# Joshua T. Vogelstein

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## Current Experience

### Academic Positions

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

08/14 – now **Core Faculty**, *Institute for Computational Medicine & Center for Imaging Science*, Johns Hopkins University.

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

10/15 – now **Steering Committee Member & Associate Member**, *Kavli Neuroscience Discovery Institute*.

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*, Johns Hopkins University.

### Academic Activities

01/11 – now **Co-Founder & Co-Director**, *NeuroData (formerly Open Connectome Project)*.

08/14 – now **Director of Undergraduate Studies**, *Institute for Computational Medicine*.

### Commercial Experience

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

01/17 – now **Advisory Board**, *PivotalPath*.

01/16 – now **Co-Founder**, *d8alab*.

## Previous Experience

05/15 – now **Co-Founder and Faculty Advisor**, *MedHacks*.

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

08/12 – 08/14 **Senior Research Scientist**, *Dept's of Statistical Sciences & Mathematics & Neurobiology*.

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

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

01/11 – 08/12 **Assistant Research Professor**, *Department of Applied Mathematics and Statistics*.

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

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*.

## Education

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| 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.* |
| 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.* |

## Awards & Honors

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| 2017 | **Best Presentation Award HPDC**, *Mhembere 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).* |

## Pre-Prints

1. S. Wang, C. Shen, A. Badea, C. E. Priebe, and J. T. Vogelstein. Signal Subgraph Estimation Via Vertex Screening. *arXiv:1801.07683*, 2018.

2. J. T. Vogelstein, M. Tang, E. W. Bridgeford, D. Zheng, R. Burns, and M. Maggioni. Linear Optimal Low Rank Projection for High-Dimensional Multi-class Data. *arXiv:1709.01233*, 2017.

3. C. Shen, M. Tang, E. W. Bridgeford, C. E. Priebe, M. Maggioni, and J. T. Vogelstein. Discovering Relationships Across Disparate Data Modalities. *arXiv:1609.05148*, 2016.

4. R. Tang, M. Tang, J. T. Vogelstein, and C. E. Priebe. Robust Estimation from Multiple Graphs under Gross Error Contamination. *arXiv:1707.03487*, 2017.

5. Y. Lee, C. Shen, and J. T. Vogelstein. Network Dependence Testing via Diffusion Maps and Distance-Based Correlations. *arXiv:1703.10136*, 2017.

6. C. E. Priebe, Y. Park, M. Tang, A. Athreya, V. Lyzinsky, J. T. Vogelstein, Y. Qin, B. Cocanougher, K. Eichler, M. Zlatic, and A. Cardona. Semiparametric spectral modeling of the *Drosophila* connectome. *arXiv:1705.03297*, 2017.

7. R. Tang, M. Ketcha, A. Badea, E. D. Calabrese, D. S. Margulies, J. T. Vogelstein, C. E. Priebe, and D. L. Sussman. Connectome Smoothing via Low-rank Approximations. *arXiv:1609.01672*, 2016.

8. T. Tomita, J. Browne, C. Shen, P. C. E., R. Burns, M. Maggioni, and J. T. Vogelstein. Randomer Forests. *arXiv:1506.03410*, 2016.

9. D. Zheng, R. Burns, J. T. Vogelstein, C. E. Priebe, and A. S. Szalay. An SSD-based eigensolver for spectral analysis on billion-node graphs. *arXiv:1602.01421*, 2016.

10  D. Zheng, D. Mhembere, V. Lyzinski, J. Vogelstein, C. E. Priebe, and R. Burns. Semi-External memory sparse matrix multiplication for Billion-Node graphs. *IEEE Trans. Parallel Distrib. Syst.*, PP(99):1–1, 2016.

11  D. Zheng, D. Mhembere, J. T. Vogelstein, C. E. Priebe, and R. Burns. FlashMatrix: Parallel, Scalable Data Analysis with Generalized Matrix Operations using Commodity SSDs. *arXiv:1604.06414*, 2016.

12  V. Lyzinski, S. Adali, J. T. Vogelstein, Y. Park, and C. E. Priebe. Seeded Graph Matching Via Joint Optimization of Fidelity and Commensurability. *arXiv:1401.3813*, 2014.

13  A. Banerjee, J. Vogelstein, and D. Dunson. Parallel inversion of huge covariance matrices. *arXiv:1312.1869*, 1312.1869:17, 2013.

14  M. Kazhdan, R. Burns, B. Kasthuri, J. Lichtman, J. Vogelstein, and J. Vogelstein. Gradient-Domain Processing for Large EM Image Stacks. *arXiv:1310.0041*, 1310.0041, 2013.

## Peer-Reviewed Journal Publications

1  D. Durante, D. B. Dunson, and J. T. Vogelstein. Rejoinder: Nonparametric Bayes Modeling of Populations of Networks. *Journal of the American Statistical Association*, 112(520):1547–1552, 2017.

