Joshua T. Vogelstein

✉ *jovo@jhu.edu*
jovo.me

I am currently an Assistant Professor of Biomedical Engineering in the Whiting School of Engineering at Johns Hopkins University, where I co-direct the NeuroData lab, whose mission is to understand and improve animal and machine intelligences worldwide. As of September 2019, according to Google Scholar, I have over 5,000 citations and an h-index of 29.

Our website, neurodata.io, has the most up to date information regarding our team's publications, talks, posters, awards, press, funding, and blog.

Education & Training

08/12 – 08/14 **Senior Research Scientist**, *Dept's of Statistical Sciences & Mathematics & Neurobiology*, Supervised by Mauro Maggioni, Lawrence Carin, Guillermo Sapiro, and David Dunson, Duke University.
Research Big data statistics, network statistics, graph matching.

01/11 – 08/12 **Assistant Research Professor**, *Department of Applied Mathematics and Statistics*, Supervised by Mauro Maggioni, Lawrence Carin, Jon Harer, and David Dunson, Duke University.
Research Big data statistics, network statistics, graph matching.

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.

2003 – 2009 **Ph.D in Neuroscience**,
Johns Hopkins School of Medicine, Supervised by Eric Young,
Dissertation 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*.

Summer Workshops

06/08 – 07/08 **Molecular Biology Summer Workshop**, *Smith College, Mass, USA*.

07/08 – 07/08 **Advanced Techniques in Molecular Neuroscience**, *Cold Spring Harbor, New York, USA*.

06/05 – 07/05 **Imaging Structure and Function of the Nervous System (audited)**, *Cold Spring Harbor, New York, USA*.

06/04 – 07/04 **Advanced Course in Computational Neuroscience**, *Obidos, Portugal*.

Positions Held

Current Academic Positions

08/14 – now **Assistant Professor**, *Department of Biomedical Engineering*, Johns Hopkins University (JHU).

08/14 – now **Core Faculty**, *Institute for Computational Medicine (ICM)*.

08/14 – now **Core Faculty**, *Center for Imaging Science (CIS)*.

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

Current Joint Appointments, Affiliations, and Activities

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

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

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

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

08/14 – now **Assistant Research Faculty**, *Human Language Technology Center of Excellence.*
10/12 – now **Affiliated Faculty**, *Institute for Data Intensive Engineering and Sciences.*
08/18 – now **Director of Biomedical Data Science Focus Area**.
05/16 – now **Visiting Scientist**, *Howard Hughes Medical Institute*, Janelia Research Campus.
01/11 – now **Co-Founder & Co-Director**, *NeuroData (formerly Open Connectome Project).*

Previous Positions & Affiliations

08/15 – 07/18 **Co-Developer**, *Computational Medicine Minor.*
08/14 – 08/18 **Director of Undergraduate Studies**, *Institute for Computational Medicine.*
05/15 – 07/17 **Co-Founder and Faculty Advisor**, *MedHacks.*
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.*
07/04 – 07/12 **Chief Data Scientist**, *Global Domain Partners, LLC.*
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.*

Entrepreneurial Activities

Founding Companies

01/17 – now **Co-Founder**, *gigantum.*
01/16 – now **Co-Founder**, *d8alab.*

Advisory Board

10/18 – now **Advisory Board**, *Mind-X.*
01/17 – now **Advisory Board**, *PivotalPath.*

Ad Hoc Consulting

2017 **Consultant**, *Greenspring Associates.*
2016 **Consultant**, *Scanadu.*

Awards & Honors

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

Peer-Reviewed Journal Publications

(52 articles published/accepted; top 10 cited 2,944 times; H-index 29)

[J1] 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. URL: http://dx.doi.org/10.1002/hbm.23150.

[J2] 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. URL: http://jmlr.org/papers/v18/17-448.html.

[J3] N. Binkiewicz, J. T. Vogelstein, and K. Rohe. "Covariate-assisted spectral clustering". In: *Biometrika* 104.2 (2017), pp. 361–377. ISSN: 14643510. DOI: 10.1093/biomet/asx008. arXiv: 1411.2158. URL: https://doi.org/10.1093/biomet/asx008.

[J4] David E. Carlson, Joshua T. Vogelstein, Qisong Wu, Wenzhao Lian, Mingyuan Zhou, Colin R. Stoetzner, 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: 00189294. DOI: 10.1109/TBME.2013.2275751. arXiv: 1304.0542. URL: http://ieeexplore.ieee.org/document/6571240/.

[J5] 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. URL: http://dx.doi.org/10.1109/TPAMI.2015.2456913.

[J6] 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. URL: http://arxiv.org/abs/1507.08376.

[J7] 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: 01678655. DOI: 10.1016/j.patrec.2016.12.012. URL: https://www.sciencedirect.com/science/article/pii/S0167865516303671.

[J8] 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. URL: https://arxiv.org/abs/1904.05329.

[J9] 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. URL: https://doi.org/10.1126/science.aar3247.

[J10] 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. URL: https://doi.org/10.1038/nmeth.2482.

[J11] 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. URL: https://doi.org/10.1007/s00138-012-0462-0.

[J12] 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. arXiv: 1406.7851. URL: https://doi.org/10.1080/01621459.2016.1219260.

[J13] 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. URL: https://doi.org/10.1080/01621459.2017.1395643.

[J14] 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. URL: https://doi.org/10.1523/ENEURO.0195-17.2017.

[J15] 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: 08954798. DOI: 10.1137/120875600. arXiv: 1205.0309. URL: http://arxiv.org/abs/1205.0309.

[J16] 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. URL: http://journal.frontiersin.org/article/10.3389/fninf.2015.00020.

[J17] 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. URL: http://ieeexplore.ieee.org/document/6173097/.

[J18] 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.

[J19] 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. URL: https://doi.org/10.1038/sdata.2015.46.

[J20] 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. URL: https://doi.org/10.1038/nature22356.

[J21] 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. URL: https://doi.org/10.1038/nn.2876.

[J22] 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. URL: https://doi.org/10.1016/j.cell.2015.06.054.

[J23] 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: 2047217X. DOI: 10.1093/gigascience/gix013. arXiv: 1610.08484. URL: https://academic.oup.com/gigascience/article-lookup/doi/10.1093/gigascience/gix013.

