelstein**, John M. Conroy, Vince Lyzinski, Minh Tang, Avanti Athreya, Joshua Cape, and *Eric Bridgeford*. “On a two-truths phenomenon in spectral graph clustering”. In: *Proceedings of the National Academy of Sciences of the United States of America* 116.13 (Feb. 2019), pp. 5995–6000. ISSN: 10916490. DOI: [10.1073/pnas.1814462116](https://doi.org/10.1073/pnas.1814462116). arXiv: [1808.07801](https://arxiv.org/abs/1808.07801). URL: <https://www.pnas.org/content/early/2019/03/07/1814462116.short>.
- [49] **Joshua T. Vogelstein**, *Eric W. Bridgeford*, Qing Wang, Carey E. Priebe, Mauro Maggioni, and *Cencheng Shen*. “Discovering and deciphering relationships across disparate data modalities”. In: *eLife* 8 (Jan. 2019). ISSN: 2050084X. DOI: [10.7554/eLife.41690](https://doi.org/10.7554/eLife.41690). arXiv: [1609.05148](https://arxiv.org/abs/1609.05148). URL: <https://elifesciences.org/articles/41690>.
- [48] Runze Tang, Michael Ketcha, Alexandra Badea, Evan D Calabrese, Daniel S Margulies, **Joshua T Vogelstein**, Carey E Priebe, and Daniel L Sussman. “Connectome Smoothing via Low-rank Approximations”. In: *Transactions in Medical Imaging* (Dec. 2018). URL: <https://ieeexplore.ieee.org/document/8570772>.
- [47] *Cencheng Shen*, Carey E Priebe, and **Joshua T Vogelstein**. “From Distance Correlation to Multiscale Graph Correlation”. In: *Journal of the American Statistical Association* (Oct. 2018). URL: <https://www.tandfonline.com/doi/full/10.1080/01621459.2018.1543125>.
- [46] **Joshua T. Vogelstein**, Eric Perlman, Benjamin Falk, *Alex Baden*, William Gray Roncal, *Vikram Chandrashekhar*, Forrest Collman, Sharmishta 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 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, and Randal Burns. “A Community-Developed Open-Source Computational Ecosystem for Big Neuro Data”. In: *Nature Methods* 15.11 (Oct. 2018), pp. 846–847. ISSN: 15487105. DOI: [10.1038/s41592-018-0181-1](https://doi.org/10.1038/s41592-018-0181-1). arXiv: [1804.02835](https://arxiv.org/abs/1804.02835). URL: <https://www.nature.com/articles/s41592-018-0181-1>.

- [45] Avanti Athreya, Donniell E. Fishkind, Minh Tang, Carey E. Priebe, Youngser Park, **Joshua T. Vogelstein**, Keith Levin, Vince Lyzinski, Yichen Qin, and Daniel L. Sussman. “Statistical Inference on Random Dot Product Graphs: a Survey”. In: *Journal of Machine Learning Research* 18 (May 2018), pp. 1–92. ISSN: 15337928. arXiv: [1709.05454](https://arxiv.org/abs/1709.05454). URL: <http://jmlr.org/papers/v18/17-448.html>.
- [44] Joshua D. Cohen, Lu Li, Yuxuan Wang, Christopher Thoburn, Bahman Afsari, Ludmila Danilova, Christopher Douville, Ammar A. Javed, Fay Wong, Austin Mattox, Ralph H. Hruban, Christopher L. Wolfgang, Michael G. Goggins, Marco Dal Molin, Tian Li Wang, Richard Roden, Alison P. Klein, Janine Ptak, Lisa Dobbyn, Joy Schaefer, Natalie Silliman, Maria Popoli, **Joshua T. Vogelstein**, James D. Browne, Robert E. Schoen, Randall E. Brand, Jeanne Tie, Peter Gibbs, Hui Li Wong, Aaron S. Mansfield, Jin Jen, Samir M. Hanash, Massimo Falconi, Peter J. Allen, Shibin Zhou, Chetan Bettegowda, Luis A. Diaz, Cristian Tomasetti, Kenneth W. Kinzler, Bert Vogelstein, Anne Marie Lennon, and Nickolas Papadopoulos. “Detection and localization of surgically resectable cancers with a multi-analyte blood test”. In: *Science* 359.6378 (Feb. 2018), pp. 926–930. ISSN: 10959203. DOI: [10.1126/science.aar3247](https://doi.org/10.1126/science.aar3247). URL: <https://doi.org/10.1126/science.aar3247>.
- [43] Daniele Durante, David B. Dunson, and **Joshua T. Vogelstein**. “Rejoinder: Nonparametric Bayes Modeling of Populations of Networks”. In: *Journal of the American Statistical Association* 112 (Oct. 2017). ISSN: 0162-1459. DOI: [10.1080/01621459.2017.1395643](https://doi.org/10.1080/01621459.2017.1395643). URL: <https://doi.org/10.1080/01621459.2017.1395643>.
- [42] Gregory Kiar, Krzysztof J. Gorgolewski, Dean Kleissas, William Gray Roncal, Brian Litt, Brian Wandell, Russel A. Poldrack, Martin Wiener, R. Jacob Vogelstein, Randal Burns, and **Joshua T. Vogelstein**. “Science in the cloud (SIC): A use case in MRI connectomics”. In: *GigaScience* 6.5 (May 2017), pp. 1–10. ISSN: 2047-217X. DOI: [10.1093/gigascience/gix013](https://doi.org/10.1093/gigascience/gix013). arXiv: [1610.08484](https://arxiv.org/abs/1610.08484). URL: <https://academic.oup.com/gigascience/article-lookup/doi/10.1093/gigascience/gix013>.
- [41] Shaojie Chen, Kai Liu, Yuguang Yang, Yuting Xu, Seonjoo Lee, Martin Lindquist, Brian S. Caffo, and **Joshua T. Vogelstein**. “An M-estimator for reduced-rank system identification”. In: *Pattern Recognition Letters* 86 (Jan. 2017), pp. 76–81. ISSN: 0167-8655. DOI: [10.1016/J.PATREC.2016.12.012](https://doi.org/10.1016/J.PATREC.2016.12.012). URL: <https://www.sciencedirect.com/science/article/pii/S0167865516303671>.
- [40] Anish K. Simhal, Cecilia Aguerrebere, Forrest Collman, **Joshua T. Vogelstein**, Kristina D. Micheva, Richard J. Weinberg, Stephen J. Smith, and Guillermo Sapiro. “Probabilistic fluorescence-based synapse detection”. In: *PLoS Computational Biology* 13.4 (2017). DOI: [10.1371/journal.pcbi.1005493](https://doi.org/10.1371/journal.pcbi.1005493). URL: <https://doi.org/10.1371/journal.pcbi.1005493>.
- [39] Da Zheng, Disa Mhembere, Vince Lyzinski, **Joshua T. Vogelstein**, Carey E. Priebe, and Randal Burns. “Semi-external memory sparse matrix multiplication for billion-node graphs”. In: *IEEE Transactions on Parallel and Distributed Systems* 28.5 (2017), pp. 1470–1483. ISSN: 10459219. DOI: [10.1109/TPDS.2016.2618791](https://doi.org/10.1109/TPDS.2016.2618791). arXiv: [1602.02864](https://arxiv.org/abs/1602.02864). URL: <https://ieeexplore.ieee.org/abstract/document/7593270>.
- [38] Cencheng Shen, **Joshua T. Vogelstein**, and Carey E. Priebe. “Manifold matching using shortest-path distance and joint neighborhood selection”. In: *Pattern Recognition Letters* 92 (2017), pp. 41–48. ISSN: 01678655. DOI: [10.1016/j.patrec.2017.04.005](https://doi.org/10.1016/j.patrec.2017.04.005). arXiv: [1412.4098](https://arxiv.org/abs/1412.4098). URL: <http://www.sciencedirect.com/science/article/pii/S016786551730106X>.
- [37] Norbert Binkiewicz, **Joshua T. Vogelstein**, and Karl Rohe. “Covariate-assisted spectral clustering”. In: *Biometrika* 104.2 (2017), pp. 361–377. ISSN: 14643510. DOI: [10.1093/biomet/asx008](https://doi.org/10.1093/biomet/asx008). arXiv: [1411.2158](https://arxiv.org/abs/1411.2158). URL: <https://doi.org/10.1093/biomet/asx008>.
- [36] Daniele Durante, David B. Dunson, and **Joshua T. Vogelstein**. “Nonparametric Bayes Modeling of Populations of Networks”. In: *Journal of the American Statistical Association* 112.520 (2017), pp. 1516–1530. ISSN: 1537274X. DOI: [10.1080/01621459.2016.1219260](https://doi.org/10.1080/01621459.2016.1219260). arXiv: [1406.7851](https://arxiv.org/abs/1406.7851). URL: <https://doi.org/10.1080/01621459.2016.1219260>.

- [35] Qing Wang, Ming Zhang, Tyler Tomita, **Joshua T. Vogelstein**, Shibin Zhou, Nickolas Papadopoulos, Kenneth W. Kinzler, and Bert Vogelstein. “Selected reaction monitoring approach for validating peptide biomarkers”. In: *Proceedings of the National Academy of Sciences of the United States of America* 114.51 (2017), pp. 13519–13524. ISSN: 10916490. DOI: [10.1073/pnas.1712731114](https://doi.org/10.1073/pnas.1712731114). URL: <http://www.pnas.org/content/114/51/13519.short>.
- [34] David Grant Colburn Hildebrand, Marcelo Cicconet, Russel Miguel Torres, Woohyuk Choi, Tran Minh Quan, Jungmin Moon, Arthur Willis Wetzel, Andrew Scott Champion, Brett Jesse Graham, Owen Randlett, George Scott Plummer, Ruben Portugues, Isaac Henry Bianco, Stephan Saalfeld, *Alexander David Baden*, Kunal Lillaney, Randal Burns, **Joshua Tzvi Vogelstein**, Alexander Franz Schier, Wei Chung Allen Lee, Won Ki Jeong, Jeff William Lichtman, and Florian Engert. “Whole-brain serial-section electron microscopy in larval zebrafish”. In: *Nature* 545.7654 (2017), pp. 345–349. ISSN: 14764687. DOI: [10.1038/nature22356](https://doi.org/10.1038/nature22356). URL: <https://doi.org/10.1038/nature22356>.
- [33] Danai Koutra, Neil Shah, **Joshua T. Vogelstein**, Brian Gallagher, and Christos Faloutsos. “DeltaCon: Principled Massive-Graph Similarity Function with Attribution”. In: *ACM Transactions on Knowledge Discovery from Data* 10.3 (Feb. 2016). ISSN: 1556-4681. DOI: [10.1145/2824443](https://doi.org/10.1145/2824443). URL: <http://doi.acm.org/10.1145/2824443>.
- [32] Vince Lyzinski, Donniell E. Fishkind, Marcelo Fiori, **Joshua T. Vogelstein**, Carey E. Priebe, and Guillermo Sapiro. “Graph Matching: Relax at Your Own Risk”. In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 38.1 (Jan. 2016), pp. 60–73. ISSN: 01628828. DOI: [10.1109/TPAMI.2015.2424894](https://doi.org/10.1109/TPAMI.2015.2424894). arXiv: [1405.3133](https://arxiv.org/abs/1405.3133). URL: <http://doi.org/10.1109/TPAMI.2015.2424894>.
- [31] Eva L. Dyer, *William Gray Roncal*, Hugo L. Fernandes, Doga Gürsoy, Vincent De Andrade, Rafael Vescovi, Kamel Fezzaa, Xianghui Xiao, **Joshua T. Vogelstein**, Chris Jacobsen, Konrad P. Körding, and Narayanan Kasthuri. “Quantifying Mesoscale Neuroanatomy Using X-Ray Microtomography”. In: *eNeuro* 4 (2016). ISSN: 2373-2822. DOI: [10.1523/ENEURO.0195-17.2017](https://doi.org/10.1523/ENEURO.0195-17.2017). eprint: [1604.03629](https://doi.org/10.1523/ENEURO.0195-17.2017). URL: <https://doi.org/10.1523/ENEURO.0195-17.2017>.
- [30] Raag D. Airan, **Joshua T. Vogelstein**, Jay J. Pillai, Brian Caffo, James J. Pekar, and Haris I. Sair. “Factors affecting characterization and localization of interindividual differences in functional connectivity using MRI”. In: *Human Brain Mapping* 37.5 (2016), pp. 1986–1997. ISSN: 10970193. DOI: [10.1002/hbm.23150](https://doi.org/10.1002/hbm.23150). URL: <http://dx.doi.org/10.1002/hbm.23150>.
- [29] Li Chen, Cencheng Shen, **Joshua T. Vogelstein**, and Carey E. Priebe. “Robust Vertex Classification”. In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 38.3 (2016), pp. 578–590. ISSN: 01628828. DOI: [10.1109/TPAMI.2015.2456913](https://doi.org/10.1109/TPAMI.2015.2456913). URL: <http://dx.doi.org/10.1109/TPAMI.2015.2456913>.
- [28] Carey E. Priebe, Daniel L. Sussman, Minh Tang, and **Joshua T. Vogelstein**. “Statistical Inference on Errorfully Observed Graphs”. In: *Journal of Computational and Graphical Statistics* 24.4 (Oct. 2015), pp. 930–953. ISSN: 15372715. DOI: [10.1080/10618600.2014.951049](https://doi.org/10.1080/10618600.2014.951049). arXiv: [1211.3601](https://arxiv.org/abs/1211.3601). URL: <https://doi.org/10.1080/10618600.2014.951049>.
- [27] Kristen M. Harris, Josef Spacek, Maria Elizabeth Bell, Patrick H. Parker, Laurence F. Lindsey, Alexander D. Baden, **Joshua T. Vogelstein**, and Randal Burns. “A resource from 3D electron microscopy of hippocampal neuropil for user training and tool development”. In: *Scientific Data* 2 (2015). ISSN: 20524463. DOI: [10.1038/sdata.2015.46](https://doi.org/10.1038/sdata.2015.46). URL: <https://doi.org/10.1038/sdata.2015.46>.
- [26] Li Chen, **Joshua T. Vogelstein**, Vince Lyzinski, and Carey E. Priebe. “A Joint Graph Inference Case Study: the C.elegans Chemical and Electrical Connectomes”. In: *Worm* 5 (2015). ISSN: 2162-4054. DOI: [10.1080/21624054.2016.1142041](https://doi.org/10.1080/21624054.2016.1142041). eprint: [1507.08376](https://arxiv.org/abs/1507.08376). URL: <http://arxiv.org/abs/1507.08376>.
- [25] *William R. Gray Roncal*, Dean M. Kleissas, **Joshua T. Vogelstein**, Priya Manavalan, Kunal Lillaney, Michael Pekala, Randal Burns, R. Jacob Vogelstein, Carey E. Priebe, Mark A. Chevillet, and Gregory D. Hager. “An automated images-to-graphs framework for high resolution connectomics”. In: *Frontiers in Neuroinformatics* 9 (2015). ISSN: 1662-5196. DOI: [10.3389/fninf.2015.00020](https://doi.org/10.3389/fninf.2015.00020). URL: <http://journal.frontiersin.org/article/10.3389/fninf.2015.00020>.