2  J. D. Cohen, L. Li, Y. Wang, C. Thoburn, B. Afsari, L. Danilova, C. Douville, A. A. Javed, F. Wong, A. Mattox, R. H. Hruban, C. L. Wolfgang, M. G. Goggins, M. D. Molin, T.-L. Wang, R. Roden, A. P. Klein, J. Ptak, L. Dobbyn, J. Schaefer, N. Silliman, M. Popoli, J. T. Vogelstein, J. D. Browne, R. E. Schoen, R. E. Brand, J. Tie, P. Gibbs, H.-L. Wong, A. S. Mansfield, J. Jen, S. M. Hanash, M. Falconi, P. J. Allen, S. Zhou, C. Bettegowda, L. Diaz, C. Tomasetti, K. W. Kinzler, B. Vogelstein, A. M. Lennon, and N. Papadopoulos. Detection and localization of surgically resectable cancers with a multi-analyte blood test. *Science*, page eaar3247, January 2018.

3  S. Wang, J. T. Vogelstein, and C. E. Priebe. Joint Embedding of Graphs. *arXiv:1703.03862*, 2017.

4  E. L. Dyer, W. Gray Roncal, J. A. Prasad, H. L. Fernandes, D. Gürsoy, V. De Andrade, K. Fezzaa, X. Xiao, J. T. Vogelstein, C. Jacobsen, K. P. Körding, and N. Kasthuri. Quantifying mesoscale neuroanatomy using X-ray microtomography. *eNeuro*, 4(5), September 2017.

5  A. K. Simhal, C. Aguerrebere, F. Collman, J. T. Vogelstein, K. D. Micheva, R. J. Weinberg, S. J. Smith, and G. Sapiro. Probabilistic fluorescence-based synapse detection. *PLOS Computational Biology*, 13(4):1–24, 04 2017.

6  C. Shen, J. T. Vogelstein, and C. E. Priebe. Manifold matching using shortest-path distance and joint neighborhood selection. *Pattern Recognition Letters*, 92:41 – 48, 2017.

7  G. Kiar, K. J. Gorgolewski, D. Kleissas, W. Gray Roncal, B. Litt, B. Wandell, R. A. Poldrack, M. Wiener, R. Vogelstein, R. Burns, and J. T. Vogelstein. Science In the Cloud (SIC): A use case in MRI Connectomics. *GigaScience*, gix013, mar 2017.

8  D. G. C. Hildebrand, R. M. Torres, W. Choi, T. M. Quan, A. W. Wetzel, G. S. Plummer, R. Portugues, I. H. Bianco, S. Saalfeld, A. Baden, L. Kunal, R. Burns, J. T. Vogelstein, W.-K. Jeong, J. W. Lichtman, and F. Engert. Whole-brain serial-section electron microscopy in larval zebrafish. *Nature*, 2017.

9  S. Chen, K. Liu, Y. Yang, Y. Xu, S. Lee, M. Lindquist, B. S. Caffo, and J. T. Vogelstein. An M-Estimator for Reduced-Rank High-Dimensional Linear Dynamical System Identification. *Pattern Recognition Letters*, 86:76 – 81, 2017.

10  N. Binkiewicz, J. T. Vogelstein, and K. Rohe. Covariate Assisted Spectral Clustering. *Biometrika*, 2017.

11  D. Durante, D. B. Dunson, and J. T. Vogelstein. Nonparametric Bayes Modeling of Populations of Networks. *Journal of the American Statistical Association*, 0(ja):0–0, 2016.

12  L. Chen, C. Shen, J. T. Vogelstein, and C. E. Priebe. Robust Vertex Classification. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 38(3):578–590, 2016.

13  R. D. Airan, J. T. Vogelstein, J. J. Pillai, B. Caffo, J. J. Pekar, and H. I. Sair. Factors affecting characterization and localization of interindividual differences in functional connectivity using MRI. *Human Brain Mapping*, 37(5):1986–1997, 2016.

14  L. Chen, J. T. Vogelstein, V. Lyzinski, and C. E. Priebe. A Joint Graph Inference Case Study: the C. Elegans Chemical and Electrical Connectomes. *Worm*, 5(2):e1142041, 2016.

15  K. M. Harris, J. Spacek, M. E. Bell, P. H. Parker, L. F. Lindsey, A. D. Baden, J. T. Vogelstein, and R. Burns. A resource from 3D electron microscopy of hippocampal neuropil for user training and tool development. *Scientific Data*, 2:150046, 2015.

16  D. Koutra, N. Shah, J. T. Vogelstein, B. Gallagher, and C. Faloutsos. DeltaCon: Principled Massive-Graph Similarity Function with Attribution. *ACM Transactions on Knowledge Discovery from Data*, 10(3):28:1–28:43, February 2016.

17  W. G. Roncal, D. M. Kleissas, J. T. Vogelstein, P. Manavalan, R. Burns, R. J. Vogelstein, C. E. Priebe, M. A. Chevillet, and G. D. Hager. An Automated Images-to-Graphs Pipeline for High Resolution Connectomics. *Frontiers in Neuroinformatics*, 9, 2015.

18  N. Kasthuri, K. J. Hayworth, D. R. Berger, R. L. Schalek, J. A. Conchello, S. Knowles-Barley, D. Lee, Vazquez-Reina, V. Kaynig, T. R. Jones, M. Roberts, J. L. Morgan, J. C. Tapia, H. S. Seung, W. G. Roncal, J. T. Vogelstein, R. Burns, D. L. Sussman, C. E. Priebe, H. Pfister, and J. W. Lichtman. Saturated Reconstruction of a Small Volume of Neocortex. *Cell*, 162:648–661, 2015.