[J24] 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: 1556472X. DOI: 10.1145/2824443. URL: http://doi.acm.org/10.1145/2824443.

[J25] 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. arXiv: 1703.10136. URL: https://doi.org/10.1093/biomet/asz045.

[J26] 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. arXiv: 1405.3133. URL: http://doi.org/10.1109/TPAMI.2015.2424894.

[J27] 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. arXiv: 1310.1297. URL: https://doi.org/10.1016/j.parco.2015.03.004.

[J28] Yuriy Mishchencko, Joshua T Vogelstein, and Liam Paninski. "A Bayesian approach for inferring neuronal conectivity from calcium fluorescent imaging data". In: *The annals of applied statistics* 5 (2011). ISSN: 19326157. DOI: 10.1214/09-AOAS303. URL: https://doi.org/10.1214/09-AOAS303.

[J29] Liam Paninski, Yashar Ahmadian, Daniel Gil Ferreira, Shinsuke Koyama, Kamiar Rahnama 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. URL: https://doi.org/10.1007/s10827-009-0179-x.

[J30] 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. arXiv: 1808.07801. URL: https://www.pnas.org/content/early/2019/03/07/1814462116.short.

[J31] 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. arXiv: 1211.3601. URL: https://doi.org/10.1080/10618600.2014.951049.

[J32] 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. arXiv: 1108.6271. URL: https://doi.org/10.1080/03610926.2011.630768.

[J33] 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. URL: https://doi.org/10.1126/scitranslmed.3003380.

[J34] 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.

[J35] 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. arXiv: 1412.4098. URL: http://www.sciencedirect.com/science/article/pii/S016786551730106X.

[J36] 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). ISSN: 15537358. DOI: 10.1371/journal.pcbi.1005493. URL: https://doi.org/10.1371/journal.pcbi.1005493.

[J37] 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. URL: https://doi.org/10.1038/s41746-019-0092-2.

[J38] 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. URL: https://doi.org/10.1371/journal.pone.0095753.

[J39] 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.

[J40] 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. URL: https://doi.org/10.1016/j.conb.2019.04.005.

[J41] 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. arXiv: 1609.05148. URL: https://elifesciences.org/articles/41690.

[J42] 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. URL: http://dx.doi.org/10.1371/journal.pone.0121002.

[J43] 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. URL: https://science.sciencemag.org/content/344/6182/386.

[J44] Joshua T. Vogelstein, Eric Perlman, Benjamin Falk, Alex Baden, William Gray Roncal, Vikram Chandrashekhar, Forrest Collman, Sharmishtaa Seshamani, Jesse L. Patsolic, Kunal Lillaney, Michael Kazhdan, Robert Hider, Derek Pryor, Jordan Matelsky, Timothy Gion, Priya Manavalan, Brock Wester, Mark Chevillet, Eric T. Trautman, Khaled Khairy, Eric 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. arXiv: 1804.02835. URL: https://www.nature.com/articles/s41592-018-0181-1.

[J45] 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. arXiv: 1112.5506. URL: https://doi.org/10.1007/s00357-015-9170-6.

[J46] 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://doi.org/10.1109/TPAMI.2012.235.

[J47] 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. URL: https://doi.org/10.1152/jn.00141.2003.

[J48] 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. URL: https://doi.org/10.1038/srep00100.

[J49] Joshua T. Vogelstein, Brendon O. Watson, Adam M. Packer, Rafael Yuste, Bruno Jedynak, and Liam Paninskik. "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. URL: https://doi.org/10.1016/j.bpj.2008.08.005.

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[P23] 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.

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Invited Talks

[I1] 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#/.

[I2] Jaewon Chung. "Statistical Methods for Population of Connectomes". In: Organization of Human Brain Mapping, June 2019. URL: https://neurodata.io/talks/ohbm19.html.

[I3] 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.

[I4] 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.

[I5] 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.

[I6] Joshua T Vogelstein. "Discovering Relationships and their Geometry Across Disparate Data Modalities". In: Yale, Jan. 2018. URL: http://docs.neurodata.io/MGC-paper/.

[I7] Joshua T Vogelstein. "NeuroData: Enabling Terascale Neuroscience for Everyone". In: Keystone Symposia: State of the Brain, 2016.

[I8] Joshua T Vogelstein. "Connectome Classification: Statistical Graph Theoretic Methods for Analysis of MR-Connectome Data". In: Organization for Human Brain Mapping, 2011.

[I9] Joshua T Vogelstein. "Consistent Connectome Classification". In: Math/Bio Seminar, Duke University, 2011.

[I10] Joshua T Vogelstein. "Statistical Connectomics". In: Harvard University Connectomics Labs, 2011.

[I11] Joshua T Vogelstein. "Inferring spike trains from Calcium Imaging". In: Redwood Center for Theoretical Neuroscience, University of California, Berkeley, 2008.

[I12] Joshua T Vogelstein. "Inferring spike trains from Calcium Imaging". In: Cambridge University, Gatsby Unit, and University College London, 2008.

[I13] Joshua T Vogelstein. "Beyond Little Neuroscience". In: Beyond Optogenetics workshop at Cosyne, 2013.

[I14] Joshua T Vogelstein. "BIG NEURO". In: Theory and Neurobiology, Duke University, 2012.

[I15] Joshua T Vogelstein. "Top Challenges of Big Data Neuroscience". In: BRAIN Initiative Workshop, Dec. 2014.

[I16] Joshua T Vogelstein. "Open-Science Platform for Heterogeneous Brain Data: Opportunities and Challenges". In: Kavli, 2014.

[I17] 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.

[I18] Joshua T Vogelstein. "Inferring Spike Trains Given Calcium-Sensitive Fluorescence Observations". In: Statistical Analysis of Neural Data, 2008.

[I19] Joshua T Vogelstein. "Model based optimal inference of spike times and calcium dynamics givern noisy and intermittent calcium-fluorescence observations". In: Neurotheory Center of Columbia University, 2007.

[I20] 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.

[I21] Joshua T Vogelstein. "Once we get connectomes, what the %#* are we going to do with them?" In: Institute of Neuroinformatics, 2011.