- [24] **Joshua T. Vogelstein**, John M. Conroy, Vince Lyzinski, Louis J. Podrazik, Steven G. Kratzer, Eric T. Harley, Donniell E. Fishkind, R. Jacob Vogelstein, and Carey E. Priebe. “Fast Approximate Quadratic programming for graph matching”. In: *PLoS ONE* 10.4 (2015). ISSN: 19326203. DOI: [10.1371/journal.pone.0121002](https://doi.org/10.1371/journal.pone.0121002). URL: <http://dx.doi.org/10.1371/journal.pone.0121002>.
- [23] **Joshua T. Vogelstein** and Carey E. Priebe. “Shuffled Graph Classification: Theory and Connectome Applications”. In: *Journal of Classification* 32.1 (2015), pp. 3–20. ISSN: 14321343. DOI: [10.1007/s00357-015-9170-6](https://doi.org/10.1007/s00357-015-9170-6). arXiv: [1112.5506](https://arxiv.org/abs/1112.5506). URL: <https://doi.org/10.1007/s00357-015-9170-6>.
- [22] Vince Lyzinski, Daniel L. Sussman, Donniell E. Fishkind, Henry Pao, Li Chen, **Joshua T. Vogelstein**, Youngser Park, and Carey E. Priebe. “Spectral clustering for divide-and-conquer graph matching”. In: *Parallel Computing* 47 (2015), pp. 70–87. ISSN: 01678191. DOI: [10.1016/j.parco.2015.03.004](https://doi.org/10.1016/j.parco.2015.03.004). arXiv: [1310.1297](https://arxiv.org/abs/1310.1297). URL: <https://doi.org/10.1016/j.parco.2015.03.004>.
- [21] Narayanan Kasthuri, Kenneth Jeffrey Hayworth, Daniel Raimund Berger, Richard Lee Schalek, José Angel Conchello, Seymour Knowles-Barley, Dongil Lee, Amelio Vázquez-Reina, Verena Kaynig, Thouis Raymond Jones, Mike Roberts, Josh Lyskowski Morgan, Juan Carlos Tapia, H. Sebastian Seung, William Gray Roncal, **Joshua Tzvi Vogelstein**, Randal Burns, Daniel Lewis Sussman, Carey Eldin Priebe, Hanspeter Pfister, and Jeff William Lichtman. “Saturated Reconstruction of a Volume of Neocortex”. In: *Cell* 162.3 (2015), pp. 648–661. ISSN: 10974172. DOI: [10.1016/j.cell.2015.06.054](https://doi.org/10.1016/j.cell.2015.06.054). URL: <https://doi.org/10.1016/j.cell.2015.06.054>.
- [20] David E. Carlson, **Joshua T. Vogelstein**, Qisong Wu, Wenzhao Lian, Mingyuan Zhou, Colin R. Stoetznner, Daryl Kipke, Douglas Weber, David B. Dunson, and Lawrence Carin. “Multichannel Electrophysiological Spike Sorting via Joint Dictionary Learning and Mixture Modeling”. In: *IEEE Transactions on Biomedical Engineering* 61.1 (Jan. 2014), pp. 41–54. ISSN: 0018-9294. DOI: [10.1109/TBME.2013.2275751](https://doi.org/10.1109/TBME.2013.2275751). arXiv: [1304.0542](https://arxiv.org/abs/1304.0542). URL: <http://ieeexplore.ieee.org/document/6571240/>.
- [19] Nicholas C. Weiler, Forrest Collman, **Joshua T. Vogelstein**, Randal Burns, and Stephen J. Smith. “Synaptic molecular imaging in spared and deprived columns of mouse barrel cortex with array tomography”. In: *Scientific Data* 1 (2014). ISSN: 20524463. DOI: [10.1038/sdata.2014.46](https://doi.org/10.1038/sdata.2014.46). URL: <http://www.nature.com/articles/sdata201446>.
- [18] Elizabeth M. Sweeney, **Joshua T. Vogelstein**, Jennifer L. Cuzzocreo, Peter A. Calabresi, Daniel S. Reich, Ciprian M. Crainiceanu, and Russell T. Shinohara. “A comparison of supervised machine learning algorithms and feature vectors for MS lesion segmentation using multimodal structural MRI”. In: *PLoS ONE* 9.4 (2014). ISSN: 19326203. DOI: [10.1371/journal.pone.0095753](https://doi.org/10.1371/journal.pone.0095753). URL: <https://doi.org/10.1371/journal.pone.0095753>.
- [17] **Joshua T. Vogelstein**, Youngser Park, Tomoko Ohyama, Rex A. Kerr, James W. Truman, Carey E. Priebe, and Marta Zlatic. “Discovery of brainwide neural-behavioral maps via multiscale unsupervised structure learning”. In: *Science* 344.6182 (2014), pp. 386–392. ISSN: 10959203. DOI: [10.1126/science.1250298](https://doi.org/10.1126/science.1250298). URL: <https://science.sciencemag.org/content/344/6182/386>.
- [16] R. Cameron Craddock, Saad Jbabdi, Chao Gan Yan, **Joshua T. Vogelstein**, F Xavier Castellanos, Adriana Di Martino, Clare Kelly, Keith Heberlein, Stan Colcombe, and Michael P. Milham. “Imaging human connectomes at the macroscale”. In: *Nature Methods* 10.6 (2013), pp. 524–539. ISSN: 15487091. DOI: [10.1038/nmeth.2482](https://doi.org/10.1038/nmeth.2482). eprint: [NIHMS150003](https://arxiv.org/abs/NIHMS150003). URL: <https://doi.org/10.1038/nmeth.2482>.
- [15] Dai Dai, Huiguang He, **Joshua T. Vogelstein**, and Zengguang Hou. “Accurate prediction of AD patients using cortical thickness networks”. In: *Machine Vision and Applications* 24.7 (2013), pp. 1445–1457. ISSN: 09328092. DOI: [10.1007/s00138-012-0462-0](https://doi.org/10.1007/s00138-012-0462-0). URL: <https://doi.org/10.1007/s00138-012-0462-0>.
- [14] **Joshua T. Vogelstein**, William Gray Roncal, R. Jacob Vogelstein, and Carey E. Priebe. “Graph classification using signal-subgraphs: Applications in statistical connectomics”. In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 35.7 (2013), pp. 1539–1551. ISSN: 01628828. DOI: [10.1109/TPAMI.2012.235](https://doi.org/10.1109/TPAMI.2012.235). arXiv: [1108.1427](https://arxiv.org/abs/1108.1427). URL: <https://doi.org/10.1109/TPAMI.2012.235>.

- [13] Carey E. Priebe, **Joshua Vogelstein**, and Davi Bock. “Optimizing the quantity/quality trade-off in connectome inference”. In: *Communications in Statistics - Theory and Methods* 42.19 (2013), pp. 3455–3462. ISSN: 03610926. DOI: [10.1080/03610926.2011.630768](https://doi.org/10.1080/03610926.2011.630768). arXiv: [1108.6271](https://arxiv.org/abs/1108.6271). URL: <https://doi.org/10.1080/03610926.2011.630768>.
- [12] William R. Gray, John A. Bogovic, **Joshua T. Vogelstein**, Bennett A. Landman, Jerry L. Prince, and R. Jacob Vogelstein. “Magnetic Resonance Connectome Automated Pipeline: An Overview”. In: *IEEE Pulse* 3.2 (Mar. 2012), pp. 42–48. ISSN: 21542287. DOI: [10.1109/MPUL.2011.2181023](https://doi.org/10.1109/MPUL.2011.2181023). URL: <http://ieeexplore.ieee.org/document/6173097/>.
- [11] Nicholas J Roberts, **Joshua T Vogelstein**, Giovanni Parmigiani, Kenneth W Kinzler, Bert Vogelstein, and Victor E Velculescu. “The predictive capacity of personal genome sequencing”. In: *Science Translational Medicine* 4 (2012). ISSN: 19466234. DOI: [10.1126/scitranslmed.3003380](https://doi.org/10.1126/scitranslmed.3003380). URL: <https://doi.org/10.1126/scitranslmed.3003380>.
- [10] Donniell E. Fishkind, Daniel L. Sussman, Minh Tang, **Joshua T. Vogelstein**, and Carey E. Priebe. “Consistent adjacency-spectral partitioning for the stochastic block model when the model parameters are unknown”. In: *SIAM Journal on Matrix Analysis and Applications* 34.1 (2012), pp. 23–39. ISSN: 0895-4798. DOI: [10.1137/120875600](https://doi.org/10.1137/120875600). arXiv: [1205.0309](https://arxiv.org/abs/1205.0309). URL: <http://arxiv.org/abs/1205.0309>.
- [9] **Joshua T. Vogelstein**, R. Jacob Vogelstein, and Carey E. Priebe. “Are mental properties supervenient on brain properties?” In: *Scientific Reports* 1 (2011). ISSN: 20452322. DOI: [10.1038/srep00100](https://doi.org/10.1038/srep00100). URL: <https://doi.org/10.1038/srep00100>.
- [8] Yuriy Mishchencko, **Joshua T Vogelstein**, and Liam Paninski. “A Bayesian approach for inferring neuronal connectivity from calcium fluorescent imaging data”. In: *The annals of applied statistics* 5 (2011). ISSN: 19326157. DOI: [10.1214/09-A0AS303](https://doi.org/10.1214/09-A0AS303). URL: <https://doi.org/10.1214/09-A0AS303>.
- [7] Sonja B. Hofer, Ho Ko, Bruno Pichler, **Joshua Vogelstein**, Hana Ros, Hongkui Zeng, Ed Lein, Nicholas A. Lesica, and Thomas D. Mrsic-Flogel. “Differential connectivity and response dynamics of excitatory and inhibitory neurons in visual cortex”. In: *Nature Neuroscience* 14.8 (2011), pp. 1045–1052. ISSN: 10976256. DOI: [10.1038/nn.2876](https://doi.org/10.1038/nn.2876). URL: <https://doi.org/10.1038/nn.2876>.
- [6] Liam Paninski, Yashar Ahmadian, Daniel Gil Ferreira, Shinsuke Koyama, Kamiar Rahnema Rad, Michael Vidne, **Joshua Vogelstein**, and Wei Wu. “A new look at state-space models for neural data”. In: *Journal of Computational Neuroscience* 29.1-2 (2010), pp. 107–126. ISSN: 09295313. DOI: [10.1007/s10827-009-0179-x](https://doi.org/10.1007/s10827-009-0179-x). URL: <https://doi.org/10.1007/s10827-009-0179-x>.
- [5] **Joshua T. Vogelstein**, Brendon O. Watson, Adam M. Packer, Rafael Yuste, Bruno Jedynek, and Liam Paninski. “Spike inference from calcium imaging using sequential Monte Carlo methods”. In: *Biophysical Journal* 97.2 (2009), pp. 636–655. ISSN: 15420086. DOI: [10.1016/j.bpj.2008.08.005](https://doi.org/10.1016/j.bpj.2008.08.005). URL: <https://doi.org/10.1016/j.bpj.2008.08.005>.
- [4] **Joshua T Vogelstein**, Adam M Packer, Tim A Machado, Tanya Sippy, Baktash Babadi, Rafael Yuste, and Liam Paninski. “Fast non-negative deconvolution for spike train inference from population calcium imaging”. In: *Journal of Neurophysiology* 104 (2009). ISSN: 0022-3077. DOI: [10.1152/jn.01073.2009](https://doi.org/10.1152/jn.01073.2009). arXiv: [0912.1637](https://arxiv.org/abs/0912.1637). URL: <https://doi.org/10.1152/jn.01073.2009>.
- [3] R. Jacob Vogelstein, Udayan Mallik, **Joshua T. Vogelstein**, and Gert Cauwenberghs. “Dynamically reconfigurable silicon array of spiking neurons with conductance-based synapses”. In: *IEEE Transactions on Neural Networks* 18.1 (2007), pp. 253–265. ISSN: 10459227. DOI: [10.1109/TNN.2006.883007](https://doi.org/10.1109/TNN.2006.883007). URL: <https://doi.org/10.1109/TNN.2006.883007>.
- [2] **Joshua T. Vogelstein**, Lawrence H. Snyder, and Dora E. Angelaki. “Accuracy of saccades to remembered targets as a function of body orientation in space”. In: *Journal of Neurophysiology* 90.1 (2003), pp. 521–524. ISSN: 00223077. DOI: [10.1152/jn.00141.2003](https://doi.org/10.1152/jn.00141.2003). URL: <https://doi.org/10.1152/jn.00141.2003>.
- [1] David L. Greenspan, Denise C. Connolly, Rong Wu, Rachel Y. Lei, **Joshua T.C. Vogelstein**, Young Tak Kim, Jung Eun Mok, Nubia Muñoz, F. Xavier Bosch, Keerti Shah, and Kathleen R. Cho. “Loss of FHIT expression in cervical carcinoma cell lines and primary tumors”. In: *Cancer Research* 57 (1997). ISSN: 00085472. URL: <http://cancerres.aacrjournals.org/content/57/21/4692>.

Submitted (Peer-Review Research Articles)

- [29] Cencheng Shen and Joshua T. Vogelstein. “The Chi-Square Test of Distance Correlation”. In: (Dec. 2019). arXiv: [1912.12150](https://arxiv.org/abs/1912.12150) [stat.ML].
- [28] Ronak Mehta, Cencheng Shen, Ting Xu, and **Joshua T. Vogelstein**. “A Consistent Independence Test for Multivariate Time-Series”. In: *arxiv* (Oct. 2019). URL: <https://arxiv.org/abs/1908.06486>.
- [27] Eric W. Bridgeford, Shangsi Wang, Zhi Yang, Zeyi Wang, Ting Xu, Cameron Craddock, Gregory Kiar, William Gray-Roncal, Carey E. Priebe, Brian Caffo, Michael Milham, Xi-Nian Zuo, (CoRR), and **Joshua T. Vogelstein**. “Optimal Experimental Design for Big Data: Applications in Brain Imaging”. In: *bioRxiv* (Oct. 2019). URL: <https://doi.org/10.1101/802629>.
- [26] Marc-Andre Schulz, B.T. Thomas Yeo, **Joshua T. Vogelstein**, Janaina Mourao-Miranada, Jakob N. Kather, Konrad Kording, Blake Richards, and Danilo Bzdok. “Deep learning for brains?: Different linear and nonlinear scaling in UK Biobank brain images vs. machine-learning datasets”. In: *bioRxiv* (Sept. 2019). DOI: [10.1101/757054](https://doi.org/10.1101/757054). URL: <https://www.biorxiv.org/content/early/2019/09/06/757054>.
- [25] Ronan Perry, Tyler M. Tomita, Jesse Patsolic, Benjamin Falk, and **Joshua T. Vogelstein**. “Manifold Forests: Closing the Gap on Neural Networks”. In: *arXiv* (Sept. 2019). URL: <https://arxiv.org/abs/1909.11799>.
- [24] Tyler M. Tomita, James Browne, Cencheng Shen, Jaewon Chung, Jesse L. Patsolic, Benjamin Falk, Jason Yim, Carey E. Priebe, Randal Burns, Mauro Maggioni, and **Joshua T. Vogelstein**. “Sparse Projection Oblique Randomer Forests”. In: *arXiv* (Sept. 2019). URL: <http://arxiv.org/abs/1506.03410>.
- [23] Ting Xu, Karl-Heinz Nenning, Ernst Schwartz, Seok-Jun Hong, **Joshua T. Vogelstein**, Damien A. Fair, Charles E. Schroeder, Daniel S. Margulies, Jonny Smallwood, Michael P. Milham, and Georg Langs. “Cross-species Functional Alignment Reveals Evolutionary Hierarchy Within the Connectome”. In: *bioRxiv* (July 2019). URL: <https://doi.org/10.1101/692616>.
- [22] Aki Nikolaidis, Anibal Solon Heinsfeld, Ting Xu, Pierre Bellec, **Joshua T. Vogelstein**, and Michael Milham. “Bagging Improves Reproducibility of Functional Parcellation of the Human Brain”. In: *bioRxiv* (July 2019). URL: <https://www.biorxiv.org/content/10.1101/343392v3>.
- [21] Richard Guo, Cencheng Shen, and **Joshua T. Vogelstein**. “Estimating Information-Theoretic Quantities with Random Forests”. In: *arXiv* (July 2019). URL: <https://arxiv.org/abs/1907.00325>.
- [20] Meghana Madhyastha, Percy Li, James Browne, Veronika Strnadova-Neely, Carey E. Priebe, Randal Burns, and **Joshua T. Vogelstein**. “Geodesic Learning via Unsupervised Decision Forests”. In: *arXiv* (July 2019). URL: <https://arxiv.org/abs/1907.02844>.
- [19] Disa Mhembere, Da Zheng, **Joshua T. Vogelstein**, Carey E. Priebe, and Randal Burns. “Graphyti: A Semi-External Memory Graph Library for FlashGraph”. In: *arXiv* (July 2019). URL: <https://arxiv.org/abs/1907.03335>.
- [18] Nian Wang, Robert J. Anderson, David G. Ashbrook, Vivek Gopalakrishnan, Youngser Park, Carey E. Priebe, Yi Qi, **Joshua T. Vogelstein**, Robert W. Williams, and Allan G. Johnson. “Node-Specific Heritability in the Mouse Connectome”. In: *bioRxiv* (July 2019). URL: <https://www.biorxiv.org/content/10.1101/701755v1>.
- [17] Sambit Panda, Satish Palaniappan, Junhao Xiong, Ananya Swaminathan, Sandhya Ramachandran, Eric W. Bridgeford, Cencheng Shen, and **Joshua T. Vogelstein**. “mgcpy: A Comprehensive High Dimensional Independence Testing Python Package”. In: *arXiv* (July 2019). URL: <https://arxiv.org/abs/1907.02088>.
- [16] Seok-Jun Hong, **Joshua T. Vogelstein**, G. Gozzi, Boris C. Bernhardt, Thomas B.T. Yeo, Michael P. Milham, and Adriana Di Martino. “Towards Neurosubtypes in Autism”. In: *bioRxiv* in press (July 2019).
- [15] Junhao Xiong, Cencheng Shen, Jesús Arroyo, and **Joshua T. Vogelstein**. “Graph Independence Testing”. In: *arXiv* (June 2019). URL: <https://arxiv.org/abs/1906.03661>.
- [14] Jesús Arroyo, Avanti Athreya, Joshua Cape, Guodong Chen, Carey E. Priebe, and **Joshua T. Vogelstein**. “Inference for multiple heterogeneous networks with a common invariant subspace”. In: *arXiv* (June 2019). URL: <https://arxiv.org/abs/1906.10026>.

- [13] *Hayden Helm*, **Joshua T. Vogelstein**, and Carey E. Priebe. “Vertex Classification on Weighted Networks”. In: *arXiv* (June 2019). URL: <https://arxiv.org/abs/1906.02881>.
- [12] *Dia Mhembe*, *Da Zheng*, Carey E Priebe, **Joshua T Vogelstein**, and Randal Burns. “clusterNOR: A NUMA-Optimized Clustering Framework”. In: *arxiv* (Feb. 2019). URL: <https://arxiv.org/abs/1902.09527>.
- [11] Cencheng Shen and **Joshua T Vogelstein**. “Decision Forests Induce Characteristic Kernels”. In: *arXiv* (Dec. 2018). URL: <https://arxiv.org/abs/1812.00029>.
- [10] David S Greenberg, Damian J Wallace, Kay-Michael Voit, Silvia Wuertenberger, Uwe Czubayko, Arne Monsees, Takashi Handa, **Joshua T Vogelstein**, Reinhard Seifert, Yvonne Groemping, and Jason ND Kerr. “Accurate action potential inference from a calcium sensor protein through biophysical modeling”. In: *bioRxiv* (Nov. 2018). DOI: [10.1101/479055](https://doi.org/10.1101/479055). eprint: <https://www.biorxiv.org/content/early/2018/11/29/479055.full.pdf>. URL: <https://www.biorxiv.org/content/early/2018/11/29/479055>.
- [9] **Joshua T Vogelstein**, *Eric Bridgeford*, Minh Tang, Da Zheng, Randal Burns, and Mauro Maggioni. “Geometric Dimensionality Reduction for Subsequent Classification”. In: *arXiv* 1050 (Nov. 2018), p. 21. URL: <https://arxiv.org/abs/1709.01233>.
- [8] *Zeyi Wang*, Haris Sair, Ciprian Crainiceanu, Martin Lindquist, Bennett A Landman, Susan Resnick, **Joshua T. Vogelstein**, and Brian Scott Caffo. “On statistical tests of functional connectome fingerprinting”. In: *bioRxiv* (Oct. 2018). URL: <https://www.biorxiv.org/content/early/2018/10/15/443556>.
- [7] *Cencheng Shen* and **Joshua T. Vogelstein**. “The Exact Equivalence of Distance and Kernel Methods for Hypothesis Testing”. In: *arXiv* (July 2018). URL: <https://arxiv.org/abs/1806.05514>.
- [6] *Gregory Kiar*, *Eric Bridgeford*, *Will Gray Roncal*, (CoRR), *Vikram Chandrashekhar*, *Disa Mhembe*, *Sephira Ryman*, *Xi-Nian Zuo*, *Daniel S Marguiles*, *R Cameron Craddock*, *Carey E Priebe*, *Rex Jung*, *Vince Calhoun*, *Brian Caffo*, *Randal Burns*, *Michael P Milham*, and **Joshua Vogelstein**. “A High-Throughput Pipeline Identifies Robust Connectomes But Troublesome Variability”. In: *bioRxiv* (Apr. 2018). DOI: [10.1101/188706](https://doi.org/10.1101/188706). URL: <https://www.biorxiv.org/content/early/2018/04/24/188706>.
- [5] *Shangsi Wang*, *Cencheng Shen*, *Alexandra Badea*, *Carey E Priebe*, and **Joshua T Vogelstein**. “Signal Subgraph Estimation Via Vertex Screening”. In: *arXiv* (Jan. 2018). eprint: *arXiv*. URL: <https://arxiv.org/abs/1801.07683>.
- [4] *Gregory Kiar*, *Eric Bridgeford*, *Vikram Chandrashekhar*, *Disa Mhembe*, *Randal Burns*, *William R Gray Roncal*, and **Joshua T Vogelstein**. “A comprehensive cloud framework for accurate and reliable human connectome estimation and meganalysis”. In: *bioRxiv* (Sept. 2017), p. 188706. URL: <https://www.biorxiv.org/content/early/2017/09/14/188706>.
- [3] *Guilherme Franca*, *Maria L Rizzo*, and **Joshua T. Vogelstein**. “Kernel k-Groups via Hartigan’s Method”. In: *arXiv* (Aug. 2017). URL: <https://arxiv.org/abs/1710.09859>.
- [2] Runze Tang, Minh Tang, **Joshua T Vogelstein**, and Carey E Priebe. “Robust Estimation from Multiple Graphs under Gross Error Contamination”. In: *arXiv* (July 2017). eprint: *arXiv*. URL: <https://arxiv.org/abs/1707.03487>.
- [1] Heather Patsolic, Sancar Adali, **Joshua T. Vogelstein**, Youngser Park, Carey E. Priebe, Gongki Li, and Vince Lyzinski. “Seeded Graph Matching Via Joint Optimization of Fidelity and Commensurability”. In: *arXiv* (Jan. 2014). eprint: [1401.3813](https://arxiv.org/abs/1401.3813). URL: <http://arxiv.org/abs/1401.3813>.