19  J. T. Vogelstein, J. M. Conroy, V. Lyzinski, L. J. Podrazik, S. G. Kratzer, E. T. Harley, D. E. Fishkind, R. J. Vogelstein, and C. E. Priebe. Fast Approximate Quadratic Programming for Graph Matching. *PLoS One*, 10:e0121002, 2015.

20  J. T. Vogelstein and C. E. Priebe. Shuffled Graph Classification: Theory and Connectome Applications. *Journal of Classification*, 32:3–20, 2015.

21  V. Lyzinski, D. L. Sussman, D. E. Fishkind, H. Pao, L. Chen, J. T. Vogelstein, Y. Park, and C. E. Priebe. Spectral clustering for divide-and-conquer graph matching. *Parallel Computing*, 47:70–87, 2015.

22  V. Lyzinski, D. E. Fishkind, M. Fiori, J. T. Vogelstein, C. E. Priebe, and G. Sapiro. Graph Matching: Relax at Your Own Risk. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 38(1):60–73, Jan 2016.

23  N. C. Weiler, F. Collman, J. T. Vogelstein, R. Burns, and S. J. Smith. Synaptic molecular imaging in spared and deprived columns of mouse barrel cortex with array tomography. *Scientific Data*, 1:140046, 2014.

24  E. M. Sweeney, J. T. Vogelstein, J. L. Cuzzocreo, P. A. Calabresi, D. S. Reich, C. M. Crainiceanu, and R. T. Shinohara. A Comparison of Supervised Machine Learning Algorithms and Feature Vectors for MS Lesion Segmentation Using Multimodal Structural MRI. *PLoS ONE*, 9:e95753, 2014.

25  J. T. Vogelstein, Y. Park, T. Ohyama, R. A. Kerr, J. W. Truman, C. E. Priebe, and M. Zlatic. Discovery of brainwide neural-behavioral maps via multiscale unsupervised structure learning. *Science*, 344(6182):386–92, 2014.

26  D. E. Carlson, J. T. Vogelstein, Q. Wu, W. Lian, M. Zhou, C. R. Stoetzner, D. Kipke, D. Weber, D. B. Dunson, and L. Carin. Multichannel Electrophysiological Spike Sorting via Joint Dictionary

Learning & Mixture Modeling. *IEEE Transactions on Biomedical Engineering*, 61(1):41–54, 2014.

27  J. T. Vogelstein, W. R. Gray, R. J. Vogelstein, and C. E. Priebe. Graph classification using signal-subgraphs: applications in statistical connectomics. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 35(7):1539–51, 2013.

28  R. C. Craddock, S. Jbabdi, C.-G. Yan, J. T. Vogelstein, F. X. Castellanos, A. Di Martino, C. Kelly, K. Heberlein, S. Colcombe, and M. P. Milham. Imaging human connectomes at the macroscale. *Nature Methods*, 10(6):524–39, 2013.

29  C. E. Priebe, J. Vogelstein, and D. Bock. Optimizing the Quantity/Quality Trade-Off in Connectome Inference. *Communications in Statistics - Theory and Methods*, 42(19):3455–3462, 2013.

30  D. Dai, H. He, J. T. Vogelstein, and Z. Hou. Accurate prediction of AD patients using cortical thickness networks. *Machine Vision and Applications*, 24(7):1445–1457, 2012.

31  D. E. Fishkind, D. L. Sussman, M. Tang, J. T. Vogelstein, and C. E. Priebe. Consistent Adjacency-Spectral Partitioning for the Stochastic Block Model When the Model Parameters Are Unknown. *SIAM Journal on Matrix Analysis and Applications*, 34(1):23–39, 2013.

32  N. J. Roberts, J. T. Vogelstein, G. Parmigiani, K. W. Kinzler, B. Vogelstein, and V. E. Velculescu. The predictive capacity of personal genome sequencing. *Science Translational Medicine*, 4(133):133ra58, 2012.

33  W. R. Gray, J. A. Bogovic, J. T. Vogelstein, B. A. Landman, J. L. Prince, and R. J. Vogelstein. Magnetic resonance connectome automated pipeline: an overview. *IEEE Pulse*, 3(2):42–8, 2012.

34  J. T. Vogelstein, R. J. Vogelstein, and C. E. Priebe. Are mental properties supervenient on brain properties? *Scientific Reports*, 1:100, 2011.

35  S. B. Hofer, H. Ko, B. Pichler, J. Vogelstein, H. Ros, H. Zeng, E. Lein, N. A. Lesica, and T. D. Mrsic-Flogel. Differential connectivity and response dynamics of excitatory and inhibitory neurons in visual cortex. *Nature Neuroscience*, 14(8):1045–52, 2011.

36  Y. Mishchenko, J. T. Vogelstein, and L. Paninski. A Bayesian approach for inferring neuronal connectivity from calcium fluorescent imaging data. *The Annals of Applied Statistics*, 5(2B):1229–1261, 2011.

37  J. T. Vogelstein, A. M. Packer, T. A. Machado, T. Sippy, B. Babadi, R. Yuste, and L. Paninski. Fast nonnegative deconvolution for spike train inference from population calcium imaging. *Journal of Neurophysiology*, 104(6):3691–704, 2010.

38  L. Paninski, Y. Ahmadian, D. G. Ferreira, S. Koyama, K. R. Rad, M. Vidne, J. Vogelstein, and W. Wu. A new look at State-Space Models for Neural Data. *Journal of Computational Neuroscience*, 29(1-2):107–26, 2010.

