Joshua T. Vogelstein

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I am currently an Assistant Professor of Biomedical Engineering in the Whiting School of Engineering at Johns Hopkins University, where I co-direct a lab called NeuroData whose mission is to flourish together by extending and fusing statistical machine learning and big data science to address the most important brain science and mental health questions of our time. As of October 2018, I have over 3,700 citations and an h-index of 27. Our website has the most up to date information regarding our team's:

- publications,
- talks,
- posters,
- awards,
- press,
- funding, and
- blog

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*.
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*.

Academic Activities

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

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.*

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 Institues 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 2018 **NeuroData Design I**, *EN.580.437*, Johns Hopkins University.
Spring 2017 **NeuroData Design II**, *EN.580.437*, Johns Hopkins University.
Fall 2017 **NeuroData Design I**, *EN.580.437*, Johns Hopkins University.
Spring 2016 **Upward Spiral of Science**, *EN.580.468*, Johns Hopkins University.
Fall 2016 **NeuroData Design I**, *EN.580.437*, Johns Hopkins University.
Spring 2015 **Statistical Connectomics**, Johns Hopkins University.
Winter 2015 **Statistical Connectomics**, Neuroimaging Specialization, Coursera.
Fall 2015 **Introduction to Computational Medicine**, Co-Teaching, Johns Hopkins University.

Advising

Current Advisees

08/18 – now **Ben Pedigo**, *PhD candidate*, BME.
08/16 – now **Vikram Chandrashekhar**, *PhD candidate*, BME, The Johns Hopkins University.
05/18 – now **Drishtee Mannan**, *MS*, BME, The Johns Hopkins University.
06/18 – now **Jaewon Chung**, *MS Candidate*, BME.
08/18 – now **Jesús Arroyo**, *Post-doctoral Fellow*, Center for Imaging Science, The Johns Hopkins University.
08/14 – now **Eric Bridgeford**, *PhD candidate*, Department of Biostatistics, The Johns Hopkins University.

Past Advisees

09/16 – 08/18 **Cencheng Shen**, *Post-doctoral Fellow*, Center for Imaging Science, The Johns Hopkins University.
08/14 – 01/18 **Tyler Tomita**, *PhD*, BME.
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**, *BSE*, BME.
06/15 – 12/15 **Ron Boger**, *BSE*, BME.
05/15 – 05/16 **Jordan Matelsky**, *BSE*, CS and Neuroscience.
02/15 – 05/16 **Ivan Kuznetsov**, *BSE*, BME.

08/14 – 05/16 **Greg Kiar**, *MSE*, 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.

Editorial Board

Fall 2018 **Editor**, *Neurons, Behavior, Data analysis, and Theory*.

Events

Summer 2017 **Organizer**, *NeuroStorm*, https://brainx2.io.

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/.

2015 - 2017 **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**.