Peer-Reviewed Conference Proceedings

- [20] *James Browne*, *Disa Mhembe*, *Tyler M. Tomita*, *Joshua T. Vogelstein*, and *Randal Burns*. “Forest packing: Fast Parallel, Decision Forests”. In: *SIAM International Conference on Data Mining, SDM* (June 2019), pp. 46–54. DOI: [10.1137/1.9781611975673.6](https://doi.org/10.1137/1.9781611975673.6). *arXiv*: [1806.07300](https://arxiv.org/abs/1806.07300). URL: <https://arxiv.org/abs/1806.07300>.
- [19] Aki Nikolaidis, Anibal Solon Heinsfeld, Ting Xu, Pierre Bellec, **Joshua Vogelstein**, and Michael Milham. “Bagging Improves Reproducibility of Functional Parcellation of the Human Brain”. In: *bioRxiv* (June 2019), p. 343392. DOI: [10.1101/343392](https://doi.org/10.1101/343392). URL: <http://biorxiv.org/content/early/2019/08/28/343392.abstract>.

- [18] *Kunal Lillanay*, Dean Kleissas, Alexander Eusman, Eric Perlman, William Gray Roncal, **Joshua T. Vogelstein**, and Randal Burns. “Building NDStore through hierarchical storage management and microservice processing”. In: *Proceedings - IEEE 14th International Conference on eScience, e-Science (2018)*, pp. 223–233. DOI: [10.1109/eScience.2018.00037](https://doi.org/10.1109/eScience.2018.00037). URL: <https://ieeexplore.ieee.org/abstract/document/8588656>.
- [17] *Kwame S. Kutten*, Nicolas Charon, Michael I. Miller, J. Tilak Ratnanather, *Jordan Matelsky*, Alexander D. Baden, *Kunal Lillanay*, Karl Deisseroth, Li Ye, and **Joshua T. Vogelstein**. “A large deformation diffeomorphic approach to registration of CLARITY images via mutual information”. In: *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (2017). Ed. by Maxime Descoteaux, Lena Maier-Hein, Alfred Franz, Pierre Jannin, D. Louis Collins, and Simon Duchesne, pp. 275–282. ISSN: 16113349. DOI: [10.1007/978-3-319-66182-7_32](https://doi.org/10.1007/978-3-319-66182-7_32). arXiv: [1612.00356](https://arxiv.org/abs/1612.00356). URL: https://link.springer.com/chapter/10.1007/978-3-319-66182-7_32.
- [16] *Disa Mhembe*, Carey E Priebe, **Joshua T Vogelstein**, and Randal Burns. “knor: A NUMA-Optimized In-Memory, Distributed and Semi-External-Memory k-means Library”. In: *Proceedings of the 26th International Symposium on High-Performance Parallel and Distributed Computing. ACM. Proceedings of the 26th International Symposium on High-Performance Parallel and Distributed Computing, 2017*. ISBN: 9781450346993. URL: <https://arxiv.org/abs/1606.08905>.
- [15] *Tyler M. Tomita*, Mauro Maggioni, and **Joshua T. Vogelstein**. “ROFLMAO: Robust oblique forests with linear MATrix operations”. In: *Proceedings of the 17th SIAM International Conference on Data Mining, SDM 2017*. SIAM. 2017, pp. 498–506. ISBN: 9781611974874. DOI: [10.1137/1.9781611974973.56](https://doi.org/10.1137/1.9781611974973.56).
- [14] *Da Zheng*, *Disa Mhembe*, **Joshua T. Vogelstein**, Carey E. Priebe, and Randal Burns. “FlashR: R-Programmed Parallel and Scalable Machine Learning using SSDs”. In: *PPoPP (May 2016)*. arXiv: [1604.06414](https://arxiv.org/abs/1604.06414). URL: <http://arxiv.org/abs/1604.06414>.
- [13] *Kwame S. Kutten*, **Joshua T. Vogelstein**, Nicolas Charon, Li Ye, Karl Deisseroth, and Michael I. Miller. “Deformably registering and annotating whole CLARITY brains to an atlas via masked LDDMM”. In: *Optics, Photonics and Digital Technologies for Imaging Applications IV* 9896 (2016), p. 989616. ISSN: 1996756X. DOI: [10.1117/12.2227444](https://doi.org/10.1117/12.2227444). arXiv: [1605.02060](https://arxiv.org/abs/1605.02060). URL: <https://doi.org/10.1117/12.2227444>.
- [12] *William Gray Roncal*, Michael Pekala, Verena Kaynig-Fittkau, Dean M Kleissas, **Joshua T Vogelstein**, Hanspeter Pfister, Randal Burns, R Jacob Vogelstein, Mark A Chevillet, and Gregory D Hager. “VESICLE: Volumetric Evaluation of Synaptic Interfaces using Computer Vision at Large Scale”. In: *British Machine Vision Conference*. 2015, pp. 81.1–81.13. DOI: [10.5244/c.29.81](https://doi.org/10.5244/c.29.81). arXiv: <http://arxiv.org/abs/1403.3724>.
- [11] *William Gray Roncal*, Zachary H. Koterba, *Disa Mhembe*, Dean M. Kleissas, **Joshua T. Vogelstein**, Randal Burns, Anita R. Bowles, Dimitrios K. Donavos, Sephira Ryman, Rex E. Jung, Lei Wu, Vince Calhoun, and R. Jacob Vogelstein. “MIGRAINE: MRI graph reliability analysis and inference for connectomics”. In: *2013 IEEE Global Conference on Signal and Information Processing*. IEEE, Dec. 2013, pp. 313–316. ISBN: 9781479902484. DOI: [10.1109/GlobalSIP.2013.6736878](https://doi.org/10.1109/GlobalSIP.2013.6736878). eprint: [1312.4875](https://arxiv.org/abs/1312.4875). URL: <http://ieeexplore.ieee.org/document/6736878/>.
- [10] *Disa Mhembe*, *William Gray Roncal*, Daniel Sussman, Carey E. Priebe, Rex Jung, Sephira Ryman, R. Jacob Vogelstein, **Joshua T. Vogelstein**, and Randal Burns. “Computing scalable multivariate global invariants of large (brain-) graphs”. In: *2013 IEEE Global Conference on Signal and Information Processing, GlobalSIP 2013 - Proceedings (Dec. 2013)*, pp. 297–300. DOI: [10.1109/GlobalSIP.2013.6736874](https://doi.org/10.1109/GlobalSIP.2013.6736874). URL: <http://dx.doi.org/10.1109/GlobalSIP.2013.6736874>.
- [9] Randal Burns, *William Gray Roncal*, Dean Kleissas, *Kunal Lillanay*, Priya Manavalan, Eric Perlman, Daniel R. Berger, Davi D. Bock, Kwanghun Chung, Logan Grosenick, Narayanan Kasthuri, Nicholas C. Weiler, Karl Deisseroth, Michael Kazhdan, Jeff Lichtman, R. Clay Reid, Stephen J. Smith, Alexander S. Szalay, **Joshua T. Vogelstein**, and R. Jacob Vogelstein. “The Open Connectome Project Data Cluster: Scalable Analysis and Vision for High-Throughput Neuroscience”. In: *ACM International Conference Proceeding Series*. ACM. 2013. ISBN: 978-1-4503-1921-8. DOI: [10.1145/2484838.2484870](https://doi.org/10.1145/2484838.2484870). arXiv: [1306.3543](https://arxiv.org/abs/1306.3543). URL: <http://arxiv.org/abs/1306.3543>.

- [8] David E. Carlson, Vinayak Rao, **Joshua T. Vogelstein**, and Lawrence Carin. “Real-Time Inference for a Gamma Process Model of Neural Spiking”. In: *Advances in Neural Information Processing Systems* 26 (2013). ISSN: 10495258. URL: <http://papers.nips.cc/paper/5061-real-time-inference-for-a-gamma-process-model-of-neural-spiking.pdf>.
- [7] Bruno Cornelis, Yun Yang, **Joshua T. Vogelstein**, Ann Dooms, Ingrid Daubechies, and David Dunson. “Bayesian crack detection in ultra high resolution multimodal images of paintings”. In: *18th International Conference on Digital Signal Processing* (2013). DOI: [10.1109/ICDSP.2013.6622710](https://doi.org/10.1109/ICDSP.2013.6622710). eprint: [1304.5894](https://arxiv.org/abs/1304.5894). URL: <http://arxiv.org/abs/1304.5894>.
- [6] Marcelo Fiori, Pablo Sprechmann, **Joshua Vogelstein**, Pablo Muse, and Guillermo Sapiro. “Robust Multimodal Graph Matching: Sparse Coding Meets Graph Matching”. In: *Advances in Neural Information Processing Systems* (2013). ISSN: 10495258. eprint: [arXiv](https://arxiv.org/abs/1304.5894). URL: <http://papers.nips.cc/paper/4925-robust-multimodal-graph-matching-sparse-coding-meets-graph-matching>.
- [5] Danai Koutra, **Joshua T. Vogelstein**, and Christos Faloutsos. “DELTACON: A principled massive-graph similarity function”. In: *Proceedings of the 2013 SIAM International Conference on Data Mining, SDM 2013* (2013), pp. 162–170. ISSN: 1095-712X. DOI: [10.1137/1.9781611972832.18](https://doi.org/10.1137/1.9781611972832.18). arXiv: [1304.4657](https://arxiv.org/abs/1304.4657). URL: <http://arxiv.org/abs/1304.4657>.
- [4] Francesca Petralia, **Joshua Vogelstein**, and David B. Dunson. “Multiscale Dictionary Learning for Estimating Conditional Distributions”. In: *Advances in Neural Information Processing Systems* (2013). ISSN: 10495258. URL: <https://papers.nips.cc/paper/4944-multiscale-dictionary-learning-for-estimating-conditional-distributions>.
- [3] Vivek Kulkarni, Jagat Sastry Pudipeddi, Leman Akoglu, **Joshua T. Vogelstein**, R. Jacob Vogelstein, Sephira Ryman, and Rex E. Jung. “Sex differences in the human connectome”. In: *Brain and Health Informatics*. Vol. 8211 LNAI. Springer. 2013, pp. 82–91. ISBN: 9783319027524. DOI: [10.1007/978-3-319-02753-1_9](https://doi.org/10.1007/978-3-319-02753-1_9). URL: <https://pdfs.semanticscholar.org/98da/eeccc6d3cc80b789de30ecf8790c56950739.pdf>.
- [2] Da Zheng, Disa Mhembere, Randal Burns, **Joshua T. Vogelstein**, Carey E. Priebe, and Alexander S. Szalay. “FlashGraph: Processing Billion-Node Graphs on an Array of Commodity SSDs”. In: *USENIX Conference on File and Storage Technologies*. 2012. ISBN: 9781931971201. DOI: [10.1109/ICDE.2012.28](https://doi.org/10.1109/ICDE.2012.28). eprint: [1408.0500](https://arxiv.org/abs/1408.0500). URL: <http://arxiv.org/abs/1408.0500>.
- [1] Quentin J. Huys, **Joshua Vogelstein**, and Peter Dayan. “Psychiatry: Insights into depression through normative decision-making models”. In: *Advances in Neural Information Processing Systems* (2008). URL: <http://papers.nips.cc/paper/3563-psychiatry-insights-into-depression-through-normative-decision-making-models.pdf>.

Technical Reports

- [8] Gregory Kiar, Robert J. Anderson, Alex Baden, Alexandra Badea, Eric W. Bridgeford, Andrew Champion, Vikram Chandrashekar, Forrest Collman, Brandon Duderstadt, Alan C. Evans, Florian Engert, Benjamin Falk, Tristan Glatard, William R. Gray Roncal, David N. Kennedy, Jeremy Maitin-Shepard, Ryan A. Marren, Onyeka Nnaemeka, Eric Perlman, Sharmishtaas Seshamani, Eric T. Trautman, Daniel J. Tward, Pedro Antonio Valdés-Sosa, Qing Wang, Michael I. Miller, Randal Burns, and **Joshua T. Vogelstein**. “NeuroStorm: Accelerating Brain Science Discovery in the Cloud”. In: *arXiv* (Mar. 2018). arXiv: [1803.03367](https://arxiv.org/abs/1803.03367). URL: <http://arxiv.org/abs/1803.03367>.
- [7] Jonathan Caplis and Joshua T. Vogelstein. Glass box vs. black box. <https://www.pionline.com/article/20170727/ONLINE/170729878/glass-box-vs-black-box>. Accessed: 2020-1-14. July 2017.
- [6] Carey E. Priebe, Youngser Park, Minh Tang, Avanti Athreya, Vince Lyzinski, **Joshua T. Vogelstein**, Yichen Qin, Ben Cocanougher, Katharina Eichler, Marta Zlatic, and Albert Cardona. “Semiparametric spectral modeling of the Drosophila connectome”. In: *arXiv* (2017). arXiv: [1705.03297](https://arxiv.org/abs/1705.03297). URL: <http://arxiv.org/abs/1705.03297>.

- [5] *Da Zheng, Disa Mhembere, Joshua T. Vogelstein, Carey E. Priebe, and Randal Burns.* “FlashR: R-Programmed Parallel and Scalable Machine Learning using SSDs”. In: *CoRR*, abs/1604.06414 (2016). arXiv: 1604.06414. URL: <http://arxiv.org/abs/1604.06414>.
- [4] *Da Zheng, Randal Burns, Joshua Vogelstein, Carey E. Priebe, and Alexander S. Szalay.* “An SSD-based eigensolver for spectral analysis on billion-node graphs”. In: *arXiv* (2016). arXiv: 1602.01421. URL: <http://arxiv.org/abs/1602.01421>.
- [3] *A Sinha, WG Roncal, and N Kasthuri.* “Automatic Annotation of Axoplasmic Reticula in Pursuit of Connectomes”. In: *arXiv* (2014). arXiv: arXiv:1404.4800v1. URL: <http://arxiv.org/abs/1404.4800>.
- [2] *Michael Kazhdan, Randal Burns, Bobby Kasthuri, Jeff Lichtman, Jacob Vogelstein, and Joshua Vogelstein.* “Gradient-Domain Processing for Large EM Image Stacks”. In: *arXiv* (Sept. 2013). arXiv: 1310.0041. URL: <http://arxiv.org/abs/1310.0041>.
- [1] *Anjishnu Banerjee, Joshua Vogelstein, and David Dunson.* “Parallel inversion of huge covariance matrices”. In: *arXiv* 1312.1869 (2013). arXiv: 1312.1869. URL: <http://arxiv.org/abs/1312.1869>.