39  J. T. Vogelstein, B. O. Watson, A. M. Packer, R. Yuste, B. Jedynak, and L. Paninski. Spike inference from calcium imaging using sequential Monte Carlo methods. *Biophysical Journal*, 97(2):636–55, 2009.

40  R. J. Vogelstein, U. Mallik, J. T. Vogelstein, and G. Cauwenberghs. Dynamically reconfigurable silicon array of spiking neurons with conductance-based synapses. *IEEE Transactions on Neural Networks*, 18(1):253–65, 2007.

41  J. T. Vogelstein, D. Angelaki, and L. Snyder. Accuracy of saccades to remembered targets as a function of body orientation in space. *Journal of Neurophysiology*, 90(1):521–4, 2003.

42  D. L. Greenspan, D. C. Connolly, R. Wu, R. Y. Lei, J. T. Vogelstein, Y. T. Kim, J. E. Mok, N. Muñoz, F. X. Bosch, K. Shah, and K. R. Cho. Loss of FHIT expression in cervical carcinoma cell lines and primary tumors. *Cancer research*, 57(21):4692–8, 1997.

## Peer-Reviewed Conference Proceedings

1   D. Zheng, D. Mhembere, J. T. Vogelstein, C. E. Priebe, and R. Burns. FlashR: Parallelize and Scale R for Machine Learning Using SSDs. *SIGPLAN Not.*, 53(1):183–194, February 2018.

2   K. S. Kutten, N. Charon, M. I. Miller, T. Ratnanather, K. Deisseroth, L. Ye, and J. T. Vogelstein. A Diffeomorphic Approach to Multimodal Registration with Mutual Information: Applications to CLARITY Mouse Brain Images. *MICCAI*, 2017.

3   D. Mhembere, C. E. Da Zheng, J. T. Vogelstein, and R. Burns. knor: A NUMA-optimized In-memory, Distributed and Semi-external-memory k-means Library. *High Performance Distributed Computing 2017*, 2017.

4   T. M. Tomita, M. Maggioni, and J. T. Vogelstein. ROFLMAO: Robust Oblique Forests with Linear Matrix Operations. In *Proceedings of the 2017 SIAM International Conference on Data Mining*. SIAM, 2017.

5   K. S. Kutten, J. T. Vogelstein, N. Charon, L. Ye, K. Deisseroth, and M. I. Miller. Deformably Registering and Annotating Whole CLARITY Brains to an Atlas via Masked LDDMM. *SPIE Europe*, 2016.

6   W. Gray Roncal, M. Pekala, V. Kaynig-fittkau, D. M. Kleissas, J. T. Vogelstein, H. Pfister, R. Burns, R. J. Vogelstein, M. A. Chevillet, and G. D. Hager. VESICLE : Volumetric Evaluation of Synaptic Inferfaces using Computer vision at Large Scale. In *26th British Machine Vision Conference (BMVC)*, pages 1–9, 2015.

7   D. Zheng, D. Mhembere, R. Burns, J. T. Vogelstein, C. E. Priebe, and A. S. Szalay. FlashGraph: Processing Billion-Node Graphs on an Array of Commodity SSDs. In *USENIX Conference on File and Storage Technologies*, 2015.

8   F. Petralia, J. T. Vogelstein, and D. Dunson. Multiscale Dictionary Learning for Estimating Conditional Distributions. *Advances in Neural Information Processing Systems (NIPS)*, pages 1797–1805, 2013.

9   D. Carlson, V. Rao, J. T. Vogelstein, and L. Carin. Real-Time Inference for a Gamma Process Model of Neural Spiking. *Advances in Neural Information Processing Systems (NIPS)*, pages 2805–2813, 2013.

10  M. Fiori, P. Sprechmann, J. T. Vogelstein, P. Muse, and G. Sapiro. Robust Multimodal Graph Matching: Sparse Coding Meets Graph Matching. *Advances in Neural Information Processing Systems (NIPS)*, pages 127–135, 2013. (spotlight).

11  D. Koutra, J. T. Vogelstein, and C. Faloutsos. DeltaCon: A Principled Massive-Graph Similarity Function. *Proceedings of the 2013 SIAM International Conference on Data Mining*, pages 162–170, 2013.

12  W. G. Roncal, Z. H. Koterba, D. Mhembere, D. M. Kleissas, J. T. Vogelstein, R. Burns, A. R. Bowles, D. K. Donavos, S. Ryman, R. E. Jung, L. Wu, V. Calhoun, and R. J. Vogelstein. MIGRAINE: MRI Graph Reliability Analysis and Inference for Connectomics. *IEE GlobalSIP*, 2013.

13  D. Mhembere, W. G. Roncal, D. Sussman, C. E. Priebe, R. Jung, S. Ryman, R. J. Vogelstein, J. T. Vogelstein, and R. Burns. Computing Scalable Multivariate Global Invariants of Large (Brain-) Graphs. *IEE GlobalSIP*, 2013.

14  V. Kulkarni, J. Sastry, J. T. Vogelstein, and L. Akoglu. Sex Differences in the Human Connectome. In *International Conference on Brain and Health Informatics*, 2013. Lecture Notes in Computer Science, Volume 8211.