[I22] Joshua T Vogelstein. "Statistical Inference on Graphs". In: University of Michigan, 2013.

[I23] Joshua T Vogelstein. "Statistical Inference on Graphs". In: Scientific Computing Institute, University of Utah, 2013.

[I24] 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/.

[I25] 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/.

[I26] Joshua T Vogelstein. "What can Translational neuroimaging Research do for Clinical Practice". In: Child Mind Institute, 2011.

[I27] Joshua T. Vogelstein. "Big Biomedical Data Science". In: Sol Goldman International Conference, Apr. 2019. URL: https://neurodata.io/talks/goldman19.html.

[I28] Joshua T. Vogelstein. "Connectal Coding". In: Dipy Workshop, Mar. 2019. URL: https://neurodata.io/talks/DiPy19.html.

[I29] Joshua T. Vogelstein. "Connectome Coding". In: Society for Neuroscience, Nov. 2018. URL: https://neurodata.io/talks/SFN18.html.

[I30] Joshua T. Vogelstein. "Discovering Relationships and their Geometry Across Disparate Data Modalities". In: Stanford, Aug. 2017. URL: http://docs.neurodata.io/MGC-paper/.

[I31] Joshua T. Vogelstein. "Opportunities and Challenges in Big Data Neuroscience". In: Society for Neuroscience, 2017.

[I32] Joshua T. Vogelstein. "The International Brain Station (TIBS)". In: Kavli Foundation, 2016.

[I33] Joshua T. Vogelstein. "The International Brain Station (TIBS)". In: United Nations Global Brain Workshop Meeting, 2016.

[I34] 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.

[I35] Joshua T. Vogelstein. "Statistical Foundations For Connectomics". In: Max Planck / HHMI Connectomics Meeting, Apr. 2019. URL: https://neurodata.io/talks/connectomics19.html.

[I36] 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/.

[I37] 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.

Other Talks

[T1] James Browne. "Forest Packing: Fast Parallel, Decision Forests". In: SIAM International Conference on Data Mining, May 2019. URL: https://neurodata.io/talks/ForestPacking2019JamesBrowne.pptx.

[T2] 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.

[T3] Gregory Kiar. "Science in the Cloud (SIC): A use-case in MRI Connectomics". In: Open Science Special Interest Group, 2017.

[T4] Youjin Lee. "Network Dependence Testing via Diffusion Maps and Distance-Based Correlations". In: Joint Statistical Meetings, 2017.

[T5] Disa Mhembere. "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-mhembere.pdf.

[T6] Disa Mhembere. "knor: K-means NUMA Optimized Routines Library". In: High-Performance Parallel and Distributed Computing, 2017. DOI: 10.1145/3078597.3078607.

[T7] C. Shen. "Local Distance Correlation for Testing Independence". In: Temple University, Nov. 2015.

[T8] C. Shen. "Multiscale Generalized Correlation". In: Joint Statistical Meeting, Aug. 2016.

[T9] C. Shen. "The Exact Equivalence of Distance and Kernel Methods for Hypothesis Testing". In: Joint Statistical Meeting, Aug. 2018.

[T10] T. M. Tomita. "ROFLMAO: Robust Oblique Forests with Linear Matrix Operations". In: SIAM International Conference on Data Mining 2017, 2017. DOI: 10.1137/1.9781611974973.56.

[T11] Daniel Tward. "Brain mapping tools for neuroscience research". In: NeuroNex, May 2019. URL: https://neurodata.io/talks/tward_neuronex2.pdf.

[T12] 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.

[T13] Joshua T Vogelstein. "Decision Theoretic Approach to Statistical Inference". In: guest Lecture in Current Topics in Machine Learning, Johns Hopkins University, 2012.

[T14] Joshua T Vogelstein. "Big Statistics for Brain Sciences". In: Baylor College of Medicine, Department of Neuroscience, May 2014.

[T15] 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.

[T16] Joshua T Vogelstein. "Open Problems in Neuropsychiatry". In: Data Seminar, Duke University, 2013.

[T17] Joshua T Vogelstein. "Consistent Graph Classification". In: Guest Lecture in Deisseroth Lab, Stanford University, 2011.

[T18] Joshua T Vogelstein. "Towards Inference and Analaysis of Neural Circuits Inferred from Population Calcium Imaging". In: Guest Lecture in Schnitzer Lab, 2009.

[T19] Joshua T Vogelstein. "Neurocognitive Graph Theory". In: National Security Agency, 2009.

[T20] Joshua T Vogelstein. "Towards Inferring Neural Circuits from Calcium Imaging". In: Guest Lecture in Yuste Lab, 2009.

[T21] Joshua T Vogelstein. "Inferring spike times given typical time-series fluorescence observations". In: Department of Applied Mathematics and Statistics, Johns Hopkins University, 2008.

[T22] Joshua T Vogelstein. "Are mental properties supervenient on brain properties". In: NIPS workshop on Philosophy and Machine Learning. 2011.

[T23] Joshua T Vogelstein. "Open-Science Platform for Heterogeneous Brain Data: Opportunities and Challenges". In: Kavli, 2014.

[T24] 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.

[T25] Joshua T Vogelstein. "Law of Large Graphs". In: DARPA Graphs, 2015.

[T26] Joshua T Vogelstein. "From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data". In: SIMPLEX Kickoff, 2015.

[T27] Joshua T Vogelstein. "Opportunities and Challenges in Big Data Neuroscience". In: DoE, 2015.

[T28] Joshua T Vogelstein. "From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data: Part 1". In: DARPA SIMPLEX PI Meeting, 2015.

[T29] Joshua T Vogelstein. "From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data: Part 2". In: DARPA SIMPLEX PI Meeting, 2015.

[T30] 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.

[T31] Joshua T Vogelstein. "Special Symposium: Neuroscience in the 21st Century". In: Kavli, 2015.

[T32] Joshua T Vogelstein. "Research Computing Support for Neuroscience and Other Life Sciences". In: CASC, 2015.

[T33] 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.

[T34] 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.

[T35] Joshua T Vogelstein. "Open Connectome Project". In: Academic Medical Center, Amsterdam, 2012.