Other Publications

- [10] *Eric W Bridgeford, Daniel Sussman, Vince Lyzinski, Yichen Qin, Youngser Park, Brian Caffo, Carey E Priebe, and Joshua T Vogelstein.* “What is Connectome Coding?” In: *SfN 2018 course book* (2018). URL: https://neurodata.io/talks/sfn_2018_coursebook.pdf.
- [9] **Joshua T. Vogelstein**, Katrin Amunts, Andreas Andreou, Dora Angelaki, Giorgio A. Ascoli, Cori Bargmann, Randal Burns, Corrado Cali, Frances Chance, George Church, Hollis Cline, Todd Coleman, Winfried Stephanie de La Rochefoucauld Denk, Ana Belén Elgoyhen, Ralph Etienne Cummings, Alan Evans, Kenneth Harris, Michael Hausser, Sean Hill, Samuel Inverso, Chad Jackson, Viren Jain, Rob Kass, Bobby Kasthuri, Adam Kepecs, Gregory Kiar, Konrad Kording, Sandhya P. Koushika, John Krakauer, Story Landis, Jeff Layton, Qingming Luo, Adam Marblestone, David Markowitz, Justin McArthur, Brett Mensh, Michael P. Milham, Partha Mitra, Pedja Neskovic, Miguel Nicolelis, Richard O’Brien, Aude Oliva, Gergo Orban, Hanchuan Peng, Eric Perlman, Marina Picciotto, Mu-Ming Poo, Jean-Baptiste Poline, Alexandre Pouget, Sridhar Raghavachari, Jane Roskams, Alyssa Picchini Schaffer, Terry Sejnowski, Friedrich T. Sommer, Nelson Spruston, Larry Swanson, Arthur Toga, R. Jacob Vogelstein, Anthony Zador, Richard Hugarir, and Michael I. Miller. *Grand challenges for global brain sciences*. 2016. DOI: 10.12688/f1000research.10025.1. URL: <https://f1000research.com/articles/5-2873/v1>.
- [8] **Joshua T. Vogelstein**, Brett Mensh, Michael Häusser, Nelson Spruston, Alan C. Evans, Konrad Kording, Katrin Amunts, Christoph Ebell, Jeff Muller, Martin Telefont, Sean Hill, Sandhya P. Koushika, Corrado Calì, Pedro Antonio Valdés-Sosa, Peter B. Littlewood, Christof Koch, Stephan Saalfeld, Adam Kepecs, Hanchuan Peng, Yaroslav O. Halchenko, *Gregory Kiar*, Mu Ming Poo, Jean Baptiste Poline, Michael P. Milham, Alyssa Picchini Schaffer, Rafi Gidron, Hideyuki Okano, Vince D. Calhoun, Miyoung Chun, Dean M. Kleissas, R. Jacob Vogelstein, Eric Perlman, Randal Burns, Richard Hugarir, and Michael I. Miller. “To the Cloud! A Grassroots Proposal to Accelerate Brain Science Discovery”. In: *Neuron* 92.3 (2016), pp. 622–627. ISSN: 10974199. DOI: 10.1016/j.neuron.2016.10.033. URL: <http://dx.doi.org/10.1016/j.neuron.2016.10.033>.
- [7] *Polina Golland, Jack Gallant, Greg Hager, Hanspeter Pfister, Christos Papadimitriou, Stefan Schaal, and Joshua T Vogelstein.* *A New Age of Computing and the Brain: Report of the CCC Brain Workshop*. 2014. URL: <https://dl.acm.org/citation.cfm?id=2837681>.
- [6] *Randal Burns, Joshua T. Vogelstein, and Alexander S. Szalay.* “From cosmos to connectomes: The evolution of data-intensive science”. In: *Neuron* 83.6 (2014), pp. 1249–1252. ISSN: 10974199. DOI: 10.1016/j.neuron.2014.08.045. eprint: 1304.0542.
- [5] *Joshua T. Vogelstein, William Gray Roncal, R. Jacob Vogelstein, and Carey E. Priebe.* “Graph classification using signal-subgraphs: Applications in statistical connectomics”. In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 35.7 (2013), pp. 1539–1551. ISSN: 01628828. DOI: 10.1109/TPAMI.2012.235. arXiv: 1108.1427. URL: https://neurodata.io/talks/sfn_2017_coursebook.pdf.

- [4] Joshua T Vogelstein. “Q and A: What is the Open Connectome Project?” In: *Neural Systems and Circuits* 1.1 (2011). ISSN: 2042-1001. DOI: [10.1186/2042-1001-1-16](https://doi.org/10.1186/2042-1001-1-16). URL: <http://neuralsystemsandcircuits.biomedcentral.com/articles/10.1186/2042-1001-1-16>.
- [3] Rafael Yuste, Jason MacLean, Joshua Vogelstein, and Liam Paninski. “Imaging action potentials with calcium indicators”. In: *Cold Spring Harbor Protocols* 6.8 (2011), pp. 985–989. ISSN: 15596095. DOI: [10.1101/pdb.prot5650](https://doi.org/10.1101/pdb.prot5650). URL: <http://cshprotocols.cshlp.org/content/2011/8/pdb.prot5650.full.pdf+html>.
- [2] Joshua T Vogelstein. “Oops! a family of optimal optical spike inference algorithms for inferring neural connectivity from population calcium imaging”. In: *Learning* (2009). URL: https://www.researchgate.net/profile/Joshua_Vogelstein2/publication/45657467_OOPSI_A_family_of_optimal_optical_spike_inference_algorithms_for_inferring_neural_connectivity_from_population_calcium_imaging/links/00b7d536f73b4445c1000000.pdf.
- [1] **J. T. Vogelstein**, Jacob V. Vogelstein, and Bert Vogelstein. “NIH Grant Application Testing the effects of genetic variations using MINIME technology”. In: *Science* 286.5448 (Dec. 1999), pp. 2300–2301. ISSN: 00368075. DOI: [10.1126/science.286.5448.2300](https://doi.org/10.1126/science.286.5448.2300). URL: <http://www.sciencemag.org/cgi/doi/10.1126/science.286.5448.2300>.

Funding

The below table shows my direct (total) cost expenditures since being hired, indicating a steady increase >30% per year.

Financial Year	Direct	Total
2015:	\$113,761	\$168,924
2016:	\$360,123	\$524,225
2017:	\$459,523	\$709,019
2018:	\$550,011	\$887,186
2019:	\$850,836	\$1,366,308

Current

- 2020 – 2025 **CAREER: Foundational Statistical Theory and Methods for Analysis of Populations of Attributed**,
NSF 17-537
Role on project: Principal Investigator
Term: 01-Mar-2020 to 31-Dec-2025
Budget: \$384,873 (direct) \$245,357 (indirect) \$630,230 (total)
The goal is to establish foundational theory and methods for analyzing populations of attributed connectomes.
- 2019 – 2022 **Accessible technologies for high-throughput, whole-brain reconstructions of molecularly characterized mammalian neurons**,
NIH RO1 Research Grant
Role on project: Co-Investigator (PI: Muller, Miller)
Term: 01-Sept-2019 to 31-Aug-2022
Total budget: \$753,974 (direct) \$426,471 (indirect) \$1,180,445 (total cost)
The overall goal of the proposal is to develop technologies for the brain wide reconstruction of axonal arbors of molecularly defined neurons. The proposal aims at overcoming barriers in neuronal labeling, imaging and computation to achieve this goal, and to develop a technology platform that can be scaled to all neurons of the brain.
- 2019 – 2020 **Reproducible imaging-based brain growth charts for psychiatry**,
NIH RO1 Research Grant
Role on project: Co-Investigator (PI: Saterthwaite)
Term: 01-Aug-2019 to 31-May-2020
Budget: \$231,276 (direct) \$131,585 (indirect) \$362,861 (total cost)
Aggregate, harmonize, and analyze existing large-scale pediatric neuroimaging datasets to identify normative and clinical brain growth curves.

- 2019 – **Microsoft Research Award,**
 Microsoft Research Gift
 Role on Project: Principal Investigator
 Term: Unrestricted Gift
 Budget: \$50,000 (total cost)
 Research and development of neuroscience and connectomes around neuronal circuit and system modeling, application of time-series-of-graphs and dynamics to neuronal signaling analysis and connectomes, and in the abstractions of matter, math, machines that point toward complex systems composed of low-level components.
- 2018 – 2020 **Lifelong Learning Forests,**
 Defense Advanced Research Projects Agency Research Grant FA8650-18-2-7834 (128567)
 Role on Project: Principal Investigator
 Term: 01-Jul-2018 to 30-Jun-2020
 Budget: \$1,123,474 (direct) \$715,834 (indirect) \$1,839,308 (total cost)
 Lifelong Learning Forests (L2Fs) will learn continuously, selectively adapting to new environments and circumstances utilizing top-down feedback to impact low-level processing, with provable statistical guarantees, while maintaining computational tractability at scale.
- 2018 – 2021 **SemiSynBio: Collaborative Research: YeastOns: Neural Networks Implemented in Communication Yeast Cells,**
 National Science Foundation Research Grant (129439)
 Role on project: Co-Investigator (PI: Schuman)
 Term: 01-Jul-2018 to 30-Jun-2021
 Budget: \$172,971 (direct) \$90,971 (indirect) \$263,942 (total cost)
 Provide neuroscience and machine learning expertise to guide the design of the computational learning capabilities of the system.
- 2018 – 2019 **Connectome Coding at the Synaptic Scale,**
 Schmidt Science Foundation (128503)
 Role on Project: Principal Investigator
 Term: 01-Jan-2018 to 31-Dec-2019
 Budget: \$250,000 (total cost)
 Study learning and plasticity at an unprecedented scale, revealing the dynamics of large populations of synapses comprising an entire local cortical circuit. No previously conducted experiment could answer the questions about the dynamics of large populations of synapses, which is crucial to understanding the learning process.
- 2017 – 2021 **Continual Learning Across Synapses, Circuits, and Brain Areas,**
 Defense Advanced Research Projects Agency Research Grant FA8650-18-2-7834 (129061)
 Role on project: Co-Investigator (PI: Tolias)
 Term: 01-Nov-2017 to 30-Oct-2021
 Budget: \$486,666 (direct) \$310,049 (indirect) \$796,715 (total cost)
 Develop the pre-processing analysis pipeline for the imaging data collected in this project.
- 2017 – 2020 **NeuroNex Innovation Award: Towards Automatic Analysis of Multi-Terabyte Cleared Brains,**
 National Science Foundation 1707298
 Role on Project: Principal Investigator
 Term: 01-Sept-2017 to 31-Aug-2020 (No Cost Extension)
 Budget: \$588,758 (direct) \$371,241 (indirect) \$959,999 (total cost)
 We propose to lower the barrier to connecting data to analyses and models by providing a coherent cloud computational ecosystem that minimizes current bottlenecks in the scientific process.

- 2017 – 2022 **Sensorimotor processing, decision making, and internal states: towards a realistic multi-scale circuit model of the larval zebrafish brain,**
 NIH Research Grant 1U19NS104653-01 (127940)
 Role on Project: Co-Investigator (PI: Engert)
 Term: 01-Sept-2017 to 31-Aug-2022
 Budget: \$655,206 (direct) \$394,794 (indirect) \$1,050,000 (total cost) (JHU sub-award)
 Generate a realistic multiscale circuit model of the larval zebrafish's brain – the multiscale virtual fish (MSVF). The model will span spatial ranges from the nanoscale at the synaptic level, to local microcircuits to inter-area connectivity - and its ultimate purpose is to explain and simulate the quantitative and qualitative nature of behavioral output across various timescales.
- 2017 – 2020 **CRCNS US-German Res Prop: functional computational anatomy of the auditory cortex,**
 National Institutes of Health Research Grant 1R01DC016784-01 (126308)
 Role on Project: Co-Investigator (PI: Ratnanather, J)
 Term: 01-July-2017 to 30-June-2020
 Budget: \$458,519 (direct) \$288,624 (indirect) \$747,143 (total cost)
 Create a robust computational framework for analyzing the cortical ribbon in a specific region: the auditory cortex.
- 2017 – 2020 **Multiscale Generalized Correlation: A Unified Distance-Based Correlation Measure for Dependence Discovery,**
 National Science Foundation Research Grant (132031)
 Role on project: Co-Investigator (PI: Cencheng, S)
 Term: 01-May-2017 to 30-April-2020
 Budget: \$124,189 (direct) \$75,811 (indirect) \$200,000 (total cost)
 Establish a unified methodology framework for statistical testing in high-dimensional, noisy, big data, through theoretical advancements, comprehensive simulations, and real data experiments.
- 2016 – 2020 **D3M: What Would Tukey Do?,**
 Defense Advanced Research Projects Agency Research Grant FA8750-17-2-0112 (125863)
 Role on project: Co-Investigator (PI: Priebe, C)
 Term: 01-Oct-2016 to 30-Sep-2020
 Budget: \$2,746,050 (direct) \$1,660,310 (indirect) \$4,406,360 (total cost)
 Develop theory and methods for generating a discoverable archive of data modeling primitives and for automatically selecting model primitives and for composing selected primitives into complex modeling pipelines based on user-specified data and outcome(s) of interest.
- [Pending](#)
- 2020 – 2023 **Graspy: A python package for rigorous statistical analysis of populations of attributed connectomes,**
 NIH MN-19-147
 Role on project: Principal Investigator
 Term: 01-Mar-2020 to 30-June-2023
 Budget: \$861,240 (direct) \$549,039 (indirect) \$1,410,279 (total)
 The goal of this project is to establish a state-of-the-art toolbox for analysis of connectomes, spanning taxa, scale, and complexity. More specifically, we will develop and extend implementations to enable neurobiologists to 1) estimate latent structure from attributed connectomes, (2) identify meaningful clusters among populations of connectomes, and (3) detect relationships between connectomes and multivariate phenotypes, such as behavior, genetics, and physiology.
- 2020 – 2022 **High throughput mapping pipeline for incomplete and censored neuroimaging data,**
 NIH / MH-19-148
 Role on Project: Co-Investigator (PI: Miller)
 Term: 01-Mar-2020 to 30-Nov-2022
 Budget: \$1,107,698 (direct) \$637,159 (indirect) \$1,744,857 (total)
 Develop technologies to map brain coordinates on incomplete MRI brain imaging data.

- 2020 – 2025 **NeuroNex: Enabling Identification and Impact of Synaptic Weight in Functional Networks**,
NSF 19-563
Role on project: Co-Investigator (PI: Harris)
Term: 01-April 2020 to 31-March-2025
Budget: \$609,294 (direct) \$388,425 (indirect) \$997,719 (total)
Develop the requisite technology to understand the impact of synaptic weight on functional networks.
- 2020 – 2025 **Identifying Neurobehavioral Pathways for Cannabis Use Disorder: Multimodal MRI Investigations of Control and Reward Neural Networks**,
NIH18-062 - National Institute on Drug Abuse
Role on project: Co-Investigator (PI: Hanson)
Term: 01-April-2020 to 31-March-2025
Budget: \$234,338 (direct) \$149,389 (indirect) \$383,727 (total)
This project will connect strong behavioral markers of addiction risk, measures of drug use, and measures of brain network connectivity to aid in understanding what causes drug use, versus what is a consequence of it.
- 2020 – 2023 **A Novel Framework for Mapping Brain Dynamics and Substrates of Human Cognition Across Species**,
NIH MH-20-120
Role on project: Co-Investigator (PI: Milham)
Term: 01-July-2020 to 30-June-2023
Budget: \$178,898 (direct) \$114,047 (indirect) \$292,945 (total)
Develop and apply modern alignment methods to compare and contrast human and non-human brain imaging.
- 2020 – 2023 **MBAc: Mouse Brain Atlasing in the Cloud**,
NIH MN-19-147
Role on project: Co-Investigator (PI: Osten)
Term: 01-July-2020 to 30-June-2023
Budget: \$1,520,570 (direct) \$969,363 (indirect) \$2,489,933 (total)
Develop and disseminate CloudReg, a cloud brain atlasing tool for microscale whole mouse brains.
- 2020 – 2024 **Exploiting latent structure for efficient and robust inference**,
NSF
Role on project: Co-Investigatror (PI: Priebe)
Term: 01-July-2020 to 30-June-2024
Budget: \$999,330 (direct) \$505,332 (indirect) \$1,504,662 (total)
Develop theory and methods for analysis of networks and populations thereof.
- 2020 – 2024 **Distributed ensemble neural representations of anxiety states**,
NIH 0 NS 18-303 BrainInitiative RO1
Role on project: Co-Investigator (PI: Adwanikar)
Term: 01-July-2020 to 30-June-2024
Budget: \$2,672,969 (total)
Imaging the coordinated, multi-area, ensemble neural signaling of anxiety and attention states at cellular-resolution in freely behaving mice.
- 2020 – 2025 **The NKI-Rockland Sample II: An open resource of multimodal brain, physiology, and behavior data from a community lifespan sample**,
NIH 19-056
Role on project: Co-Investigator (PI: Milham)
Term: 01-July-2020 to 30-June-2025
Budget: \$30,713 (direct) \$48,178 (indirect) \$78,891 (total)
We will continue collecting, organizing, and analyzing another cohort of the NKI-Rockland Sample.

[Previous](#)

- 2017 – 2018 **The Brain Ark**,
 Defense Advance Research Project Agency Grant 90076467
 Role of the Project: Principal Investigator
 Budget: \$56,499.08 (direct) \$35,876.92 (indirect) \$92,376 (total cost)
 Characterize the statistical properties of the individual graphs, to identify circuit motifs, both that specialize in a species specific fashion, and that are preserved across species. As a test, will compare the connectomes of sea lions and coyotes.
- 2017 – 2018 **The International Brain Station**,
 The Kavli Foundation 90071826
 Role of the Project: Principal Investigator
 Budget: \$50,000 (direct) \$50,000 (total cost)
 Take the first few steps towards building the international brain station.
- 2017 – 2018 **Brain Comp Infra: EAGER: BrainLab CI: Collaborative, Community Experiments**,
 National Science Foundation ACI-1649880
 Role of Project: Co-Investigator (PI: Miller, Burns)
 Budget: \$180,736 (direct) \$113,863 (indirect) \$294,599 (total cost)
 The BrainLab CI prototype system will deploy an experimental-management infrastructure that allows users to construct community-wide experiments that implement data and metadata controls on the inclusion and exclusion of data.
- 2016 – 2019 **A Scientific Planning Workshop for Coordinating Brain Research Around the Globe National Science Foundation 1637376 Part 1 of 2**,
 Role of the Project: Principal Investigator
 Budget: \$97,950 (direct) \$97,950 (total cost)
 This travel grant is for the expressed purposes of gathering researchers from around the globe to discuss the new way to further brain research during part one of a two day conference.
- 2016 – 2019 **A Scientific Planning Workshop for Coordinating Brain Research Around the Globe National Science Foundation 1637376 Part 2 of 2**,
 Role of the Project: Principal Investigator
 Budget: \$14,491 (direct) \$1,836 (indirect) \$16,327 (total cost)
 This travel grant is for the expressed purposes of gathering researchers from around the globe to further discuss advancements in brain research during the second part of a two day conference.
- 2015 – 2018 **From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from**,
 Defense Advance Research Project Agency Grant N66001-15-C-40401
 Role on Project: Principal Investigator
 Budget: \$1,298,204 (direct) \$804,886.60 (indirect) \$2,103,091.60 (total cost)
 Multiple, large, multifarious brain imaging datasets are rapidly becoming standards in neuroscience. Yet, we lack the tools to analyze individual datasets, much less populations thereof. Therefore, we will develop theory and methods to analyze and otherwise make such data available.
- 2014 – 2016 **Scalable Grain Graph Analyses Using Big-Memory, High-IPS Compute Architectures**,
 Defense Advance Research Project Agency Grant N66001-14-1-4028
 Role on Project: Co-Investigator (PI: Burns)
 Budget: \$28,272 (direct) \$11,610 (indirect) \$39,882 (total cost)
 Build software infrastructure to enable analytics on billion node, terabyte sized networks using commodity hardware.
- 2014 – 2019 **Synaptomes of Mouse and Man**,
 R01NS092474
 Role on project: Co-Investigator (PI: Smith)
 Budget: \$491,341 (direct) \$265,076 (indirect) \$756,417 (total cost)
 The major goals of this project are to discover the synaptic diversity and complexity in mammalian brains, specifically comparing and contrasting humans with mice, the leading experimental animal.