15  R. Burns, W. G. Roncal, D. Kleissas, K. Lillaney, P. Manavalan, E. Perlman, D. R. Berger, D. D. Bock, K. Chung, L. Grosenick, N. Kasthuri, N. C. Weiler, K. Deisseroth, M. Kazhdan,

J. Lichtman, R. C. Reid, S. J. Smith, A. S. Szalay, J. T. Vogelstein, and R. J. Vogelstein. The Open Connectome Project Data Cluster: Scalable Analysis and Vision for High-Throughput Neuroscience. *Proceedings of the 25th International Conference on Scientific and Statistical Database Management (SSDBM).* Article No. 27, 2013.

16  B. Cornelis, Y. Yang, J. T. Vogelstein, A. Dooms, I. Daubechies, and D. Dunson. Bayesian crack detection in ultra high resolution multimodal images of paintings. *DSP 2013 Special Session on Tensor Factorization and its Applications*, 2013.

17  Q. J. Huys, J. Vogelstein, and P. Dayan. Psychiatry: Insights into depression through normative decision-making models. *Advances in Neural Information Processing Systems (NIPS)*, pages 729–736, 2008.

## Other Publications

1  Neuro Cloud Consortium et al. To the Cloud! A Grassroots Proposal to Accelerate Brain Science Discovery. *Neuron*, 92(3):622–627, 2016.

2  J. T. Vogelstein et al. Grand Challenges for Global Brain Sciences, 2016.

3  P. Golland, J. Galland, G. Hager, H. Pfister, P. Christos, S. Schaal, and J. T. Vogelstein. A New Age of Computing and the Brain. In CCC Brain Workshop, 2015.

4  R. Burns, J. T. Vogelstein, and A. S. Szalay. From cosmos to connectomes: the evolution of data-intensive science. *Neuron*, 83(6):1249–52, 2014.

5  R. Yuste, J. MacLean, J. Vogelstein, and L. Paninski. Imaging action potentials with calcium indicators. *Cold Spring Harbor Protocols*, 2011(8):985–9, 2011.

6  J. T. Vogelstein. Q&A: What is the Open Connectome Project? *Neural Systems & Circuits*, 1:16, 2011.

7  J. T. Vogelstein, R. J. Vogelstein, and B. Vogelstein. Testing the effects of genetic variations using MINIME technology. *Science*, 286:2300–2301, 1999.

## Unpublished Work – Pre-prints Available upon Request

1  Robust Bayesian Inference via Lq-Likelihood. Joint work with D.B. Dunson, Carey E. Priebe, Y. Qin.

2  Neuronal Classification from Network Connectivity. Joint work with R. Goldin, D. Marchette, P. Salomonsky, Carey E. Priebe, G. Ascoli.

3  Class Morphing. Joint work with D. Marchette, Carey E. Priebe.

4  Optimal Spike Inference from in vivo 2-Photon Calcium Imaging. Joint work with D. Greenberg, J. Kerr.

5  Extracting Priximity for Brain Graph Voxel Classification. Joint work with N. Sismanis, D.L. Sussman, X. Sun, N. Pitsianis.

6  A Six Degree-Of-Freedom Two-Photon Microscope for Functional Imaging in Awake Behaving Primates. Joint work with C.E. Connor et al.

7  A Spiking Model of Ventral Cochlear Nucleus in Response to Complex Stimuli, 2004. Joint work with E. Young.

8  A Hardware Emulator of Awake Behaving Macaque Primary Motor Cortex, 2003. Joing work with D. Moran.

## Invited Talks

1. *Challenges and Opportunities in Big Data for Neuroscientists*, Society for Neuroscience: DC Metro Area Chapter Keynote Address, 2017.

2. *NeuroData: Enabling Terascale Neuroscience for Everyone*, Keystone Symposia: State of the Brain, 2016.

3. Using big data science to understand what goes on in our heads. SOHOP Faculty Spotlight, 2017.

4. Using big data science to understand what goes on in our heads. SOHOP Faculty Spotlight, 2016.

5. From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data: Part 1. DARPA SIMPLEX PI Meeting, 2015.

6. *Special Symposium: Neuroscience in the 21st Century*, Kavli, 2015.

7. *Open Connectome Project: Lowering the Barrier to Entry of Big Data Neuroscience*, Institute for Computational Medicine at Johns Hopkins University, 2015.

8. *Law of Large Graphs*, DARPA Graphs, 2015.

9. *From RAGs to Riches: Utilizing Richly Attributed Graphs to Reason from Heterogeneous Data*, SIMPLEX Kickoff, 2015.

10. *Opportunities and Challenges in Big Data Neuroscience*, DoE, 2015.

11. *Open-Science Platform for Heterogeneous Brain Data: Opportunities and Challenges*, Kavli, 2014.

12. *Top Challenges of Big Data Neuroscience*, BRAIN Initiative Workshop, Dec 2014.

13. *Big Statistics for Brain Sciences*, Baylor College of Medicine, Department of Neuroscience, May 2014.

14. *Big (Neuro) Statistics*, Kavli Salon, 2014. Big Data: Practice Across Disciplines.

15. *Statistical Models and Inference for big Brain-Graphs*, NIPS Workshop on Acquiring and analyzing the activity of large neural ensembles, 2013.

16. *Beyond Little Neuroscience*, Beyond Optogenetics workshop at Cosyne, 2013.

17. *Statistical Inference on Graphs*, University of Michigan, 2013.