[T36] Joshua T Vogelstein. "Sequential Monte Carlo in Neuroscience". In: SAMSI Program on Sequential Monte Carlo, Tracking Working Group, 2009.

[T37] 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.

[T38] Joshua T. Vogelstein. "Big Data and the Life Sciences". In: Sloan Foundation, May 2019. URL: https://neurodata.io/talks/SloanFoundation2019.pptx.

[T39] Joshua T. Vogelstein. "big time (series data in neuroscience)". In: figshare, 2015. URL: https://figshare.com/articles/big_time_series_data_for_neuroscience_/1591211.

[T40] Joshua T. Vogelstein. "Biomedical Big Data and Data Science". In: JHU BME, Feb. 2019. URL: https://neurodata.io/talks/datascience19.html.

[T41] Joshua T. Vogelstein. "NeuroData". In: 2017.

[T42] Joshua T. Vogelstein. "NeuroData:Enabling Terascale Neuroscience". In: JHU Kavli Neuroscience Discovery Institute, 2016.

[T43] Joshua T. Vogelstein. "Data Intensive Brain Science". In: Kavli Neuroscience Discovery Institute, June 2018.

[T44] Joshua T. Vogelstein. "The International Brain Station (TIBS)". In: JHU BME and Tsinghua University, 2017.

[T45] Joshua T. Vogelstein. "Engineering the Future of Medicine: Data Intensive Biomedical Science". In: Johns Hopkins University Biomedical Engineering, Mar. 2018.

[T46] Joshua T. Vogelstein. "Connectome Coding". In: Schmidt Sciences, 2017.

[T47] Joshua T. Vogelstein. "The International Brain Station (TIBS)". In: Kavli Foundation, 2016.

[T48] Joshua T. Vogelstein. "Lifelong Learning Forests". In: Darpa L2M PI Meeting, June 2018.

[T49] Joshua T. Vogelstein. "NeuroData 2016". In: NeuroData Lab Retreat, 2016.

[T50] Joshua T. Vogelstein. "NeuroStorm". In: Global Brain Workshop 2 JHU, 2017.

[T51] Joshua T. Vogelstein. "Global Brain Workshop 2016". In: Global Brain Workshop NSF+JHU at Kavli, 2016.

[T52] Joshua T. Vogelstein. "Global Brain Workshop 2016". In: Kavli Neuroscience Discovery Institute & Center for Imaging Science, 2016.

[T53] Joshua T. Vogelstein. "NeuroData:Enabling Terascale Neuroscience". In: Kavli Neuroscience Discovery Institute & Center for Imaging Science, 2016.

[T54] Joshua T. Vogelstein. "Learning a Data-Driven Nosology:Progress, Challenges & Opportunities". In: Kavli Neuroscience Discovery Institute & Center for Imaging Science, 2016.

[T55] Joshua T. Vogelstein. "The International Brain Station (TIBS)". In: United Nations Global Brain Workshop Meeting, 2016.

[T56] Joshua T. Vogelstein. "Journey to Here". In: JHU BMES talks, Apr. 2019. URL: https://neurodata.io/talks/jhu-bmes19.html.

[T57] Joshua T. Vogelstein. "Lifelong Learning Forests". In: L2M, Mar. 2019. URL: https://neurodata.io/talks/L2F_1yr.html.

[T58] Joshua T. Vogelstein. "NeuroData (Science)". In: Kavli, Apr. 2019. URL: https://neurodata.io/talks/kavli19.html.

[T59] Joshua T. Vogelstein. "NeuroData Tools". In: NeuroData Hackashop, Mar. 2019. URL: https://neurodata.io/talks/tools19.html#1.

[T60] 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.

[T61] 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.

[T62] Joshua T. Vogelstein. "Statistical Foundations For Connectomics". In: Max Planck / HHMI Connectomics Meeting, Apr. 2019. URL: https://neurodata.io/talks/connectomics19.html.

[T63] Joshua T. Vogelstein and Randal Burns. "Data Science Core". In: Harvard University, July 2019. URL: https://neurodata.io/talks/ZZ_MSCZ_U19.pptx.

[T64] Joshua T. Vogelstein and Vikram Chandrashekhar. "NeuroNex + Stanford". In: NeuroNex-Stanford, July 2018.

[T65] 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.

[T66] Joshua T. Vogelstein, Michael I. Miller, and Richard Hunganir. "Global Brain Workshop 2016". In: Kavli Neuroscience Discovery Institute & Center for Imaging Science @ JHU, 2016.

Abstracts & Posters

[A1] James Browne, Disa Mhembere, Tyler M. Tomita, Joshua T. Vogelstein, and Randal Burns. "Forest packing: Fast parallel, decision forests". In: *SIAM International Conference on Data Mining, SDM 2019* (June 2019), pp. 46–54. DOI: 10.1137/1.9781611975673.6. arXiv: 1806.07300. URL: https://arxiv.org/abs/1806.07300.

[A2] Randal Burns, William Gray Roncal, Dean Kleissas, Kunal Lillaney, 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: 9781450319218. DOI: 10.1145/2484838.2484870. arXiv: 1306.3543. URL: http://arxiv.org/abs/1306.3543.

[A3] David Carlson, Vinayak Rao, Joshua Vogelstein, and Lawrence Carin. "Real-time inference for a gamma process model of neural spiking". In: *Advances in Neural Information Processing Systems* (2013). ISSN: 10495258. URL: http://papers.nips.cc/paper/5061-real-time-inference-for-a-gamma-process-model-of-neural-spiking.pdf.

[A4] 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: *2013 18th International Conference on Digital Signal Processing, DSP 2013* (2013). DOI: 10.1109/ICDSP.2013.6622710. URL: http://arxiv.org/abs/1304.5894.

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[A8] 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: *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Vol. 8211 LNAI. Springer. 2013, pp. 82–91. ISBN: 9783319027524. DOI: 10.1007/978-3-319-02753-1_9. URL: https://pdfs.semanticscholar.org/98da/eeccc6d3cc80b789de30ecf8790c56950739.pdf.