- 2012 – 2015 **CRCNS: Data Sharing: The EM open Connectome Project**,
 National Institute of Biomedical Imaging and Bioengineering RO1EB16411
 Role of Project: Co-Investigator (PI: Burns)
 Budget: \$46,517 (direct) \$24,306 (indirect) \$70,823 (total cost)
 Develop cyberinfrastructure to support management, visualization, storage, and analysis of large-scale electron microscopy data.

Talks

Invited Talks (Local)

- [33] **Joshua T. Vogelstein**. "Open Access to the Brain: a Computer "Connectome" Links Brain Images in Fine Detail". In: JHM Boot Camp, June 2019. URL: <https://neurodata.io/talks/bootcamp19.html>.
- [32] **Joshua T. Vogelstein**. "Big Biomedical Data Science". In: Sol Goldman International Conference, Apr. 2019. URL: <https://neurodata.io/talks/goldman19.html>.
- [31] **Joshua T. Vogelstein**. "Journey to Here". In: JHU BMES talks, Apr. 2019. URL: <https://neurodata.io/talks/jhu-bmes19.html>.
- [30] **Joshua T. Vogelstein**. "NeuroData (Science)". In: Kavli, Apr. 2019. URL: <https://neurodata.io/talks/kavli19.html>.
- [29] **Joshua T. Vogelstein**. "NeuroData Tools". In: NeuroData Hackashop, Mar. 2019. URL: <https://neurodata.io/talks/tools19.html#1>.
- [28] **Joshua T. Vogelstein**. "Biomedical Big Data and Data Science". In: JHU BME, Feb. 2019. URL: <https://neurodata.io/talks/datascience19.html>.
- [27] **Joshua T. Vogelstein**. "Data Intensive Brain Science". In: Kavli Neuroscience Discovery Institute, June 2018.
- [26] **Joshua T. Vogelstein**. "Using Big Data Science to Understand What Goes On in our Heads". In: SOHOP Faculty Spotlight, Apr. 2018. URL: <https://neurodata.io/talks/big-data-science/>.
- [25] **Joshua T. Vogelstein**. "Engineering the Future of Medicine: Data Intensive Biomedical Science". In: Johns Hopkins University Biomedical Engineering, Mar. 2018.
- [24] **Joshua T. Vogelstein**. "Data Coordination and Data Resources for the BRAIN Initiative". In: 4th Annual BRAIN Initiative Investigators Meeting, 2018.
- [23] **Joshua T. Vogelstein**. "Opportunities and Challenges in Big Data Neuroscience". In: Society for Neuroscience, 2017.
- [22] **Joshua T. Vogelstein**. "Using Big Data Science to Understand What Goes on in Our Heads". In: SOHOP Faculty Spotlight, 2017. URL: <https://neurodata.io/talks/big-data-science/>.
- [21] **Joshua T. Vogelstein**. "The International Brain Station (TIBS)". In: JHU BME and Tsinghua University, 2017.
- [20] **Joshua T. Vogelstein**. "NeuroStorm". In: Global Brain Workshop 2 JHU, 2017.
- [19] **Joshua T. Vogelstein**. "Challenges and Opportunities in Big Data for Neuroscientists". In: Society for Neuroscience: DC Metro Area Chapter Keynote Address, 2017. URL: <https://neurodata.io/talks/sfn17.html>.
- [18] **Joshua T. Vogelstein**. "Using Big Data Science to Understand What Goes on in Our Heads". In: SOHOP Faculty Spotlight, 2016. URL: <https://neurodata.io/talks/big-data-science/>.
- [17] **Joshua T. Vogelstein**. "The International Brain Station (TIBS)". In: Kavli Foundation, 2016.
- [16] **Joshua T. Vogelstein**. "NeuroData 2016". In: NeuroData Lab Retreat, 2016.
- [15] **Joshua T. Vogelstein**. "Global Brain Workshop 2016". In: Global Brain Workshop NSF+JHU at Kavli, 2016.
- [14] **Joshua T. Vogelstein**. "Global Brain Workshop 2016". In: Kavli Neuroscience Discovery Institute & Center for Imaging Science, 2016.
- [13] **Joshua T. Vogelstein**, Michael I. Miller, and Richard Hanganir. "Global Brain Workshop 2016". In: Kavli Neuroscience Discovery Institute & Center for Imaging Science @ JHU, 2016.

- [12] **Joshua T. Vogelstein.** “[Learning a Data-Driven Nosology: Progress, Challenges & Opportunities](#)”. In: Kavli Neuroscience Discovery Institute & Center for Imaging Science, 2016.
- [11] **Joshua T. Vogelstein.** “[NeuroData: Enabling Terascale Neuroscience](#)”. In: Kavli Neuroscience Discovery Institute & Center for Imaging Science, 2016.
- [10] **Joshua T. Vogelstein.** “[NeuroData: Enabling Terascale Neuroscience](#)”. In: JHU Kavli Neuroscience Discovery Institute, 2016.
- [9] **Joshua T. Vogelstein.** “[The International Brain Station \(TIBS\)](#)”. In: United Nations Global Brain Workshop Meeting, 2016.
- [8] **Joshua T Vogelstein.** “[Special Symposium: Neuroscience in the 21st Century](#)”. In: Kavli, 2015.
- [7] **Joshua T Vogelstein.** “[Open Connectome Project: Lowering the Barrier to Entry of Big Data Neuroscience](#)”. In: Institute for Computational Medicine at Johns Hopkins University, 2015.
- [6] **Joshua T. Vogelstein.** “Open Source Platform for Heterogenous Brain Data”. In: figshare, 2015. URL: https://figshare.com/articles/Open_Source_Platform_for_Heterogeneous_Brain_Data/1381926.
- [5] **Joshua T Vogelstein.** “[Big \(Neuro\) Statistics](#)”. In: Kavli Salon: Big Data: Practice Across Disciplines, 2014. URL: http://figshare.com/articles/Big%5C_Neuro%5C_Statistics/1142907.
- [4] **Joshua T Vogelstein.** “[Open-Science Platform for Heterogeneous Brain Data: Opportunities and Challenges](#)”. In: Kavli, 2014.
- [3] **Joshua T Vogelstein.** “Decision Theoretic Approach to Statistical Inference”. In: guest Lecture in Current Topics in Machine Learning, Johns Hopkins University, 2012.
- [2] **Joshua T Vogelstein.** “Once we get connectomes, what the %#* are we going to do with them?” In: Institute of Neuroinformatics, 2011.
- [1] **Joshua T Vogelstein.** “[Inferring spike times given typical time-series fluorescence observations](#)”. In: Department of Applied Mathematics and Statistics, Johns Hopkins University, 2008.

Invited Talks (International)

- [68] **Joshua T. Vogelstein.** “Ailey in an Hour: (A "Soup-to-Nuts" Pipeline for Analysis of Whole Cleared Brain Data)”. In: NeuroNex, Oct. 2019. URL: <https://neurodata.io/talks/neuronex19.html>.
- [67] **Joshua T. Vogelstein, Hayden Helm, Ronak Mehta, Carey E. Priebe, and Raman Arora.** “A Theory and Practice of the Lifelong Learnable”. In: L2M, Sept. 2019. URL: https://neurodata.io/talks/L2F_18mo.html.
- [66] **Joshua T. Vogelstein and Randal Burns.** “Data Science Core”. In: Harvard University, July 2019. URL: https://neurodata.io/talks/ZZ_MSCZ_U19.pptx.
- [65] **Jaewon Chung.** “Statistical Methods for Population of Connectomes”. In: Organization of Human Brain Mapping, June 2019. URL: <https://neurodata.io/talks/ohbm19.html>.
- [64] **James Browne.** “Forest Packing: Fast Parallel, Decision Forests”. In: SIAM International Conference on Data Mining, May 2019. URL: <https://neurodata.io/talks/ForestPacking2019JamesBrowne.pptx>.
- [63] **Daniel Tward.** “Brain mapping tools for neuroscience research”. In: NeuroNex, May 2019. URL: https://neurodata.io/talks/tward_neuronex2.pdf.
- [62] **Joshua T. Vogelstein.** “Big Data and the Life Sciences”. In: Sloan Foundation, May 2019. URL: <https://neurodata.io/talks/SloanFoundation2019.pptx>.
- [61] **Joshua T. Vogelstein.** “Statistical Foundations For Connectomics”. In: Max Planck / HHMI Connectomics Meeting, Apr. 2019. URL: <https://neurodata.io/talks/connectomics19.html>.
- [60] **Joshua T. Vogelstein.** “Connectal Coding”. In: Dipy Workshop, Mar. 2019. URL: <https://neurodata.io/talks/DiPy19.html>.
- [59] **Joshua T. Vogelstein.** “Lifelong Learning Forests”. In: L2M, Mar. 2019. URL: https://neurodata.io/talks/L2F_1yr.html.
- [58] **Joshua T. Vogelstein.** “Connectome Coding”. In: Society for Neuroscience, Nov. 2018. URL: <https://neurodata.io/talks/SFN18.html>.

- [57] **Joshua T. Vogelstein**. “NeuroData: A Community-developed open-source computational ecosystem for big neuro data”. In: NeuroNex, Oct. 2018. URL: <https://neurodata.io/talks/neuronex18.html>.
- [56] **Joshua T Vogelstein**. “A Community-Developed Open-Source Computational Ecosystem for Big Neuro Data”. In: Princeton, Aug. 2018. URL: <https://neurodata.io/talks/princeton2018.html>.
- [55] *C. Shen*. “The Exact Equivalence of Distance and Kernel Methods for Hypothesis Testing”. In: Joint Statistical Meeting, Aug. 2018.
- [54] **Joshua T Vogelstein**. “Multiscale Graph Correlation: A Knowledge Representation System for Discovering Latent Geometric Structure”. In: DARPA SIMPLEX PI Review Meeting, Aug. 2018. URL: <https://neurodata.io/talks/mgc-simplex.html>.
- [53] *Eric Perlman*. “NeuroData: Embracing Open Source for Big Data Neuroscience”. In: NSF NeuroNex Workshop on Super 3DEM, July 2018. URL: <https://neurodata.io/talks/neuronex-3dem.html>.
- [52] *Eric W Bridgeford*. “A High-Throughput Pipeline Identifies Robust Connectomes but Troublesome Variability”. In: Organization of Human Brain Mapping, July 2018. URL: http://ericwb.me/lectures/ohbm/ohbm_ndmg.html#.
- [51] **Joshua T. Vogelstein** and *Vikram Chandrashekhhar*. “**NeuroNex + Stanford**”. In: NeuroNex-Stanford, July 2018.
- [50] *Gregory Kiar*. “Connectome Coding: what is it, how do we do it, and why do we care?” In: Data science in Neuroscience Symposium, June 2018.
- [49] **Joshua T. Vogelstein**. “**Lifelong Learning Forests**”. In: Darpa L2M PI Meeting, June 2018.
- [48] **Joshua T Vogelstein**. “Discovering Relationships and their Geometry Across Disparate Data Modalities”. In: Yale, Jan. 2018. URL: <https://neurodata.io/talks/mgc.html>.
- [47] **Joshua T. Vogelstein**. “Discovering Relationships and their Geometry Across Disparate Data Modalities”. In: Stanford, Aug. 2017. URL: <https://neurodata.io/talks/mgc.html>.
- [46] *Disa Mhembe*. “knor: a NUMA-Optimized In-Memory, Distributed and Semi-External-Memory k-means library”. In: HPDC, June 2017. URL: <https://github.com/neurodata/talks/blob/master/p67-mhembe.pdf>.
- [45] **Joshua T. Vogelstein**. “**NeuroData**”. In: 2017.
- [44] **Joshua T. Vogelstein**. “**Connectome Coding**”. In: Schmidt Sciences, 2017.
- [43] *Gregory Kiar*. “Science in the Cloud (SIC): A use-case in MRI Connectomics”. In: Open Science Special Interest Group, 2017.
- [42] *Disa Mhembe*. “knor: K-means NUMA Optimized Routines Library”. In: High-Performance Parallel and Distributed Computing, 2017. DOI: [10.1145/3078597.3078607](https://doi.org/10.1145/3078597.3078607).
- [41] *Youjin Lee*. “**Network Dependence Testing via Diffusion Maps and Distance-Based Correlations**”. In: Joint Statistical Meetings, 2017.
- [40] *T. M. Tomita*. “ROFLMAO: Robust Oblique Forests with Linear Matrix Operations”. In: SIAM International Conference on Data Mining, 2017. DOI: [10.1137/1.9781611974973.56](https://doi.org/10.1137/1.9781611974973.56).
- [39] *C. Shen*. “Multiscale Generalized Correlation”. In: Joint Statistical Meeting, Aug. 2016.
- [38] **Joshua T Vogelstein**. “**NeuroData: Enabling Terascale Neuroscience for Everyone**”. In: Keystone Symposia: State of the Brain, 2016.
- [37] **Joshua T Vogelstein**. “NeuroData: Enabling Terascale Neuroscience for Everyone”. In: 4th Annual BRAIN Initiative Investigators Meeting, 2016.
- [36] **Joshua T. Vogelstein**. “**The International Brain Station (TIBS)**”. In: United Nations Global Brain Workshop Meeting, 2016.
- [35] *C. Shen*. “Local Distance Correlation for Testing Independence”. In: Temple University, Nov. 2015.
- [34] **Joshua T. Vogelstein**. “big time (series data in neuroscience)”. In: figshare, 2015. URL: https://figshare.com/articles/big_time_series_data_for_neuroscience_/1591211.
- [33] **Joshua T Vogelstein**. “**Research Computing Support for Neuroscience and Other Life Sciences**”. In: CASC, 2015.

- [32] **Joshua T Vogelstein**. “From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data”. In: SIMPLEX Kickoff, 2015.
- [31] **Joshua T Vogelstein**. “From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data: Part 1”. In: DARPA SIMPLEX PI Meeting, 2015.
- [30] **Joshua T Vogelstein**. “From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data: Part 2”. In: DARPA SIMPLEX PI Meeting, 2015.
- [29] **Joshua T Vogelstein** and Liam Paninski. “Spike inference from calcium imaging using sequential Monte Carlo methods”. In: AMSI Program on Sequential Monte Carlo, 2015. URL: https://figshare.com/articles/Spike_Inference_from_Calcium_Imaging_using_Sequential_Monte_Carlo_Methods/1285825.
- [28] **Joshua T Vogelstein**. “Law of Large Graphs”. In: DARPA Graphs, 2015.
- [27] **Joshua T Vogelstein**. “Opportunities and Challenges in Big Data Neuroscience”. In: DoE, 2015.
- [26] **Joshua T Vogelstein**. “Top Challenges of Big Data Neuroscience”. In: BRAIN Initiative Workshop, Dec. 2014.
- [25] **Joshua T Vogelstein**. “Big Statistics for Brain Sciences”. In: Baylor College of Medicine, Department of Neuroscience, May 2014.
- [24] **Joshua T Vogelstein**. “Open-Science Platform for Heterogeneous Brain Data: Opportunities and Challenges”. In: Kavli, 2014.
- [23] **Joshua T Vogelstein**. “Statistical Inference on Graphs”. In: University of Michigan, 2013.
- [22] **Joshua T Vogelstein**. “Statistical Inference on Graphs”. In: Scientific Computing Institute, University of Utah, 2013.
- [21] **Joshua T Vogelstein**. “Beyond Little Neuroscience”. In: Beyond Optogenetics workshop at Cosyne, 2013.
- [20] **Joshua T Vogelstein**. “Open Problems in Neuropsychiatry”. In: Data Seminar, Duke University, 2013.
- [19] **Joshua T Vogelstein**. “Statistical Models and Inference for big Brain-Graphs”. In: NIPS Workshop on Acquiring and analyzing the activity of large neural ensembles, 2013.
- [18] **Joshua T Vogelstein**. “BIG NEURO”. In: Theory and Neurobiology, Duke University, 2012.
- [17] **Joshua T Vogelstein**. “Open Connectome Project”. In: Academic Medical Center, Amsterdam, 2012.
- [16] **Joshua T Vogelstein**. “Are mental properties supervenient on brain properties”. In: NIPS workshop on Philosophy and Machine Learning, 2011.
- [15] **Joshua T Vogelstein**. “What can Translational neuroimaging Research do for Clinical Practice”. In: Child Mind Institute, 2011.
- [14] **Joshua T Vogelstein**. “Statistical Connectomics”. In: Harvard University Connectomics Labs, 2011.
- [13] **Joshua T Vogelstein**. “Once we get connectomes, what the %##* are we going to do with them?” In: Krasnow Institute for Advanced Study at George Mason Univeristy, 2011.
- [12] **Joshua T Vogelstein**. “Consistent Connectome Classification”. In: Math/Bio Seminar, Duke University, 2011.
- [11] **Joshua T Vogelstein**. “Connectome Classification: Statistical Graph Theoretic Methods for Analysis of MR-Connectome Data”. In: Organization for Human Brain Mapping, 2011.
- [10] **Joshua T Vogelstein**. “Consistent Graph Classification”. In: Guest Lecture in Deisseroth Lab, Stanford University, 2011.
- [9] **Joshua T Vogelstein**. “Neurocognitive Graph Theory”. In: National Security Agency, 2009.
- [8] **Joshua T Vogelstein**. “OOPSI: A Family of Optimal Optical Spike Inference Algorithms for Inferring Neural Connectivity from Population Calcium Imaging”. In: Dissertation Defense, 2009. URL: https://www.researchgate.net/publication/45657467%5C_OOPSI%5C_A%5C_family%5C_of%5C_optimal%5C_optical%5C_spike%5C_inference%5C_algorithms%5C_for%5C_inferring%5C_neural%5C_connectivity%5C_from%5C_population%5C_calcium%5C_imaging.