18. *Statistical Inference on Graphs*, Scientific Computing Institute, University of Utah, 2013.

19. *Open Problems in Neuropsychiatry*, Data Seminar, Duke University, 2013.

20. *BIG NEURO*, Theory and Neurobiology, Duke University, 2012.

21. *Open Connectome Project*, Academic Medical Center, Amsterdam, 2012.

22. *Connectome Classification: Statistical Graph Theoretic Methods for Analysis of MR-Connectome Data*, Organization for Human Brain Mapping, 2011.

23. *Decision Theoretic Approach to Statistical Inference*, guest Lecture in Current Topics in Machine Learning, Johns Hopkins University, 2012.

24. NIPS workshop on Philosophy and Machine Learning. *Are mental properties supervenient on brain properties*, 2011.

25. *Once we get connectomes, what the %#* are we going to do with them?*, Krasnow Institute for Advanced Study at George Mason Univeristy, 2011.

26 *What can Translational neuroimaging Research do for Clinical Practice*, Child Mind Institute, 2011.

27 *Consistent Graph Classification*, Guest Lecture in Deisseroth Lab, Stanford University, 2011.

28 *Once we get connectomes, what the %#\* are we going to do with them?*, Institute of Neuroinformatics, 2011.

29 *Consistent Connectome Classification*, Math/Bio Seminar, Duke University, 2011.

30 *Statistical Connectomics*, Harvard University Connectomics Labs, 2011.

31 *Towards Inference and Analaysis of Neural Circuits Inferred from Population Calcium Imaging*, Guest Lecture in Schnitzer Lab, 2009.

32 *Towards Inferring Neural Circuits from Calcium Imaging*, Guest Lecture in Yuste Lab, 2009.

33 *Neurocognitive Graph Theory*, national Security Agency, 2009.

34 *Sequential Monte Carlo in Neuroscience*, SAMSI Program on Sequential Monte Carlo, Tracking Working Group, 2009.

35 *OOPSI: A Family of Optimal OPtical Spike Inference Algorithms for Inferring Neural Connectivity from Population Calcium Imaging*, Dissertation Defense, 2009.

36 *Inferring Spike Trains Given Calcium-Sensitive Fluorescence Observations*, Statistical Analysis of Neural Data, 2008.

37 *Inferring spike times given typical time-series fluorescence observations*, Department of Applied Mathematics and Statistics, Johns Hopkins University, 2008.

38 *Inferring spike trains from Calcium Imaging*, Redwood Center for Theoretical Neuroscience, University of California, Berkeley, 2008.

39 *Inferring spike trains from Calcium Imaging*, Cambridge University, Gatsby Unit, and University College London, 2008.

40 *Model based optimal inference of spike times and calcium dynamics givern noisy and intermittent calcium-fluorescence observations*, Neurotheory Center of Columbia University, 2007.

## Poster Presentations

1 J. T. Vogelstein. NeuroData: Enabling Terascale Neuroscience for Everyone. In *Janelia: High-Resolution Circuit Reconstruction*, 2016.

2 S. Chen, J. T. Vogelstein, S. Lee, M. Lindquist, and B. Caffo. High Dimensional State Space Model with L-1 and L-2 Penalties. In *ENAR 2015*.

3 J. T. Vogelstein and C. E. Priebe. Nonparametric Two-Sample Testing on Graph-Valued Data. In *Duke Workshop on Sensing and Analysis of HighDimensional Data*, 2013.

4 Y. Qin et al. Robust Clustering of Adjacency Spectral Embeddings of Brain Graph Data via Lq-Likelihood. In *OHBM*, 2013.

5 D. Koutra et al. Are All Brains Wired Equally? In *OHBM*, 2013.

6 D. Sussman et al. Massive Diffusion MRI Graph Structure Preserves Spatial Information. In *OHBM*, 2013.

7 D. Mhembere et al. Multivariate Invariants from Massive Brain-Graphs. In *OHBM*, 2013.

8 W. R. Gray et al. Towards a Fully Automatic Pipeline for Connectome Estimation from High-Resolution EM Data. In *OHBM*, 2013.

9   C. Craddock et al. Towards Automated Analysis of Connectomes: The Configurable Pipeline for the Analysis of Connectomes. In *OHBM*, 2013.

10   N. Sismanis et al. Feature Clustering from a Brain Graph for Voxel-to-Region Classification. In *5th Panhellic Conference on Biomedical Technology*, 2013.

11   J. T. Vogelstein et al. Anomaly Screening and Clustering of Multi-OBject Movies via Multiscale Structure Learning. In *DARPA XDATA Colloquium*, 2013.

12   E. A. Pnevmatikakis et al. Rank-penalized nonnegative spatiotemporal deconvolution and demixing of calciu inaging data. In *COSYNE*, 2013.

13   R. D. Airan, J. T. Vogelstein, et al. Reproducible differentiation of individual of individual subjects with minimal acquisition time via resting state fMRI. In *Proc ISMRM*, page 1932, 2013.

14   W. R. Gray et al. Towards a Fully Automatic Pipeline for Connectome Estimation from High-Resolution EM Data. In *Cold Spring Harbor Laboratory, Neuronal Circuits*, 2012.

15   J. T. Vogelstein et al. Statistical Connectomics. In *Janelia Farm conference, Statistical Inference and Neuroscience*, 2012.