[A9] Kwame S. Kutten, Nicolas Charon, Michael I. Miller, J. Tilak Ratnanather, Jordan Matelsky, Alexander D. Baden, Kunal Lillaney, 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)* 10433 LNCS (2017), pp. 275–282. ISSN: 16113349. DOI: 10.1007/978-3-319-66182-7_32. arXiv: 1612.00356. URL: https://link.springer.com/chapter/10.1007/978-3-319-66182-7%7B%5C_%7D32.

[A10] 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. arXiv: 1605.02060. URL: https://doi.org/10.1117/12.2227444.

[A11] Kunal Lillaney, 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* (2018), pp. 223–233. DOI: 10.1109/eScience.2018.00037. URL: https://ieeexplore.ieee.org/abstract/document/8588656.

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[A14] 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. URL: http://biorxiv.org/content/early/2019/08/28/343392.abstract.

[A15] 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.

[A16] William Gray Roncal, Zachary H. Koterba, Disa Mhembere, 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, GlobalSIP 2013 - Proceedings*. IEEE, Dec. 2013, pp. 313–316. ISBN: 9781479902484. DOI: 10.1109/GlobalSIP.2013.6736878. URL: http://ieeexplore.ieee.org/document/6736878/.

[A17] 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 Inferfaces using Computer Vision at Large Scale". In: *British Machine Vision Conference*. 2015, pp. 81.1–81.13. DOI: 10.5244/c.29.81. arXiv: 1403.3724.

[A18] 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.

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[A20] Da Zheng, Disa Mhembere, 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. URL: http://arxiv.org/abs/1604.06414.

Funding

My total cost expentidures since being hired have been FY15: $160,162 FY16: $468,545 FY17: $686,679 FY18: $887,186 FY19: $1,366,308, a steady increase each year of over 30%. Details for funding sources are below.

Current Funding

9/19 – 8/22 **NIH**, *$938,433*, Mueller (PI), *Accessible technologies for high-throughput, whole-brain reconstructions of molecularly characterized mammalian neurons P0* The goal of this grant will be to develop scalable and affordable cellular imaging and neuro-informatics tools, running preliminary experiments to connect the transcriptome to anatomy, in mice. Tools will be made available to researchers, to help accelerate the creation of detailed maps at cell resolution showing circuitry in whole brains..
JTV is responsible for all big data infrastructure and informatics.

12/19 – 11/23 **DARPA GARD**, *$X*, Arora (PI), *Understanding and improving robust learning against adversarial attacks.*.
JTV is responsible for theory, methods, and algorithms using decision forests.

12/19 – 11/23 **NIH**, *$205,998*, Badea (PI), *Brain Networks in Mouse Models of Aging*. The goal of this grant it to generate connectomes and RNA-seq transcriptomes to characterize and differentiate APOE mice as a model of aging..
JTV is responsible for all statistical analyses, particularly associated with connectomics.

8/19 – 5/24 **NIH 1R01MH120482-01**, *$73,570*, Satterthwaite (PI), *Reproducible imaging-based brain growth charts for psychiatry*. This goal of this proposal will have provide a new data resource, yield reproducible growth charts of brain development, and delineate novel mechanisms regarding the developmental basis of psychopathology in youth..
JTV is responsible for all statistical analyses, particularly associated with connectomics.

5/17 – 4/20 **NSF 1712947**, *$200,000*, Shen (PI), Multiscale Generalized Correlation: A Unified Distance-Based Correlation Measure for Dependence Discovery The goal of this proposal is to establish a unified methodology framework for statistical testing in high-dimensional, noisy, big data, through theoretical advancements, comprehensive simulations, and real data experiments.
JTV is responsible for working with the PI on all aspects of methods development and assessments, as well as all real data applications.

7/17 – 6/20 **NIH 1R01DC016784-01**, *$747,143*, Ratnanather (PI), CRCNS US-German Res Prop: functional computational anatomy of the auditory cortex. The goal of this project is to create a robust computational framework for analyzing the cortical ribbon in a specific region: the auditory cortex.
JTV is responsible for the big data aspects of this grant, including data sharing and open access properties.

10/16 – 9/20 **DARPA D3M FA8750-17-2-0112**, *$4,406,360*, Priebe (PI), *What Would Tukey Do?* The goal is to 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.
JTV is responsible for connecting methods to real data applications, specifically in brain science.

9/17 – 8/22 **NIH U19 1U19NS104653-01**, *$210,000*, Engert (PI), Sensorimotor processing, decision-making, and internal states: towards a realistic multiscale circuit model of the larval zebrafish brain. The general goal of the proposal is to 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.
JTV is the PI of the Data Core, and therefore responsible for all aspects of data, including, storage, analysis, modeling, and disseminating.

The above grant is the flagship NIH BRAIN Initiative granting mechanism. In addition to being the PI of the Data Core, I am the co-chair of the consortium of U19 Data Science Cores.

1/18 – 12/19 **Schmidt Sciences**, *$125,000*, Vogelstein (PI), *Connectome Coding at the Synaptic Scale*. This project will 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.

11/17 – 10/21 **DARPA L2M**, *$2,000,000*, Vogelstein (PI), *Lifelong Learning Forests*. Our 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. .

11/17 – 10/21 **DARPA L2M**, *$19,940*, Tolias (PI), *Continual Learning Across Synapses, Circuits, and Brain Areas*. Our goal is to develop the pre-processing analysis pipeline for the imaging data collected in this project.
JTV is responsible for all informatics associated with data management, visualization, processing, and analysis starting in Phase II of the program.

7/18 – 6/21 **NSF**, *$599,757*, Shulman (PI), SemiSynBio: Collaborative Research: YeastOns: Neural Networks Implemented in Communication Yeast Cells. Our goal is to provide neuroscience and machine learning expertise to guide the design of the computational learning capabilities of the system.
JTV is responsible for providing insight into both biological and artificial neural network architecture and function.

7/17 – 6/20 **NSF, NeuroNex 16-569 Neural System Cluster 1707298**, *$400,000*, Vogelstein (PI), NeuroNex Innovation Award: Towards Automatic Analysis of Multi-Terabyte Cleared Brains.The goal of this project is to develop an end-to-end pipeline for the analysis of big brain volume data in the cloud. .

The above grant is the flagship NSF BRAIN Initiative granting mechanism.

Past Funding

10/17 – 9/18 **Brain Ark**, *Dog Star Technologies*, Vogelstein (PI), 90074647.