- [7] **Joshua T Vogelstein**. “Sequential Monte Carlo in Neuroscience”. In: SAMSI Program on Sequential Monte Carlo, Tracking Working Group, 2009.
- [6] **Joshua T Vogelstein**. “Towards Inference and Analysis of Neural Circuits Inferred from Population Calcium Imaging”. In: Guest Lecture in Schnitzer Lab, 2009.
- [5] **Joshua T Vogelstein**. “Towards Inferring Neural Circuits from Calcium Imaging”. In: Guest Lecture in Yuste Lab, 2009.
- [4] **Joshua T Vogelstein**. “Inferring Spike Trains Given Calcium-Sensitive Fluorescence Observations”. In: Statistical Analysis of Neural Data, 2008.
- [3] **Joshua T Vogelstein**. “Inferring spike trains from Calcium Imaging”. In: Redwood Center for Theoretical Neuroscience, University of California, Berkeley, 2008.
- [2] **Joshua T Vogelstein**. “Inferring spike trains from Calcium Imaging”. In: Cambridge University, Gatsby Unit, and University College London, 2008.
- [1] **Joshua T Vogelstein**. “Model based optimal inference of spike times and calcium dynamics govern noisy and intermittent calcium-fluorescence observations”. In: Neurotheory Center of Columbia University, 2007.

Abstracts / Posters

- [51] *Benjamin D Pedigo*, Michael Winding, Turan Orujlu, Marta Zlatic, Albert Cardona, Carey E Priebe, and **Joshua T Vogelstein**. “A quantitative comparison of a complete connectome to artificial intelligence architectures”. In: NAISys, 2020.
- [50] **Joshua T. Vogelstein**, *Hayden Helm*, *Benjamin D. Pedigo*, *Ronak Mehta*, Carey E. Priebe, and Chris White. “A Biological Implementation of Lifelong Learning in the Pursuit of Artificial General Intelligence”. In: NAISys, 2020.
- [49] Benjamin Falk and **Joshua T. Vogelstein**. “NeuroData’s Open Data Cloud Ecosystem”. In: Harvard University, July 2019. URL: https://neurodata.io/talks/25_NeuroData_Open_Data_Ecosystem.pdf.
- [48] *Jaewon Chung*, *Benjamin D. Pedigo*, Carey E. Priebe, and **Joshua T. Vogelstein**. “Clustering Multi-Modal Connectomes”. In: OHBM, 2019. URL: https://figshare.com/articles/Clustering_Multi-Modal_Connectomes/8309672.
- [47] *James Browne*, *Disa Mhembe*, *Tyler M. Tomita*, **Joshua T. Vogelstein**, and Randal Burns. “Forest Packing: Fast Parallel Decision Forests”. In: SIAM International Conference on Data Mining, 2019. URL: https://figshare.com/articles/Forest_Packing_Fast_Parallel_Decision_Forests/8194142.
- [46] *Benjamin D. Pedigo*, *Jaewon Chung*, *Eric W. Bridgeford*, *Bijan Varjavand*, Carey E. Priebe, and **Joshua T. Vogelstein**. “GraSPy: an Open Source Python Package for Statistical Connectomics”. In: Max Planck / HHMI Connectomics Meeting Berlin, 2019. URL: https://figshare.com/articles/GraSPy_an_Open_Source_Python_Package_for_Statistical_Connectomics/7982888.
- [45] *Jaewon Chung*, *Benjamin D. Pedigo*, Carey E. Priebe, and **Joshua T. Vogelstein**. “Human Structural Connectomes are Heritable”. In: OHBM, 2019. URL: https://figshare.com/articles/Structural_Connectomes_are_Heritable/7800587.
- [44] Eric Perlman. “NEURODATA: ENABLING BIG DATA NEUROSCIENCE”. In: Kavli, 2017. URL: https://neurodata.io/talks/perlman_kndi_2017.pdf.
- [43] *Alex Baden*, Eric Perlman, Forrest Collman, Stephen Smith, **Joshua T. Vogelstein**, and Randal Burns. “Processing and Analyzing Terascale Conjugate Array Tomography Data”. In: Berlin, 2017. URL: https://neurodata.io/talks/berlin_2017.pdf.
- [42] *Shaojie Chen*, **Joshua T Vogelstein**, Seonjoo Lee, Martin Lindquist, and Brian Caffo. “High Dimensional State Space Model with L-1 and L-2 Penalties”. In: ENAR 2015, 2015. URL: http://www.enar.org/abstracts/2015_Program_Abstracts_03-02-15.pdf.
- [41] *Shaojie Chen*, Kai Liu, Yang Yuguang, Lee Seonjoo, Martin Lindquist, Brian Caffo, and **Joshua T Vogelstein**. “A Sparse High Dimensional State-Space Model with an Application to Neuroimaging Data”. In: Figshare, 2015. URL: https://figshare.com/articles/A_Sparse_High_Dimensional_State_Space_Model_with_an_Application_to_Neuroimaging_Data/1515020.

- [40] *Shangsi Wang*, Zhi Yang, Xi-Nian Zuo, Michael Milham, Cameron Craddock, Carey E. Priebe, and **Joshua T. Vogelstein**. “Optimal Design for Discovery Science: Applications in Neuroimaging”. In: Figshare, 2015. URL: https://figshare.com/articles/Optimal_Design_for_Discovery_Science_Applications_in_Neuroimaging/1515021.
- [39] Eva L. Deyer, Hugo L. Fernandes, *Will Gray Roncal*, Doga Gursoy, **Joshua T Vogelstein**, Xianghui Xiao, Chris Jacobsen, Konrad P. Kording, and Narayanan Kasthuri. “X-Brain: Quantifying Mesoscale Neuroanatomy Using X-ray Microtomography”. In: Figshare, 2015. URL: https://figshare.com/articles/X_Brain_Quantifying_Mesoscale_Neuroanatomy_Using_X_Ray_Microtomography/1585163.
- [38] Stephen J. Smith, Randal Burns, Mark Chevillet, Ed Lein, Guillermo Sapiro, William Seeley, James Trimmer, **Joshua T Vogelstein**, and Richard Weinberg. “The Open Synaptome Project: Toward a Microscopy-Based Platform for Single-synapse Analysis of Diverse Populations of CNS Synapses”. In: Society for Neuroscience, 2015. URL: https://figshare.com/articles/Open_Synaptome_Project/1585165.
- [37] **Joshua T Vogelstein**. “Open Connectome Project & NeuroData: Enabling Data-Driven Neuroscience at Scale”. In: Society for Neuroscience, 2015. URL: https://figshare.com/articles/NeuroData_amp_The_Open_Connectome_Project_Enabling_Big_Data_Neuroscience_at_Scale/1585167.
- [36] Sharad Sikka, Brian Cheung, Ranjit Khanuja, Satra Ghosh, Chao-gan Yan, Qingyang Li, **Joshua Vogelstein**, Randal Burns, Stanley Colcombe, Cameron Craddock, Maarten Mennes, Clare Kelly, Adriana Dimartino, Francisco Castellanos, and Michael Milham. “Towards automated analysis of connectomes: The configurable pipeline for the analysis of connectomes (c-pac)”. In: vol. 10. 5th INCF Congress of Neuroinformatics, Munich, Germany, 2014. URL: https://www.frontiersin.org/10.3389/conf.fninf.2014.08.00117/event_abstract.
- [35] Sharad Sikka, Brian Cheung, Ranjit Khanuja, Satra Ghosh, Chao-gan Yan, Qingyang Li, **Joshua Vogelstein**, RandalTheChair Burns, Stanley Colcombe, Cameron Craddock, Maarten Mennes, Clare Kelly, Adriana Dimartino, Francisco Castellanos, and Michael Milham. “Towards Automated Analysis of Connectomes: The Configurable Pipeline for the Analysis of Connectomes (C-PAC)”. In: 2013. URL: <http://www.frontiersin.org/neuroinformatics/10.3389/conf.fninf.2014.08.00117/full>.
- [34] **Joshua T Vogelstein** and Carey E Priebe. “Nonparametric Two-Sample Testing on Graph-Valued Data.” In: Duke Workshop on Sensing and Analysis of HighDimensional Data, 2013.
- [33] Yichen Qin, *Disa Mhembe*, Sephira Ryman, Rex Jung, **R. Jacob Vogelstein**, Randal Burns, Joshua Vogelstein, and Carey Priebe. “Robust Clustering of Adjacency Spectral Embeddings of Brain Graph Data via Lq-Likelihood”. In: OHBM, 2013. URL: <http://dx.doi.org/10.6084/m9.figshare.1284153>.
- [32] Daniel L Sussman, *Disa Mhembe*, Sephira Ryman, Rex Jung, R. Jacob Vogelstein, Randal Burns, Joshua T Vogelstein, and Carey E Priebe. “Massive Diffusion MRI Graph Structure Preserves Spatial Information”. In: OHBM, 2013. URL: <http://dx.doi.org/10.6084/m9.figshare.1284155>.
- [31] *Disa Mhembe*, **Randal Burns**, Joshua T. Vogelstein, R. Jacob Vogelstein, Daniel Sussman, Carey Preibe, Rex Jung, and Sephira Ryman. “Multivariate Invariants from Massive Brain-Graphs”. In: OHBM, 2013. URL: <http://dx.doi.org/10.6084/m9.figshare.1284154>.
- [30] *William Gray Roncal*, Dean M. Kleissas, James M. Burck, Priya Manavalan, **Joshua T. Vogelstein**, Eric Perlman, Randal Burns, and R. Jacob Vogelstein. “Towards a Fully Automatic Pipeline for Connectome Estimation from High-Resolution EM Data”. In: OHBM, 2013. URL: <http://dx.doi.org/10.6084/m9.figshare.1284151>.
- [29] N. Sismanis, D. L. Sussman, **J. T. Vogelstein**, *W. Gray*, R. J. Vogelstein, E. Perlman, *D. Mhembe*, S. Ryman, R. Jung, R. Burns, C. E. Priebe, N. Pitsianis, and X. Sun. “Feature Clustering from a Brain Graph for Voxel-to-Region Classification”. In: 5th Panhellenic Conference on Biomedical Technology, 2013. URL: <http://dx.doi.org/10.6084/m9.figshare.1284143>.
- [28] **Joshua T Vogelstein** et al. “Anomaly Screening and Clustering of Multi-OBject Movies via Multiscale Structure Learning”. In: DARPA XDATA Colloquium, 2013.

- [27] Eftychios A. Pnevmatikakis, Tim Machado, Logan Grosenick, Ben Poole, **Joshua T. Vogelstein**, and Paninski Liam. “Rank-penalized nonnegative spatiotemporal deconvolution and demixing of calcium imaging data”. In: COSYNE, 2013. URL: <http://dx.doi.org/10.6084/m9.figshare.1284170>.
- [26] Airan Raag D, **Joshua Vogelstein**, Brian Caffo, James J Pekar, and Sair Haris I. “Reproducible differentiation of individual of individual subjects with minimal acquisition time via resting state fMRI”. In: Proc ISMRM, 2013, p. 1932. URL: <http://dx.doi.org/10.6084/m9.figshare.1284146>.
- [25] Danai Koutra, Yu Gong, Sephira Ryman, Rex Jung, **Joshua T. Vogelstein**, and Christos Faloutsos. “Are All Brains Wired Equally?” In: vol. 1. 4.2. Proceedings of the 19th Annual Meeting of the Organization for Human Brain Mapping (OHBM), 2013, p. 3. URL: <http://dx.doi.org/10.6084/m9.figshare.1284149>.
- [24] *William R. Gray*, Dean M. Kleissas, James M. Burck, **Joshua T. Vogelstein**, Eric Perlman, Philippe M. Burlina, Randal Burns, and Vogelstein R. Jacob. “Towards a Fully Automatic Pipeline for Connectome Estimation from High-Resolution EM Data”. In: Cold Spring Harbor Laboratory, Neuronal Circuits, 2012. URL: <http://dx.doi.org/10.6084/m9.figshare.1284176>.
- [23] **Joshua T. Vogelstein**, Davi Bock, *William Gray*, Daniel Sussman, Randal Burns, Dean Kleissas, David Marchette, Donniell E. Fishkind, Minh Tang, Greg Hager, R. Jacob Vogelstein, and Priebe Carey E. “Statistical Connectomics”. In: Janelia Farm conference, Statistical Inference and Neuroscience, 2012. URL: <http://dx.doi.org/10.6084/m9.figshare.1284174>.
- [22] **J. Vogelstein**, S. Sikka, B. Cheung, R. Khanuja, Q. Li, .G. Yan C, C. Priebe, V. Calhoun, R. J. Vogelstein, M. Milham, and R. Burns. “BRAINSTORM towards clinically and scientifically useful neuroimaging analytics”. In: Neuroinformatics, 2012. URL: <http://dx.doi.org/10.6084/m9.figshare.1284173>.
- [21] **J T Vogelstein**, D E Fishkind, D L Sussman, and C E Priebe. “Large graph classification: theory and statistical connectomics applications”. In: IMA conference on Large Graphs, 2011. URL: <http://dx.doi.org/10.6084/m9.figshare.1284184>.
- [20] **Joshua T Vogelstein**, D L Sussman, M Tang, D E Fishkind, and Carey E Priebe. “Dot product embedding in large (errorfully observed) graphs with applications in statistical connectomics”. In: IMA conference on Large Graphs, 2011.
- [19] **Joshua T Vogelstein**, *William R Gray*, R Jacob Vogelstein, J Bogovic, S Resnick, J Prince, and Carey E Priebe. “Connectome Classification: Statistical Graph Theoretic Methods for Analysis of MR-Connectome Data”. In: Organization for Human Brain Mapping, 2011. URL: <http://dx.doi.org/10.6084/m9.figshare.1284179>.
- [18] **Joshua T Vogelstein**, E Perlman, D Bock, W C Lee, M Chang, B Kasthuri, M Kazhdan, C Reid, J Lichtman, R Burns, and R Jacob Vogelstein. “Open Connectome Project: collectively reverse engineering the brain one synapse at a time”. In: *Neuroinformatics* (2011). URL: <http://dx.doi.org/10.6084/m9.figshare.1284181>.
- [17] **Joshua T Vogelstein**, *W Gray*, J G Martin, G C Coppersmith, M Dredze, J Bogovic, J L Prince, S M Resnick, Carey E Priebe, and R J Vogelstein. “Connectome Classification using statistical graph theory and machine learning”. In: Society for Neuroscience, 2011. URL: <http://dx.doi.org/10.6084/m9.figshare.1284178>.
- [16] *William R Gray*, J A Bogovic, **Joshua T Vogelstein**, C Ye, B A Landman, J L Prince, and R Jacob Vogelstein. “Magnetic resonance connectome automated pipeline and repeatability analysis”. In: Society for Neuroscience, 2011. URL: <http://dx.doi.org/10.6084/m9.figshare.1284177>.
- [15] **Joshua T Vogelstein**, Carey E Priebe, R Burns, R Jacob Vogelstein, and J Lichtman. “Measuring and reconstructing the brain at the synaptic scale: towards a biofidelic human brain in silico”. In: DARPA Neural Engineering, Science and Technology Forum, 2010. URL: <http://dx.doi.org/10.6084/m9.figshare.1285813>.
- [14] *William R Gray*, **Joshua T Vogelstein**, J Bogovic, A Carass, J L Prince, B Landman, D Pham, L Ferrucci, S M Resnick, Carey E Priebe, and R Jacob Vogelstein. “Graph-Theoretical Methods for Statistical Inference on MR Connectome Data”. In: DARPA Neural Engineering, Science and Technology Forum, 2010. URL: <http://dx.doi.org/10.6084/m9.figshare.1285815>.

- [13] **Joshua T Vogelstein**, J Bogovic, A Carass, *WR Gray*, JL Prince, B Landman, D Pham, L Ferrucci, SM Resnick, Carey E Priebe, and RJ Vogelstein. “Graph-Theoretical Methods for Statistical Inference on MR Connectome Data”. In: Organization for Human Brain Mapping, 2010. URL: <http://dx.doi.org/10.6084/m9.figshare.1285813>.
- [12] **Joshua T Vogelstein**, RJ Vogelstein, and Carey E Priebe. “A Neurocognitive Graph-Theoretical Approach to Understanding the Relationship Between Minds and Brains”. In: CSHL conference on Neural Circuits, 2010. URL: <http://dx.doi.org/10.6084/m9.figshare.1284694>.
- [11] **Joshua T Vogelstein**, Y Mishchenki, AM Packer, TA Machado, R Yuste, and L Paninski. “Towards Confirming Neural Circuit Inference from Population Calcium Imaging”. In: COSYNE, 2010. URL: <http://dx.doi.org/10.6084/m9.figshare.1284693>.
- [10] **Joshua T Vogelstein**, Y Mishchenki, AM Packer, TA Machado, R Yuste, and L Paninski. “Towards Inferring Neural Circuit Inference from Population Calcium Imaging”. In: COSYNE, 2010. URL: <http://dx.doi.org/10.6084/m9.figshare.1285819>.
- [9] **Joshua T Vogelstein**, Y Mishchenko, A M Packer, T A Machado, R Yuste, and L Paninski. “Towards Confirming Neural Circuits from Population Calcium Imaging”. In: NIPS Workshop on Workshop on Connectivity Inference in Neuroimaging, 2009. URL: <http://dx.doi.org/10.6084/m9.figshare.1285822>.
- [8] **Joshua T Vogelstein**, Y Mishchenki, AM Packer, TA Machado, R Yuste, and L Paninski. “Towards Inferring Neural Circuit Inference from Population Calcium Imaging”. In: COSYNE, 2009. URL: <http://dx.doi.org/10.6084/m9.figshare.1285821>.
- [7] **Joshua T Vogelstein**, B Babadi, BO Watson, R Yuste, and L Paninski. “From Calcium Sensitive Fluorescence Movies to Spike Trains”. In: Society for Neuroscience, 2008. URL: <http://dx.doi.org/10.6084/m9.figshare.1285824>.
- [6] **Joshua T Vogelstein**, B Babadi, and L Paninski. “Model-Based Optimal Inference of Spike-Times and Calcium Dynamics given Noisy and Intermittent Calcium-Fluorescence Imaging”. In: COSYNE, 2008. URL: <http://dx.doi.org/10.6084/m9.figshare.1285826>.
- [5] **Joshua T Vogelstein** and L Paninski. “Inferring Spike Trains, Learning Tuning Curves, and Estimating Connectivity from Calcium Imaging”. In: Integrative Approaches to Brain Complexity, 2008. URL: <http://dx.doi.org/10.6084/m9.figshare.1285827>.
- [4] **Joshua T Vogelstein**, B Jedynek, K Zhang, and L Paninski. “Inferring Spike Trains, Neural Filters, and Network Circuits from in vivo Calcium Imaging”. In: Society for Neuroscience, 2007. URL: <http://dx.doi.org/10.6084/m9.figshare.1285846>.
- [3] **Joshua T Vogelstein**, K Zhang, B Jedynek, and L Paninski. “Maximum Likelihood Inference of Neural Dynamics under Noisy and Intermittent Observations using Sequential Monte Carlo EM Algorithms”. In: COSYNE, 2007. URL: <http://dx.doi.org/10.6084/m9.figshare.1285828>.
- [2] **Joshua T Vogelstein** and K Zhang. “A novel theory for simultaneous representation of multiple dynamic states in hippocampus”. In: Society for Neuroscience, 2004.
- [1] **Joshua T Vogelstein**, LH Snyder, M Warchol, and DE Angelaki. “Up-down asymmetry in memory guided saccadic eye movements are independent of head orientation in space”. In: Society for Neuroscience, 2002.