16   J. T. Vogelstein et al. BRAINSTORM towards clinically and scientifically useful neuroimaging analytics. In *Neuroinformatics*, 2012.

17   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.

18   J. T. Vogelstein, D. L. Sussman, M. Tang, D. E. Fishkind, and C. E. Priebe. Dot product embedding in large (errorfully observed) graphs with applications in statistical connectomics. In *IMA conference on Large Graphs*, 2011.

19   J. T. Vogelstein, W. R. Gray, R. J. Vogelstein, J. Bogovic, S. Resnick, J. Prince, and C. E. Priebe. Connectome Classification: Statistical Graph Theoretic Methods for Analysis of MR-Connectome Data. In *Organization for Human Brain Mapping*, 2011.

20   J. T. Vogelstein, E. Perlman, D. Bock, W. C. Lee, M. Chang, B. Kasthuri, M. Kazhdan, C. Reid, J. Lichtman, R. Burns, and R. J. Vogelstein. Open Connectome Project: collectively reverse engineering the brain one synapse at a time. *Neuroinformatics*, 2011.

21   J. T. Vogelstein, W. Gray, J. G. Martin, G. C. Coppersmith, M. Dredze, J. Bogovic, J. L. Prince, S. M. Resnick, C. E. Priebe, and R. J. Vogelstein. Connectome Classification using statistical graph theory and machine learning. In *Society for Neuroscience*, 2011.

22   W. R. Gray, J. A. Bogovic, J. T. Vogelstein, C. Ye, B. A. Landman, J. L. Prince, and R. J. Vogelstein. Magnetic resonance connectome automated pipeline and repeatability analysis. In *Society for Neuroscience*, 2011.

23   J. T. Vogelstein, C. E. Priebe, R. Burns, R. J. Vogelstein, and J. Lichtman. Measuring and reconstructing the brain at the synaptic scale: towards a biofidelic human brain in silico. In *DARPA Neural Engineeering, Science and Technology Forum*, 2010.

24   W. R. Gray, J. T. Vogelstein, J. Bogovic, A. Carass, J. L. Prince, B. Landman, D. Pham, L. Ferrucci, S. M. Resnick, C. E. Priebe, and R. J. Vogelstein. Graph-Theoretical Methods for Statistical Inference on MR Connectome Data. In *DARPA Neural Engineering, Science and Technology Forum*, 2010.

25   J. T. Vogelstein, J. Bogovic, A. Carass, W. Gray, J. Prince, B. Landman, D. Pham, L. Ferrucci, S. Resnick, C. E. Priebe, and R. Vogelstein. Graph-Theoretical Methods for Statistical Inference on MR Connectome Data. In *Organization for Human Brain Mapping*, 2010.

26  J. T. Vogelstein, R. Vogelstein, and C. E. Priebe. A Neurocognitive Graph-Theoretical Approach to Understanding the Relationship Between Minds and Brains. In *CSHL conference on Neural Circuits*, 2010.

27  J. T. Vogelstein, Y. Mishchenki, A. Packer, T. Machado, R. Yuste, and L. Paninski. Towards Confirming Neural Circuit Inference from Population Calcium Imaging. In *COSYNE*, 2010.

28  J. T. Vogelstein, Y. Mishchchenko, 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 Infernence in Neuroimaging*, 2009.

29  J. T. Vogelstein, Y. Mishchenki, A. Packer, T. Machado, R. Yuste, and L. Paninski. Towards Inferring Neural Circuit Inference from Population Calcium Imaging. In *COSYNE*, 2010.

30  J. T. Vogelstein, Y. Mishchchenko, A. M. Packer, T. A. Machado, R. Yuste, and L. Paninski. Towards Confirming Neural Circuits from Population Calcium Imaging. In *Society for Neuroscience*, 2009.

31  J. T. Vogelstein, Y. Mishchenki, A. Packer, T. Machado, R. Yuste, and L. Paninski. Towards Inferring Neural Circuit Inference from Population Calcium Imaging. In *COSYNE*, 2009.

32  J. T. Vogelstein, B. Babadi, B. Watson, R. Yuste, and L. Paninski. From Calcium Sensitive Fluorescence Movies to Spike Trains. In *Society for Neuroscience*, 2008.

33  J. T. Vogelstein and L. Paninski. In *Statistical and Applied Mathematical Sciences Institute (SAMSI) Program on Sequential Monte Carlo Methods*.

34  B. Vogelstein, Joshua T Babadi and L. Paninski. Model-Based Optimal Inference of Spike-Times and Calcium Dynamics given Noisy and Intermittent Calcium-Fluorescence Imaging. In *COSYNE*, 2008.

35  J. T. Vogelstein and L. Paninski. Inferring Spike Trains, Learning Tuning Curves, and Estimating Connectivity from Calcium Imaging. In *Integrative Approaches to Brain Complexity*, 2008.

36  J. T. Vogelstein, B. Jedynak, K. Zhang, and L. Paninski. Inferring Spike Trains, Neural Filters, and Network Circuits from in vivo Calcium Imaging. In *Society for Neuroscience*, 2007.

37  J. T. Vogelstein, K. Zhang, B. Jedynak, and L. Paninski. Maximum Likelihood Inference of Neural Dynamics under Noisy and Intermittent Observations using Sequential Monnte Carlo EM Algorithms. In *COSYNE*, 2007.