1/17 – 10/18 **Brain Comp Infra: EAGER: BrainLab CI: Collaborative, Community Experiments with Data-Quality Controls through Continuous Integration**, *NSF*, The brain research community needs to increase the practice of sharing and combining data sets to increase the power of statistical analyses and to gain the most knowledge from collected data. This project aims to build a prototype system called BrainLab CI that will facilitate meaningful integration of thousands of publicly available Magnetic Resonance Imaging (MRI) and neurophysiology data sets, and allow researchers to define and conduct new large-scale community-level experiments on these data. BrainLab CI has the potential to transform research practice in neuroscience by overcoming major obstacles to data sharing: Scientists will be able to share data without losing control over data quality, and will maintain full visibility into how all subsequent experiments use their data and algorithms. This project may consequently drive a change in scientific culture by encouraging data sharing and the development of common analysis tools, and resulting accelerated discovery from connecting ideas, tools, data, and people. This project therefore aligns with the NSF mission to promote the progress of science and to advance the national health, prosperity and welfare. The BrainLab CI prototype system will provide new paradigms for combining different analytic methods, meta-analysis with raw data, comparing the results of different laboratories and even synthesizing new experiments by combining different studies. An experimental-management software system will be deployed that allows users to construct community-wide experiments that implement data and metadata controls on the inclusion and exclusion of data. Example of controls include: requiring specific metadata, that data are registered to a given atlas, or that data are collected using specific experimentation protocols. BrainLab CI will initially focus on two different experimental patterns: (1) An incremental experiment defines an experiment against an existing data set which then opens to additional community contributions of data; and (2) a derived experiment forks/branches an existing experiment, allowing a researcher to change properties, such as an acceptance criteria or analysis algorithm, but otherwise run the same pipeline against the same inputs. The system will allow each experiment to maintain online dashboards showing how additional data changes results with complete provenance. To develop and validate the BrainLab CI prototype, several community experiments will be developed for MRI and for neurophysiology (including both optical and electrical physiology) data. These research domains were chosen because of the great potential gains for increased sharing of laboratory data in these domains. This Early-concept Grants for Exploratory Research (EAGER) award by the CISE Division of Advanced Cyberinfrastructure is jointly supported by the SBE Division of Behavioral and Cognitive Sciences, with funds associated with the NSF Understanding the Brain activity including for developing national research infrastructure for neuroscience, and alignment with NSF objectives under the National Strategic Computing Initiative, Burns (PI), ACI-1649880.

5/15 – 8/18 **From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogenous Data**, *DARPA*, Vogelstein (PI), N66001-15-C-4041.

9/14 – 6/19 **Synaptomes of Mouse and Man**, *NIH*, The synapse is the principle active signaling component of the brain's neuronal circuitry. Synapses are highly complex, plastic, strongly modulated and deeply diverse entities, and their molecular complexity and diversity are fundamental to all synaptic circuit development and function. Moreover, many or most neurodevelopmental, psychiatric, and neurodegenerative disorders are rooted in abnormalities of the brain's vast and highly heterogeneous synapse populations. Unfortunately, such disorders are poorly understood and difficult to diagnose, prevent, and treat because we lack adequate tools to measure the brain's vast and highly diverse synapse populations, and because most of the limited tools in use today can be applied only to experimental animals such as mice. An interdisciplinary consortium comprising neurobiologists, biophysicists, clinicians, mathematicians and computer scientists here proposes development of a very ambitious "synaptomic" analysis pipeline that will transform the science of synaptic network function and disorders in both experimental animal and human brains. This novel high-throughput pipeline, based on powerful new array tomography methods, will enable measurement, analysis, and modeling of heterogeneous synapse and neuromodulatory fiber populations with unprecedented precision. The synaptomic pipeline will be demonstrated initially by developing "synaptomes" to model the heterogeneous synapse populations of mouse and human frontal and temporal lobes. Pipeline resources and data will then be shared via an Open Synaptome Project that will facilitate the development of synaptomes describing synapse populations of additional brain regions and species. These efforts are expected to provide a new foundation for understanding the basic mechanisms of mammalian brain function, and to offer new quantitative perspectives on both similarities and differences between mouse and human brain that will be critical to leveraging animal research opportunities for the improvement of human mental health. Because abnormalities of synapses and their neuromodulation are prime suspects in numerous human mental health disorders, the development and sharing of synaptomic pipeline resources and data proposed here are likely to catalyze rapid progress in clinical neuroscience. , Smith (PI), Allen Institute, R01NS092474.

5/14 – 2/16 **Scalable Brain Graph Analyses Using Big-Memory, High-IOPS Compute Architectures**, *DARPA (GRAPHS)*, Burns (PI), DARPA-BAA-13-15.

3/13 – 1/16 **Computational infrastructure for massive neuroscience image stacks**, *NIH/NSF (BIG-DATA)*, Ideally, as neuroscientists collect terabytes of image stacks, the data are automatically processed for open access and analysis. Yet, while several labs around the world are collecting data at unprecedented rates- up to terabytes per day-the computational technologies that facilitate streaming data-intensive computing remain absent. Also deploying data-intensive compute clusters is beyond the means and abilities of most experimental labs. This project will extend, develop, and deploy such technologies. To demonstrate these tools, we will utilize them in support of the ongoing mouse brain architecture (MBA) project, which already has amassed over 0.5 petabytes (PBs) of image data. The main computational challenges posed by these datasets are ones of scale. The tasks that follow remain relatively stereotyped across acquisition modalities. Until now, labs collecting data on this scale have been almost entirely isolated, left to "reinvent the wheel" for each of these problems. Moreover, the extant solutions are insufficient for a number of reasons: they often include numerous excel spreadsheets that rely on manual data entry, they lack scalable scientific database backends, and they run on ad hoc clusters not specifically designed for the computational tasks at hand. We aim to augment the current state of the art by implementing the following technological advancements into the MBA project pipeline: (1) Data Management will consist of a unified system that automatically captures metadata, launches processing pipelines, and provides quality control feedback in minutes instead of hours. (2) Data Processing tasks will run algorithms "out-of-core", appropriate for their computational requirements, including registration, alignment, and semantic segmentation of cell bodies and processes. (3) Data Storage will automatically build databases for storing multimodal image data and extracted annotations learned from the machine vision algorithms. These databases will be spatially co-registered and stored on an optimized heterogeneous compute cluster. (4) Data Access will be automatically available to everyone-including all the image data and data derived products-via Web-services, including 3D viewing, downloading, and further processing. (5) Data Analytics will extend random graph models suitable for multiscale circuit graphs, Mitra (PI), 1R01DA036400.