Educational Activities

New Courses Created

- Fall '19 **NeuroData Design I**, EN.580.237/437/637, Course Director, enrollment 46.
- Spring '19 **NeuroData Design II**, EN.580.438/638, Course Director, enrollment 18.
- Fall '18 **NeuroData Design I**, EN.580.237/437/637, Course Director, enrollment 22.
- Spring '17 **NeuroData Design II**, EN.580.238/438/638, Course Director, enrollment 14.
- Winter '17 **BME Research Intersession**, EN.580.574, Course Director, enrollment 6.
- Fall '17 **NeuroData Design I**, EN.580.247/437/637, Course Director, enrollment 15.
- Spring '16 **The Art of Data Science**, EN.580.468, Course Director, enrollment 24.

Fall '16 **NeuroData Design I**, EN.580.437, Course Director, enrollment 16.

Spring '15 **Statistical Connectomics**, EN.580.694, Course Director, enrollment 26.

Courses Co-Taught

Fall '15 **Introduction to Computational Medicine**, Co-Teaching, Course Co-Director.

Spring '19 **Systems Bioengineering II**, EN.580.422, 2 Lectures.

Spring '19 **Computational Neuroscience**, AS.080.321, 2 Lectures.

Spring '18 **Systems Bioengineering II**, EN.580.422, 2 Lectures.

Spring '18 **Computational Neuroscience**, AS.080.321, 2 Lectures.

Spring '17 **Systems Bioengineering II**, EN.580.422, 2 Lectures.

Spring '16 **Systems Bioengineering II**, EN.580.422, 2 Lectures.

Winter '16 **Introduction to Connectomics**, EN.600.221, 1 Lecture.

Fall '16 **BME Modeling and Design**, EN.580.111, 1 Lecture.

Educational Workshops

Summer '19 **DiPy Workshop**, Bloomington, Indiana, 1 day lecture on statistical connectomics.

Fall '18 **Society for Neuroscience Annual Meeting**, Educational Workshop, San Diego, CA, 1 day lecture on statistical connectomics.

Fall '17 **Society for Neuroscience Annual Meeting**, Educational Workshop, San Diego, CA, 1 day lecture on statistical connectomics.

Summer '16 **CRCNS Course on Mining and Modeling of Neuroscience Data**, Redwood Center for Theoretical Neuroscience, University of California, Berkeley, 2 day lecture on statistical connectomics.

Mentorship

Research Track Faculty Mentorship (3)

02/19 – **Hayden Helm, MSE**, Assistant Research Faculty, BME, JHU.

Leading research efforts developing theory and methods for lifelong learning.

08/16 – 8/18 **Eric Perlman, PhD**, Assistant Research Scientist, BME, JHU.

Lead Scientist developing storage, transfer, and visualization solutions for large data in our cloud infrastructure.

03/16 – **Jesse Patsolic, MA**, Assistant Research Faculty, BME, JHU.

Lead developer converting our extensions to decision forests to be merged into sklearn.

Staff Research Scientists (4)

10/18 – **Alex Loftus**, Research Assistant, BME, JHU.

Current lead developer of NDMG, transitioning from a stand-alone package to be integrated with DiPy.

09/19 – **Ross Lawrence, BS**, Research Assistant, BME, JHU.

Responsible for documenting and bug fixing NDMG.

07/19 – **Ronak Mehta, MSE**, Research Assistant, BME, JHU.

Finalizing three manuscripts on (1) uncertainty forests, (2) time-series dependence quantification, and (3) lifelong learning forests.

06/18 – 12/19 **Benjamin Falk, PhD**, Research Engineer, BME, JHU.

Lead software engineer, oversees all development projects, solely responsible for all cloud infrastructure.

Postdoctoral Fellows (8)

07/19 – **Celine Drieu, PhD**, Post-doctoral Fellow, Kavli NDI, JHU.

Co-Advised by Assistant Prof. Kuchibhotla, Department of Psychological and Brain Sciences. Working on understanding learning and memory using two-photon calcium imaging.

07/19 – **Austin Grave, PhD**, Post-doctoral Fellow, Kavli NDI, JHU.

Co-Advised by Prof. Richard Huganir, Department of Neuroscience. Working on understanding whole brain synaptic plasticity using genetic engineering and light microscopy imaging.

- 06/19 – **Devin Crowley**, *Research Assistant*, BME, JHU.
Lead developer of our scalable Python implementation of LDDMM.
- 08/18 – **Jesús Arroyo, PhD**, *Post-doctoral Fellow*, CIS, JHU.
Working on graph matching and joint graph embedding.
- 07/18 – **Audrey Branch, PhD**, *Post-doctoral Fellow*, Kavli NDI, JHU.
Co-Advised by Prof Michela Gallagher, extending brain clearing experimental technology from mice to rats. Currently with a manuscript on biorxiv.
- 09/16 – 08/18 **Cencheng Shen, PhD**, *Post-Doctoral Fellow*, CIS, JHU.
Developed Multiscale Graph Correlation, which is currently the premiere hypothesis testing framework, and about to be integrated into SciPy, by far the world's leading scientific computing package. Currently an Assistant Professor in Department of Statistics at University of Delaware, and still an active collaborator and grantee.
- 05/16 – 06/17 **Leo Duan, PhD**, *Post-doctoral Fellow*, CIS, JHU.
Went on to do a second postdoc with Leo Dunson (who I did my second postdoc with). Currently an Assistant Professor at University of Florida.
- 06/16 – 07/17 **Guilherme Franca, PhD**, *Post-doctoral Fellow*, CIS, JHU.
Worked on non-parametric clustering, with an article about to be accepted in PAMI, the leading machine learning journal. Currently a postdoc for Rene Vidal.

Doctoral Student Supervision (8)

- 08/19 – **Michael Powell, MSE**, *PhD advisee*, BME, JHU.
Dissertation will focus on explainable artificial intelligence, spearheads collaboration with Andreas Muller, Co-Director of scikit-learn, the world's leading machine learning package.
- 06/19 – **Jaewon Chung, MSE**, *PhD advisee*, BME, JHU.
Dissertation will focus on statistics of populations of human networks. Already co-first author and middle author on multiple manuscripts.
- 08/19 – **Tommy Athey, BSE**, *PhD advisee*, BME, JHU.
Dissertation will focus on MouseLight project, spearheads collaborations with Prof. Jeremias Sulam and Michael I. Miller.
- 08/19 – **Eric Bridgeford, BSE**, *PhD advisee*, Department of Biostatistics, JHU.
Dissertation will focus on statistics of human connectomes and mitigating batch effects. Already first author on several manuscripts under review, and spearheads collaboration with Prof Brian Caffo at Biostatistics.
- 08/18 – **Benjamin Pedigo, BSE**, *PhD advisee*, BME, JHU.
Dissertation will focus on analysis and modeling of the world's first whole animal connectome, in collaboration with Marta Zlatic and Albert Cardona (formerly of Janelia Research Campus). Already co-first author and middle author on multiple manuscripts.
- 08/18 – **Meghana Madyastha, BSE**, *PhD Co-advisee*, CS, JHU.
Dissertation will focus on computational aspects of accelerating learning and inference using decision forests.
- 08/16 – **Vikram Chandrashekhar, BSE**, *PhD advisee*, BME, JHU.
Dissertation has focused on extending LDDMM to whole cleared brain datasets, spearheads collaboration with Prof. Karl Deisseroth's lab at Stanford, one of the world's leading neuroscientists.
- 08/14 – 01/18 **Tyler Tomita, PhD**, BME, JHU.
Developed Sparse Projection Oblique Randomer Forest in his dissertation, currently the best performing machine learning algorithm on a standard suite of over 100 benchmark problems. Currently a postdoc with Assistant Prof. Chris Honey of Psychology and Brain Sciences.

Visiting Doctoral Student Supervision

- 03/19 – 09/19 **Derek Pisner**, *PhD advisee*, JHU/ UT Austin.

Master's Student Supervision (6)

- 06/19 – **Bijan Varjavand**, *MS advisee*, BME, JHU.
Submitted manuscript to PAMI on advancing statistics on populations of networks.
- 06/19 – **Sambit Panda**, *MS advisee*, BME, JHU.
Led development of Python implementation of MGC, to be integrated into SciPy.

- 06/19 – **Varun Kotharkar**, *MS advisee*, AMS, JHU.
Investigating theoretical advantages of oblique, as compared to axis-aligned, decision trees.
- 06/18 – **Drishiti Mannan**, *MS advisee*, BME, JHU.
Preparing manuscript introducing novel specification for large attributed networks.
- 06/18 – 05/19 **Jaewon Chung**, *MSE advisee*, BME, JHU.
Co-first author of manuscript and co-lead developer of Python package for statistical analysis of networks. Currently a BME PhD student in my lab.
- 08/14 – 06/17 **Greg Kiar**, *MSE*, BME, JHU.
Lead developer of NDMG, the only existing “soup to nuts” pipeline for both functional and diffusion pipelines; co-first author of manuscript under review. Currently a PhD student at McGill University.

Undergraduate Student Supervision (8)

- 06/19 – **Vivek Gopalakrishnan**, *BSE*, BME, JHU.
Winner of Pistrutto Fellowship, worked on statistics of populations of connectomes in Austim mouse models and human data.
- 06/19 – **Ronan Perry**, *BSE*, BME, JHU.
Developed generalized canonical correlation analysis code for analysis of high-dimensional brain imaging data in a novel meditation dataset.
- 06/19 – 12/19 **Richard Guo**, *BSE*, BME, JHU.
Developed uncertainty forests, an approach for estimated posterior class probabilities, conditional entropy, and mutual information for high-dimensional data common in brain science applications.
- 08/14 – 08/18 **Eric Bridgeford**, *BSE*, BME, JHU.
Currently a PhD student in Biostatistics at JHSPH in my lab. Developed and applied a number of R and Python packages, including an fMRI pipeline, dimensionality reduction, and various graph statistics.
- 08/15 – 08/16 **Albert Lee**, *BSE*, BME, JHU.
Developed big data visualization tools.
- 06/15 – 12/15 **Ron Boger**, *BSE*, BME, JHU.
Currently working at a computational medicine start-up in Silicon Valley, worked on high-dimensional low-sample size theory.
- 05/15 – 05/16 **Jordan Matelsky**, *BSE*, CS and Neuroscience, JHU.
Currently a data scientist at APL, developed a number of simple WebApps in support of big data management.
- 02/15 – 05/16 **Ivan Kuznetsov**, *BSE*, BME, JHU.
Currently an MD/PhD Candidate at the UPenn, winner of [Soros Fellowship](#), worked on analysis of data from Dr. Daniel Amen, developed matrix exploratory data analysis package.

Summer Interns

- Summer '19 **Kareef Ullah**, *Summer Intern*, BME, JHU.
Will begin undergrad in BME at JHU in Fall 2020
- Summer '19 **Shunan Wu**, *Summer Intern*, BME, JHU.
Applied to BME PhD Program in Fall 2020
- Summer '19 **Shiyu Sun**, *Summer Intern*, BME, JHU.
Applied to BME PhD Program in Fall 2020
- Summer '19 **Sander Shulhoff**, *Summer Intern*, BME, JHU.
- Summer '19 **Kiki Zhang**, *Summer Intern*, BME, JHU.
- Summer '18 **Papa Kobina Van Dyck**, *Summer Intern*, BME, JHU.
Applied to PhD Program in Fall 2019

Examining Committees (9)

- 2019 **Browne, James**, *Computer Science*, JHU Ph.D. Student, Graduated 2019.
- 2019 **Mhembere, Disa**, *Computer Science*, JHU Ph.D. Student, Graduated 2019.
- 2018 **Kutten, Kwame**, *JHU Ph.D. Student*, Graduated 2018.
- 2018 **Wang, Shangsi**, *Applied Mathematics and Statistics*, JHU Ph.D. Student, Graduated 2018.
- 2018 **Tang, Runze**, *Applied Mathematics and Statistics*, JHU Ph.D. Student, Graduated 2018.

- 2018 **Lee, Youjin**, *Biostatistics*, JHU Ph.D. Student, Graduated 2018.
 2017 **Zheng, D**, *Computer Science*, JHU Ph.D. Student, Graduated 2017.
 2017 **Binkiewicz, Norbert**, *Statistics*, University of Wisconsin Ph.D. Student, Graduated 2017.
 2016 **Gray-Roncal, Will**, *Computer Science*, JHU Ph.D. Student, Graduated 2016.

Service

Grant Review Service

- 2015 **NSF Review Panel**, *Review for NSF BIG DATA Program*.

University Service

- Winter '19 **Track Organizer**, *AI in Healthcare: From Bench to Bedside*, Organizer for Breakout Topic Sessions on artificial intelligence.
 08/15 – 07/18 **Co-Developer**, *Computational Medicine Minor*.
 05/15 – 07/17 **Co-Founder and Faculty Advisor**, *MedHacks*, Medhacks is one of the first and largest hackathons dedicated specifically to hacking on medical advances, started entirely by BME undergrads at JHU.
 08/14 – 08/18 **Director of Undergraduate Studies**, *Institute for Computational Medicine*.

Department Service

- 2019 **Member**, *Search Committee*, BME, Neuroengineering, 2019.
 2019 **Member**, *Search Committee*, BME, Data Science, 2019.
 2018 **Member**, *Search Committee*, BME, Neuroengineering, 2018.

Service in Scientific Community

- 2017 – **Scientific Advisory Board**, *NSF NeuroNex*, Enhanced resolution for 3DEM analysis of synapses across brain regions and taxa, Provide scientific, computational, and statistical guidance to a flagship NSF funded BRAIN Initiative program.
 2017 – **Chair of Committee of Data Cores**, *U19 Data Cores*, The U19 program is NIH's flagship BRAIN Initiative program, with five original awardees, each with a dedicated Data Core and designated PI. I was elected the chair of the committee of Data Core PIs.
 2017 **Consultant for Nature Publishing Group**, The journal Nature, flagship journal of Nature Publishing Group, decided to create a "Code and Software Submission Checklist". They consulted me on their first draft, and I helped re-write it. An image of the final checklist is available [here](#).
 2011 – **Open Connectome Project**, The co-founder of the "Open Connectome Project" (OCP), for several years, I was the only neuroscientist that could easily store, manage, and analyze very big datasets, spanning first tens of terabytes, and then hundreds. For that reason, I was an essential co-author on a number of big data papers. Specifically, though I sometimes contributed relatively little to the scientific ideas, I often was required to complete, visualize, and/or share the data. Perhaps more importantly, both funding agencies and journals began mandating that these large datasets be publicly shared, and OCP was literally the only option. This is despite often not having funding, nor being a co-author, on the manuscripts.
 2010 – **AWS Open Neuro Data Registry**, Our lab co-founded the [Registry of Open Data on Amazon Web Services](#) (AWS). The implication of this is that now, pending a few minor considerations, any neuroscientist that collects large image data can deposit it online *for free*. This means that neither they nor we must request funding to store the data. Our lab maintains this repository, but only by virtue of ensuring instructions for uploading, visualizing, and downloading are up to date, and acting as a gatekeeper to ensure only appropriate data are deposited there.

Journal Service

Editorial Board

- 01/19 – **Associate Editor**, *Journal of the American Statistical Association*.

- 05/18 – **Editor**, *Neurons, Behavior, Data analysis, and Theory*.
- 08/16 – 10/16 **Guest Associate Editor**, *PLoS Computational Biology*.
- Conference and Journal Reviewer**
- Annals of Applied Statistics (AOAS).**
- Bioinformatics.**
- International Conference on Learning Representations (ICLR).**
- Network Science.**
- Current Opinion in Neurobiology.**
- Biophysical Journal.**
- IEEE International Conference on eScience.**
- IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP).**
- IEEE Global Conference on Signal and Information Processing (GlobalSIP).**
- IEEE Signal Processing Letters.**
- IEEE Transactions on Signal Processing.**
- Frontiers in Brain Imaging Methods.**
- Journal of Machine Learning Research (JMLR).**
- Journal of Neurophysiology.**
- Journal of the Royal Statistical Society B (JRSSB).**
- Nature Communications.**
- Nature Methods.**
- Nature Reviews Neuroscience.**
- Neural Computation.**
- Neural Information Processing Systems (Neurips).**
- NeuroImage.**
- Neuroinformatics.**
- PLoS One.**
- PLoS Computational Biology.**
- Conferences and Hackathon Organizer**
- Winter '19 **Track Organizer**, *AI in Healthcare: From Bench to Bedside*, Organizer for Breakout Topic Sessions on artificial intelligence.
- Winter '19 **Organizer**, *Decision Forest Hackathon*.
- Summer '19 **Organizer**, *NeuroData Workshop*, <https://neurodata.devpost.com>, Hackashop to train brain scientists in machine learning for big data (~ 50) participants from around the country.
- March '19 **Organizer**, *Neuro Reproducibility Hackashop*, <https://brainx3.io/>, Hackashop to train brain scientists in best practices in reproducible science, co-organized with two startups: Vathes, LLC and Gigantum (~ 50 participants).
- Spring '18 **Organizer**, *NeuroData Hackathon*.
- Fall '17 **Organizer**, *NeuroData Mini-Hackathon*.
- Summer '17 **Organizer**, *NeuroStorm*, <https://brainx2.io>, Workshop to bring together thought leaders from academia, national labs, industry, and non-profits around the world to take next steps towards accelerating brain science discovery in the cloud (~ 50 participants and 5 observers from funding institutions).
- Spring '16 **Organizer**, *Global Brain Workshop*, <http://brainx.io>, First ever international Brain Initiative workshop, bringing together leaders from around the world, covered by Nature and Science (~ 75 participants).
- Fall '16 **Co-Organizer**, *Brains and Bits: Neuroscience Meets Machine Learning*, *NIPS Workshop*, http://www.stat.ucla.edu/~akfletcher/brainsbits_overview.html.