38  J. T. Vogelstein and K. Zhang. A novel theory for simultaneous representation of multiple dynamic states in hippocampus. In *Society for Neuroscience*, 2004.

39  J. T. Vogelstein, L. Snyder, M. Warchol, and D. Angelaki. Up-down asymmetry in memory guided saccadic eye movements are independent of head orientation in space. In *Society for Neuroscience*, 2002.

## Press

1  D. Son and J. Lee. Research Highlights, 2014.

2  S. Begley. Fly brain 'atlas' opens door to linking human neurons to actions, 2014.

3  L. Sanders. Ten thousand neurons linked to behaviors in fly, 2014.

4  K. Yandell. Linking Neurons to Behaviors, 2014.

5  B. Yirka. Researchers create a reference atlas for neural circuits in fruit fly larvae, 2014.

6    T. O'Leary and E. Marder. Mapping Neural Activation onto Behavior in an Entire Animal, 2014.

7    L. Gatlin. Johns Hopkins mathematician receives grant to support study of brain's circuitry, 2014.

8    S. Reardon. Worldwide brain-mapping project sparks excitement — and concern. http://www.nature.com/news/worldwide-brain-mapping-project-sparks-excitement-and-concern-1.20658, 2016.

9    The Kavli Foundation. International brain initiative. http://www.kavlifoundation.org/international-brain-initiative, 2016.

10   Office of the Spokesperson. International brain initiative launch and vip dialog: Towards an international brain station. https://2009-2017.state.gov/r/pa/prs/ps/2016/09/262200.htm, 2016.

11   M. T. Review. Three grand challenges for brain science that can be solved in 10 years. https://www.technologyreview.com/s/602274/three-grand-challenges-for-brain-science-that-can-be-solved-in-10-years/, 2016.

12   National Instiues of Health. International brain projects considered. http://www.braininitiative.org/2016/04/22/international-brain-projects-considered/, 2016.

13   E. Underwood. International brain projects proposed. http://science.sciencemag.org/content/352/6283/277, 2016.

14   D. Keiger. The open connectome project takes a close look at the brain. Johns Hopkins Magazine, 2015.

15   C. B. Begg and M. C. Pike. Comment on "The Predictive Capacity of Personal Genome Sequencing". http://stm.sciencemag.org/content/4/135/135le3.full, 2012.

16   E. J. Topol. Comment on "The Predictive Capacity of Personal Genome Sequencing". http://stm.sciencemag.org/content/4/135/135le5.full, 2012.

## Teaching

| Fall 2016 | **NeuroData Design**, *EN.580.437*, Johns Hopkins University. |
| Spring 2016 | **Upward Spiral of Science**, *EN.580.468*, Johns Hopkins University. |
| Winter 2015 | **Statistical Connectomics**, Neuroimaging Specialization, Coursera. |
| Spring 2015 | **Statistical Connectomics**, Johns Hopkins University. |
| Fall 2015 | **Introduction to Computational Medicine**, Co-Teaching, Johns Hopkins University. |

## Advising

### Current Advisees

| 09/16 – now | **Cencheng Shen**, *Assistant Research Faculty*, Center for Imaging Science, The Johns Hopkins University. |
| 02/16 – now | **Jesse Leigh Patsolic**, *Assistant Research Engineer*, Center for Imaging Science, The Johns Hopkins University. |
| 08/14 – now | **Tyler Tomita**, *PhD candidate*, BME. |
| 08/14 – now | **Eric Bridgeford**, *BS candidate*, BME. |

### Past Advisees

| 08/14 – 06/17 | **Greg Kiar**, *Neuro-Cartographer*, Center for Imaging Science, The Johns Hopkins University. |
| 05/16 – 06/17 | **Leo Duan**, *Post-doctoral Fellow*, Center for Imaging Science, The Johns Hopkins University. |

06/16 – 07/17 **Guilherme Franca**, *Post-doctoral Fellow*, Center for Imaging Science, The Johns Hopkins University.

08/15 – 08/16 **Albert Lee**, *BS candidate*, BME.

06/15 – 12/15 **Ron Boger**, *BS candidate*, BME.

05/15 – 05/16 **Jordan Matelsky**, *BS*, CS and Neuroscience.

02/15 – 05/16 **Ivan Kuznetsov**, *BS*, BME.

08/14 – 05/16 **Greg Kiar**, *MS*, BME.

## Conference and Journal Activities

### Reviewer

**Annals of Applied Statistics (AOAS)**.

**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**.

**NeuroImage**.

**Neuroinformatics**.

**PLoS One**.

**PLoS Computational Biology**.

### Events

Spring 2016 **Organizer**, *Global Brain Workshop*, `http://brainx.io`.

Fall 2015 **Co-Organizer**, *BigNeuro2015: Making Sense of Big Neural Data, NIPS Workshop*, `http://neurodata.io/bigneuro2015`.

Winter 2015 **Organizer**, *Hack@NeuroData*, `http://hack.neurodata.io/`.

Fall 2015 **Faculty SUperviser**, *MedHacks*, `http://medhacks.org/`.

Fall 2012 **Co-Organizer**, *Scaling up EM Connectomics Conference*, `https://openwiki.janelia.org/wiki/download/attachments/8687459/final+agenda+EM+Connectomics+100512.pdf`.

## Funding

### Link to Current & Pending

### Past Funding

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)*, 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), 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).

## Languages

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

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