2/13 – 9/15 **Endeavor Scientists Training Fellowship**, Child Mind Institute, Vogelstein (PI).

9/12 – 8/15 **Data Sharing: The EM Open Connectome Project**, *NIH/NIBIB (CRCNS)*, Broader Impacts: The project develops open-source software and publicly-accessible infrastructure for the neuroscience community to collect, curate, and analyze electron microscopy (EM) connectomes on data-intensive clusters. Public data-intensive clusters, such as our Open Connectome Project, ease the storage management burden for the experimental biologists that collect data. High-throughput imaging is already producing massive data sets that overwhelm the infrastructure and expertise of their labs. Public clusters also facilitate data sharing for secondary data studies, verification and reanalysis of existing results, and multilevel models that integrate and differentiate multiple connectomes collected from different subjects, researchers, and instruments. Data-intensive storage and analysis will transform the scientific process for EM connectome imaging. At present, experimental biologists in the life sciences collect and analyze individual, private data sets usin proprietary analysis tools. In an Open Science approach, EM connectome data are also stored remotely on a data-intensive compute cluster designed specifically for the curation and analysis of massive EM connectome data. An open-source software pipeline automatically builds data products, including spatial databases, annotations, graphs, and graph statistics. Researchers explore multiple connectomes. Innovative analysis techniques are contributed back to the community as open-source software. In the EM Open Connectome, we define frameworks to engage an interdisciplinary community of life scientists, computer scientists, and statisticians in solving two fundamental problems in EM connectomes: (1) image segmentation, annotation, and tracking and (2) graph analysis. Our approach develops the concept of alg-sourcing (algorithmic outsourcing) in which researchers can easily deploy, run, evaluate, and visualize the efficiency and accuracy of algorithms against connectome databases. The EM Open Connectome provides access to data sets and an execution framework so that researchers simply upload a script or program for one of the algorithmic tasks. Then, they get instant feedback and can visualize and analyze results remotely on the data-intensive cluster, e.g., from a laptop in a cafe. Intellectual Merit: The primary project goal is to transform the process of extracting anatomical structure from image data. Currently, this is a manual process in which few researchers explore tens of neurons. The EM Open Connectome will support high-throughput, machine annotation over the largest data sets being collected. Obstacles include the accuracy and performance of computational vision algorithms, the quality of the image data, and access to software that execute these analyses. We will explore computational vision based on multi-scale aggregates with anatomical priors. We will develop image processing techniques that improve data quality prior to computational vision. We will also build a systems engineering framework to run vision algorithms that allows for rapid deployment, testing, and evaluation. The project will also enhance knowledge and understanding of the functional and computational capabilities of the brain through data-intensive analysis. Given the spatially registered machine annotations, the team will construct statistical models for brain-graphs that provide insight into neural computation. All tools and data products are publicly accessible to an Open-Science community of researchers in order to accelerate discovery through collaboration and by engaging scientists across disciplinary boundaries. Education and Outreach: Our education mission promotes data-analysis in the K-12 curriculum consistent with national benchmarks for math and sciences. We will provide online lesson plans and activities using the EM Open Connectome that directly support the materials that teachers are required to teach. We will also develop resources for the Center for Talented Youth pre-collegiate summer program. Outreach in the form of museum exhibits and a booth at the National Science Fair support our education materials and public data sets, Burns (PI), 1R01EB016411.

1/14 – 12/14 **Data Readiness Level**, *Laboratory for Analytic Sciences*, Harer (PI).

1/12 – 10/13 **Graph-Based Scalable Analytics for Big Data**, DARPA (XDATA), Andrews (PI), FA8750-12-C-0239.

12/09 – 1/13 **National Center for Applied Neuroscience Project**, *NSF*, RJ Vogelstein (PI).

Mentoring

Post-Doctoral Fellows

08/18 – now **Jesús Arroyo, PhD**, *Post-doctoral Fellow*, CIS, JHU.
Working on graph matching and joint graph embedding.

07/19 – now **Celine Drieu, PhD**, *Post-doctoral Fellow*, Kavli NDI, JHU.
Co-Advised by Assitant Prof. Kuchibhotla, Department of Psychological and Brain Sciences. Working on understanding learning and memory using two-photon calcium imaging.

07/19 – now **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.

07/18 – now **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 Assistent Professor in Department of Statistics at University of Delaware, and still an actice 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.

PhD Students

08/19 – now **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 – now **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 – now **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 – now **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 – now **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 – now **Meghana Madyastha, BSE**, *PhD Co-advisee*, CS, JHU.
Dissertation will focus on computational aspects of accelerationg learning and inference using decision forests.

08/16 – now **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. Currenly a postdoc with Assistant Prof. Chris Honey of Psychology and Brain Sciences.

Masters Students

06/19 – now **Bijan Varjavand**, *MS advisee*, BME, JHU.
Submitted manuscript to PAMI on advancing statistics on populations of networks.

06/19 – now **Sambit Panda**, *MS advisee*, BME, JHU.
Led development of Python implementation of MGC, to be integrated into SciPy.

06/19 – now **Varun Kotharkar**, *MS advisee*, AMS, JHU.
Investigating theoretical advantages of oblique, as compared to axis-aligned, decision trees.

06/18 – now **Drishti 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 deveoper 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 Students

06/19 – now **Vivek Gopalakrishnan**, *BSE*, BME, JHU.
Winner of Pistritto Fellowship.

06/19 – now **Richard Guo**, *BSE*, BME, JHU.

06/19 – now **Ronan Perry**, *BSE*, BME, JHU.

08/14 – 08/18 **Eric Bridgeford, BSE**, BME, JHU.
Currently a PhD student in Biostatistics at JHSPH in my lab.