- Winter '15 **Organizer**, *Hack@NeuroData*, <http://hack.neurodata.io/>.
- Fall '15 **Co-Organizer**, *BigNeuro2015: Making Sense of Big Neural Data*, NIPS Workshop, <http://neurodata.io/bigneuro2015>.
- Fall '12 **Co-Organizer**, *Scaling up EM Connectomics Conference*, The world's first connectomics workshop, now run annually alternating between Janelia Research and Max Plank locations (~ 80 participants).

Awards and Recognition

Individual

- 2002 **Dean's List**, *Washington University*.

Shared (10)

- 2019 **Kavli NDI Distinguished Postdoctoral Fellow**, Celine Drieu, PhD.
- 2019 **Kavli NDI Distinguished Postdoctoral Fellow**, Austin Graves, PhD.
- 2019 **Winner of Pistrutto Fellowship**, Vivek Gopalakrishnan.
- 2017 **Kavli NDI Distinguished Postdoctoral Fellow**, Audrey Branch, PhD.
- 2017 **Best Presentation Award HPDC**, Mhembe et al. (2017).
- 2017 **Nonparametric Statistics of the American Statistical Association Student Paper Award**, Lee et al. (2017).
- 2014 **F1000 Prime Recommended**, Vogelstein et al. (2014).
- 2013 **Spotlight**, *Neural Information Processing Systems (NIPS)*.
- 2011 **Trainee Abstract Award**, *Organization for Human Brain Mapping*.
- 2008 **Spotlight**, *Computational and Systems Neuroscience (CoSyNe)*.

Other Media

Earned Media Coverage

- 2019 **Johns Hopkins Medicine**, *BME Pioneers: Joshua Vogelstein*, BME Pioneers.
- 2019 **Johns Hopkins Medicine**, *Technology Connecting the Brain to the Human Experience*.
- 2018 **J. M. Perkel**, *Web service makes big data available to neuroscientists*, Nature.
- 2016 **Emerging Technology from the arXiv**, *Three Grand Challenges for Brain Science That Can Be Solved in 10 Years*, MIT.
- 2016 **P. Patel**, *Johns Hopkins researchers want to use big data to chart the brain*, Johns Hopkins University.
- 2016 **S. Reardon**, *Worldwide brain-mapping project sparks excitement — an concern*, Nature.
- 2016 **E. Underwood**, *International brain projects proposed*, Science.
- 2016 **National Institutes of Health**, *International Brain Projects Considered*, BRAIN initiative.
- 2016 **Office of the Spokesperson**, *International Brain Initiative Launch and VIP Dialog: Towards an International Brain Station*, US Department of State.
- 2016 **The Kavli Foundation**, *International Brain Initiative*, Kavli.
- 2015 **Dale Keiger**, *The Open Connectome Project takes a close look at the brain*, Johns Hopkins Magazine.
- 2014 **S. Begley**, *Fly brain 'atlas' opens door to linking human neurons to actions*, Reuters.
- 2014 **L. Gatlin**, *Johns Hopkins mathematician receives grant to support study of brain's circuitry*, Johns Hopkins University.
- 2014 **T. O'Leary and E. Marder**, *Mapping Neural Activation onto Behavior in an Entire Animal*, Science.
- 2014 **L. Sanders**, *Ten thousand neurons linked to behaviors in fly*, ScienceNews.

- 2014 **D. Son and J. Lee**, [Research Highlights](#), Nature.
- 2014 **K. Yandell**, [Linking Neurons to Behaviors](#), TheScientist.
- 2014 **B. Yirka**, [Researchers create a reference atlas for neural circuits in fruit fly larvae](#), MedicalXpress.
- 2012 **C. B. Begg and M. C. Pike**, [Comment on "The Predictive Capacity of Personal Genome Sequencing"](#), Science.
- 2012 **B. Thomas**, ["Open Access to the Brain" – Podcast 1: Joshua Vogelstein](#), The Connectome Podcast.
- 2012 **E. J. Topol**, [Comment on "The Predictive Capacity of Personal Genome Sequencing"](#), Science.

Professional/Social Media Presence

@neuro_data, Twitter account with a approximately 6,000 followers, over 250K impressions in December 2019, and approximately 100 new followers, and upwards of 100 new tweets, per month, and 25 link clicks per day. Follower demographics include < 50% high school graduates, 46% female.

Bits and Brains, Professional blog regarding all things academic, neurological, and statistical, with approximately 30 blog posts, approximately one new post per month (9,000 page views, 3,200 unique users)

Most Popular Post: [10 Simple Rules to Write a Paper from Start to Finish](#).

Translation / Technology Transfer Activities (as of 2020/01/28)

Open Datasets

- 2017 – **Allen Atlas**, Anatomical reference atlases that illustrate the adult mouse brain in coronal and sagittal planes. They are the spatial framework for datasets such as in situ hybridization, cell projection maps, and in vitro cell characterization. atlas.brain-map.org.
142 citations, 1058 unique visitors
- 2015 – **Amunts et al. (2015)**, BigBrain is an ultrahigh-resolution three-dimensional model of a full human brain at 20 micrometer resolution, enabling an unprecedented look into the human brain at micro- and macro-scopic scale.
262 citations, 1,041 unique visitors
- 2015 – **Bhatla et al. (2015)**, Nikhil Bhatla and Rita Droste in Bob Horvitz's Lab reconstruction of the anterior half of the *C. elegans* feeding organ, the pharynx. Volumes for three adult hermaphrodite worms include volumetric tracing of all neurons, selected cell types, I2 neuron synapses. 50 nm thick sections with an image resolution of 2 nm per pixel.
16 citations, 467 unique visitors
- 2016 – **Bloss et al. (2016)**, Images of molecularly defined inhibitory interneurons and CA1 pyramidal cell dendrites collected using correlative light-electron microscopy and large-volume array tomography.
41 citations, 701 unique visitors
- 2018 – **Bloss et al. (2018)**, Images of CA1 pyramidal neurons for analysis involving feature-selective firing as a result of dendritic integration of inputs from multiple brain regions. Show that single presynaptic axons form multiple, spatially clustered inputs onto the distal, but not proximal, dendrites of CA1 pyramidal neurons.
20 citations, 530 unique visitors
- 2011 – **Bock et al. (2011)**, Volume of mouse primary visual cortical data, spanning layers 1, 2/3, and upper layer 4 collected as electron microscope (EM) data and two-photon microscopy data collected by Davi Bock, Ph.D. and Wei-Chung Allen Lee, Ph.D.. Images have a resolution of 4x4x45 cubic nanometers.
430 citations, 511 unique visitors
- 2018 – **Branch (2018)**, Adult generated neurons in aging *M. musculus* imaged using array tomography, multi-spectral light microscopy, and electron microscopy.
2 citations, 223 unique visitors

- 2013 – [Bumbarger et al. \(2013\)](#), Serial, thin section data generated by Dan Bumbarger in Ralf Sommer's lab in order to compare the pharyngeal connectomes of the pharyngeal nervous system between *Caenorhabditis elegans* and *Pristionchus pacificus*. In *P. pacificus* they found clearly homologous neurons for all of the 20 pharyngeal neurons in *C. elegans*, and massive rewiring of synaptic connectivity between the two species.
67 citations, 22 unique visitors
- 2015 – [Collman et al. \(2015\)](#), Mouse cortex collected using conjugate array tomography (AT), a volumetric imaging method that integrates immunofluorescence and EM imaging modalities in voxel-conjugate fashion.
69 citations, 382 unique visitors
- 2015 – [Deisseroth et al. \(2015\)](#), Twelve CLARITY mouse brains (5 wild type controls and 7 behaviorally challenged) were prepared by Li Ye, and imaged using CLARITY-Optimized Light-sheet Microscopy (COLM) (whole brain COLM imaging and data stitching performed by R. Tomer, in preparation).
5 citations, 208 unique visitors
- 2016 – [Dyer et al. \(2016\)](#), Mesoscale (1 cubic micron resolution) resolution images generated with the use of synchrotron X-ray microtomography (microCT) from millimeter-scale volumes of mouse brain. X-ray tomography promises rapid quantification of large brain volumes.
21 citations, 216 unique visitors
- 2015 – [Harris et al. \(2015\)](#), Three volumes of hippocampal CA1 neuropil in adult rat imaged by the laboratory of Kristen M Harris, PhD, at an XY resolution of 2 nm on serial sections of 50-60 nm thickness.
9 citations, 463 unique visitors
- 2017 – [Hildebrand et al. \(2017\)](#), A multi-resolution serial-section electron microscopy data set containing the anterior quarter of a 5.5 days post fertilization larval zebrafish, including its complete brain acquired by Hildebrand and colleagues. Electron micrographs and reconstructions are available for view in CATMAID.
70 citations, 1,014 unique visitors
- 2015 – [Kasthuri et al. \(2015\)](#), Saturated reconstruction of a sub-volume of mouse neocortex collected using automated technologies in which all cellular objects (axons, dendrites, and glia) and many sub-cellular components are rendered and itemized in a database. Provides access to the complexity of the neocortex and enables further data-driven inquiries.
323 citations, 1,299 unique visitors
- 2016 – [Lee et al. \(2016\)](#), Electron microscopy data collected at $4 \times 4 \times 40$ nm per voxel from the visual cortex in Mouse V1 used in a study of an excitatory network.
132 citations, 725 unique visitors
- 2015 – [Micheva et al. \(2015\)](#), Multi-channel array tomography data of the barrel cortex of an adult mouse (C57BL/6J).
57 citations, 190 unique visitors
- 2015 – [Ohyama et al. \(2015\)](#), The side view of the approximately 7,000 neurons reconstructed so far, either in full or partially, of the approximately 12,000 neurons of the central nervous system of *Drosophila* larva. The 0111-8 data set was originally sectioned and imaged by Richard D. Fetter and his two tech assistants.
136 citations, 299 unique visitors
- 2013 – [Takemura et al. \(2013\)](#), The right part of the brain of a wild-type Oregon R female fly that was serially sectioned into 40-nm slices. A total of 1,769 sections, traversing the medulla and downstream neuropils, were imaged at a magnification of 35,000X.
323 citations, 144 unique visitors
- 2019 – [Templier et al. \(2019\)](#), The non-destructive collection of ultrathin sections onto silicon wafers for post-embedding staining and volumetric correlative light and electron microscopy using MagC. MagC allows the correlative visualization of neuroanatomical tracers within their ultrastructural volumetric electron microscopy context.
0 citations, 119 unique visitors

- 2017 – [Tobin et al. \(2017\)](#), Wiring variations that enable and constrain neural computation in a sensory microcircuit.
28 citations, 43 unique visitors
- 2016 – [Wanner et al. \(2016\)](#), Serial block face scanning EM (SBEM) and conductive sample embedding image stack from an olfactory bulb (OB) of a zebrafish larva at a voxel resolution of $9.25 \times 9.25 \times 25$ nm³.
12 citations, 328 unique visitors
- 2014 – [Weiler \(2014\)](#), Images of whisker-associated barrel columns of mouse somatosensory cortex stained with antibodies against selected antigens (DAPI, YFP), and indirect immunofluorescence. Images collected by the lab of Stephen J Smith.
6 citations, 123 unique visitors
- 2015 – [Randlett et al. \(2015\)](#), Zebrafish brain atlas with surface mesh of different regions intended for the analysis of whole-brain activity mapping.
124 citations, 498 unique visitors

Open-source Software: Active

Stars denote an individual users appreciation, downloads indicates a user downloading the code, and a fork indicates a user modifying the code.

- 2016 – [Non-Parametric-Clustering](#), A program which uses non-parametric-clustering to minimize or maximize a given criterion function.
3 stars, 2 forks
- 2018 – [MGC \(Non-parametric hypothesis testing\)](#), Multiscale Graph Correlation (MGC) is a framework for universally consistent testing high-dimensional and non-Euclidean data.
28 stars, 11 forks, 120 downloads/month, 266 docker pulls
- 2018 – [ndcloud \(NeuroData Cloud\)](#), The deployment of tools which support the Open Connectome Project.
- 2018 – [LOL \(Supervised dimensionality reduction\)](#), Linear Optimal Low-rank (LOL) projection for improved classification performance in high-dimensional classification tasks.
8 stars, 6 forks, 60 downloads/month
- 2018 – [m2g \(MR graph analysis\)](#), A Python pipeline which uses diffusion MRI data from individuals to generate connectomes reliably and scalably.
35 stars, 26 forks, 218 downloads/month, 7,900 docker pulls
- 2019 – [Sparse Projection Oblique Randomer Forests \(Classification and regression\)](#), SPORF is an improved random forest algorithm that achieves better accuracy and scaling than previous implementations on a standard suite of > 100 benchmark problems.
54 stars, 35 forks, 73 downloads/month, 36 docker pulls
- 2019 – [reg \(Image registration\)](#), A Python package which performs non-linear affine and deformable image registration.
6 stars, 4 forks, 61 downloads/month
- 2019 – [Uncertainty-Forest](#), A Python package containing estimation procedures for posterior distributions, conditional entropy, and mutual information between random variables X and Y.
2 stars, 1 fork
- 2019 – [neuroparc](#), This repository contains a number of useful parcellations, templates, masks, and transforms to (and from) MNI152Nlin6 space. The files are named according to the BIDs specification.
26 stars, 4 forks
- 2019 – [GraSPy \(Graph Statistics\)](#), Utilities and algorithms designed for processing and analysis of graphs with specialized graph statistical algorithms.
59 stars, 24 forks, 383 downloads/month

Open-source Software: Contributed

- 2017 [boss](#), Developed core functionality.
- 2017 – 2018 [render](#), Added cloud support.

- 2018 [igraph](#), Added spectral clustering functionality.
- 2018 – 2019 [neuroglancer](#), Added multispectral support to enable light microscopy data use.
- 2019 [cloud-volume](#), Added support for additional file types.
- 2019 [C-PAC](#), Added streamlined reproducible pipeline.
- 2019 [scipy](#), Added mgc, a state of the art method for hypothesis testing we developed in the lab.
- [Open-source Software: Archived](#)
- 2011 – 2016 [oopsi \(Calcium Spike Sorting\)](#), Model-based spike train inference from calcium imaging.
20 stars, 9 forks
- 2011 – 2017 [ndstore](#), Scalable database cluster for the spatial analysis and annotation of high-throughput brain imaging data.
37 stars, 13 forks
- 2012 – 2017 [FlashGraph \(Scalable Analytics\)](#), General-purpose graph analysis framework that exposes vertex-centric programming interface for users to express varieties of graph algorithms.
220 stars, 42 forks
- 2012 – 2017 [FlashX \(Scalable machine learning\)](#), A matrix computation engine that provides a small set of generalized matrix operations on sparse matrices and dense matrices to express varieties of data mining and machine learning algorithms.
220 stars, 42 forks
- 2015 [VESICLE \(EM Synapse Detection\)](#), Reference synapse detection program for processing serial electron microscopy data.
3 stars, 3 forks
- 2015 – 2018 [ndviz](#), Web visualization and analysis tools for neuroimaging datasets, powered by Neuroglancer.
8 stars, 4 forks, 48 docker pulls
- 2015 [CAJAL](#), A MATLAB API that provides a simple to use interface with Open Connectome Project servers and provides RAMON Objects, unit tests, configuration scripts, and utilities.
6 stars, 5 forks
- 2015 – 2016 [DMG](#), An implementation of a distributed multigrid Poisson solver for image stitching, smoothing, and sharpening.
19 stars, 6 forks
- 2017 – 2019 [ndex](#), Python 3 command-line program to exchange (download/upload) image data with NeuroData's cloud deployment of APL's BOSS spatial database.
3 stars, 0 forks, 89 downloads/month
- 2017 – 2018 [ndwebtools](#), ndwebtools (ndweb) is a Django application to provide a user-friendly interface for interacting with NeuroData resources and data.
0 stars, 1 forks
- 2017 – 2019 [knor \(Clustering\)](#), Python version of knor, a highly optimized and fast library for computing k-means in parallel with accelerations for Non-Uniform Memory Access (NUMA) architectures.
1 stars, 3 forks, 115 downloads/month
- 2017 – 2018 [MEDA \(Matrix Exploratory Data Analysis\)](#), A python package for matrix exploratory data analysis.
0 stars, 3 forks, 56 downloads/month, 21 docker pulls
- 2017 – 2019 [SynapseAnalysis \(Synapse Detection\)](#), A framework to evaluate synaptic antibodies for array tomography applications.
2 stars, 0 forks
- [Consultancy](#)
- 2017 **Consultant**, [Greenspring Associates](#).
- 2016 **Consultant**, [Scanadu](#).

Advisory Board Appointments

- 10/18 – **Advisory Board**, [Mind-X](#), A neurotechnology company combining brain-computer interfaces and artificial intelligence to make the world's information available with the speed and ease of a single thought., Incubated at Camden Partners Nexus, completed an initial round of funding for an undisclosed amount.
15 employees.
- 01/17 – **Advisory Board**, [PivotalPath](#), PivotalPath is a leading hedge fund research and intelligence organization built by a team of experienced alternative investment professionals and fintech developers., Raised undisclosed amount of funding.
11 employees.

Startups

- 01/17 – **Co-Founder**, [gigantum](#), The future of data science is open, decentralized and user friendly. That is why we created a platform that enables anybody to create and share totally reproducible computational work with the world., Completed initial round of seed funding for undisclosed amount from [Digital Science](#), which also funds figshare, readcube, altmetric, overleaf, and more.
15 employees.
- 01/16 – **Co-Founder**, [d8alab](#), Our services include evaluating model performance, building prototype R/Shiny web applications and basic data cleaning., Provides data science consulting for a variety of companies, specifically biomedical data science.
4 employees.