08/15 – 08/16 **Albert Lee,BSE**, BME, JHU.

06/15 – 12/15 **Ron Boger, BSE**, BME, JHU.
Currenly working at a computational medicine start-up in Silicon Valley.

05/15 – 05/16 **Jordan Matelsky, BSE**, CS and Neuroscience, JHU.
Currently a data scientist at APL.

02/15 – 05/16 **Ivan Kuznetsov, BSE**, BME, JHU.
Currently an MD/PhD Candidate at the UPenn, winner of Soros Fellowship.

Research Assistants

09/19 – now **Ross Lawrence**, *Research Assistant*, BME, JHU.
Responsible for documenting and bug fixing NDMG.

07/19 – now **Ronak Mehta**, *Research Assistant*, BME, JHU.
Finalizing three manuscripts on (1) uncertainty forests, (2) time-series dependence quantification, and (3) lifelong learning forests.

06/19 – now **Devin Crowley**, *Research Assistant*, BME, JHU.
Lead developer of our scalable Python implementaiton of LDDMM.

02/19 – now **Hayden Helm**, *Assistant Research Faculty*, BME, JHU.
Leading research efforts developing theory and methods for lifelong learning.

10/18 – now **Alex Loftus**, *Research Assistant*, BME, JHU.
Current lead developer of NDMG, transitioning from a stand-alone package to be integrated with DiPy.

06/18 – now **Benjamin Falk**, *Research Engineer*, BME, JHU.
Lead software engineer, overseas all development projects, solely responsible for all cloud infrastructure.

03/16 – now **Jesse Patsolic**, *Assistant Research Faculty*, BME, JHU.
Lead developer converting our extensions to decision forests to be merged into sklearn.

Summer Interns

Summer '19 **Kareef Ullah**, *Summer Intern*, BME, JHU.

Summer '19 **Shunan Wu**, *Summer Intern*, BME, JHU.

Summer '19 **Shiyu Sun**, *Summer Intern*, BME, JHU.
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.

Thesis Committee Service

James Browne, *Graduated 2019*, Computer Science, Johns Hopkins University.
Disa Mhembere, *Graduated 2019*, Computer Science, Johns Hopkins University.
Kwame Kutten, *Graduated 2018*, Biomedical Engineering, Johns Hopkins University.
Da Zheng, *Graduated 2017*, Computer Science, Johns Hopkins University.
Shangsi Wang, *Graduated 2018*, Applied Mathematics and Statistics, Johns Hopkins University.
Runze Tang, *Graduated 2018*, Applied Mathematics and Statistics, Johns Hopkins University.
Youjin Lee, *Graduated 2018*, Biostatistics, Johns Hopkins University.
Norbert Binkiewicz, *Graduated 2017*, Statistics, University of Wisconsin.
Will Gray Roncal, *Graduated 2016*, Computer Science, Johns Hopkins University.

Teaching

New Courses Developed

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.

Existing Courses Redeveloped

Fall 2015 **Introduction to Computational Medicine**, Co-Teaching, Course Co-Director.

Guest Lectures

Fall 2016 **BME Modeling and Design**, *EN.580.111*, 1 Lecture.
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.

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.

Service

Editorial Board

Guest Associate Editor, *PLoS Computational Biology*.

Editor, *Neurons, Behavior, Data analysis, and Theory*.

Associate Editor, *Journal of the American Statistical Association*.

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.

University Service

Member, *Search Committee*, BME, Neuroengineering, 2019.

Member, *Search Committee*, BME, Data Science, 2019.

Member, *Search Committee*, BME, Neuroengineering, 2018.

Other Activities

Events Organized

Summer '19 **Organizer**, *NeuroData Workshop*, https://neurodata.devpost.com, Hackashop to train brain scientists in machine learning for big data ()$\sim$ 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)..

Summer '17 **Organizer**, *NeuroStorm*, https://brainx2.io, Workshop 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 '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)..

Conference Events Organized

Fall '16 **Co-Organizer**, *Brains and Bits: Neuroscience Meets Machine Learning, NIPS Workshop*, http://www.stat.ucla.edu/~akfletcher/brainsbits_overview.html.

Fall '15 **Co-Organizer**, *BigNeuro2015: Making Sense of Big Neural Data, NIPS Workshop*, http://neurodata.io/bigneuro2015.

Hackathons Organized & Supervised

Winter '19 **Organizer**, *Decision Forest Hackathon*.

Spring '18 **Organizer**, *NeuroData Hackathon*.

Fall '17 **Organizer**, *NeuroData Mini-Hackathon*.

Winter '17 **Faculty Superviser**, *MedHacks*, http://medhacks.org/.

Winter '16 **Faculty Superviser**, *MedHacks*, http://medhacks.org/.

Winter '15 **Organizer**, *Hack@NeuroData*, http://hack.neurodata.io/.

Winter '15 **Faculty Superviser**, *MedHacks*, http://medhacks.org/.

Professional Memberships

SfN **Society for Neuroscience**.

Web Presence and Social Media

Twitter **5,600+ followers**, *https://twitter.com/neuro_data/*, I have had 27.1K impressions in September, 36.5K impressions in August, 37.7K impressions in July, and 32.6K impressions in June..

Website ∼**100,000 visitors**, *https://neurodata.io*.

Languages

Proficient **English, Hebrew, Love, MATLAB, LaTeX**.

Inproficient **R, Python, HTML, CSS**.

Appended Manuscripts

I have appended the most highly cited manuscripts on which I am first author from each academic position (number of citations as of September, 2019):.

PhD **JT Vogelstein et al.** , *Fast Nonnegative Deconvolution for Spike Train Inference From Population Calcium Imaging*, Journal of Neurophysiology, 2010.
300 citations

JHU Postdoc **JT Vogelstein et al.** , *The Predictive Capacity of Personal Genome Sequencing*, Science, 2012.
201 citations

Duke Postdoc **JT Vogelstein et al.** , *Discovery of Brainwide Neural-Behavioral Maps via Multiscale Unsupervised Structure Learning*, Science, 2014.
178 citations

JHU Faculty **JT Vogelstein et al.** , *To the Cloud! A Grassroots Proposal to Accelerate Brain Science Discovery*, Neuron, 2016.
23 citations