

EDUCATION

Stanford University

Ph.D. Candidate in Computer Science September 2011 – December 2017 (expected)

- Advisor: Prof. Surya Ganguli
- Thesis: Computational tools for understanding biological and artificial neural networks
- Areas of Study: deep learning, neuroscience, unsupervised learning, computer vision

Carnegie Mellon University

B.S. in Computer Science, additional major in Cognitive Science. GPA: 3.9/4.0. Fall 2007 - Spring 2011

- Advisor: Prof. Tai Sing Lee
- Senior Thesis: Encoding natural priors in neural populations

WORK EXPERIENCE

Stanford University

Graduate Research with Surya Ganguli Fall 2012 – present

- Developed techniques for analyzing and understanding large-scale neural datasets
- Exploring new techniques for semi-supervised and unsupervised learning
- Building new theoretical approaches for understanding deep neural networks

Teaching Assistant

Winter 2015, Spring 2017

- CS231N: Convolutional Neural Networks for Visual Recognition

DeepMind

Research Intern Summer 2017

- Investigated new approaches to unsupervised learning with hierarchical generative models

Google

Software Engineering Intern, Google Brain Summer 2016

- Designed new algorithms for unsupervised learning with generative adversarial networks
- Implemented new approach to semi-supervised learning with latent categorical variables

Software Engineering Intern, Google Research Summer 2015

- Developed improvements to the bilateral solver, an efficient technique for edge-aware smoothing
- Integrated the bilateral solver into deep networks for optical flow and semantic segmentation

Software Engineering Intern Summer 2011

- Worked on a new framework to automate the collection, preprocessing, and training of adversarial models to combat spam and fraudulent activity

Carnegie Mellon University

Undergraduate Fellow, Center for the Neural Basis of Cognition Spring 2010 – Spring 2011

- Developed methods to learn neural representations from statistics of natural scenes
- Created a framework for automated analysis and visualization of spiking neural data

New York University

NSF REU SURP Student, Center for Neural Science Summer 2009

- Implemented algorithms for real-time decoding of cognitive state from electrode recordings

Intel Research

IFYRE Researcher Spring 2008, Fall 2008, Spring 2009

- Created and deployed a program to correct for the respiratory motion of lung tumors in CT scans
- Developed software to detect the signal quality of optical coherence tomography images

US Army Research Lab – Aberdeen, MD

Consultant/Analyst, Quantum Research International June 2007 – August 2008

- Designed a tool for BRL-CAD to model 3d voxel data out of primitive shapes using genetic algorithms

AWARDS

Seth A. Ritch Bio-X Stanford Interdisciplinary Graduate Fellow	September 2014-2017
NSF IGERT Trainee, Stanford Center for Mind, Brain, and Computation	September 2012-2014
Edward J. McCluskey Engineering Graduate Fellowship	September 2011-2012
Phi Beta Kappa and Phi Kappa Phi, Carnegie Mellon University	Spring 2011
NIH Computational Neuroscience Research Fellowship	Summer 2010 - Spring 2011

PUBLICATIONS

- B. Poole***, F. Zenke*, S. Ganguli. Continual learning through synaptic intelligence. ICML 2017.
- M. Raghu, **B. Poole**, J. Kleinberg, S. Ganguli, J. Sohl-Dickstein. On the expressive power of deep neural networks. ICML 2017.
- E. Jang, S. Gu, **B. Poole**. Categorical reparameterization with Gumbel-Softmax. ICLR 2017.
- L. Metz, **B. Poole**, D. Pfau, J. Sohl-Dickstein. Unrolled generative adversarial networks. ICLR 2017.
- V. Dumoulin, I. Belghazi, **B. Poole**, A. Lamb, M. Arjovsky, O. Mastropietro, A. Courville. Adversarially learned inference. ICLR 2017.
- B. Poole**, S. Lahiri, M. Raghu, J. Sohl-Dickstein, S. Ganguli. Exponential expressivity in deep neural networks through transient chaos. NIPS 2016.
- B. Poole***, J. Leong*, J. Esch*, S. Ganguli, T. Clandinin. Direction Selectivity in Drosophila Emerges from Preferred-Direction Enhancement and Null-Direction Suppression. The Journal of Neuroscience 2016.
- J. T. Barron, **B. Poole**. The Fast Bilateral Solver. ECCV 2016. Honorable mention for best paper.
- J. Sohl-Dickstein, **B. Poole**, S. Ganguli. Fast large-scale optimization by unifying stochastic gradient and quasi-Newton methods. ICML 2014.
- J. R. Anderson, D. Bothell, J. M. Fincham, A. R. Anderson, **B. Poole**, Y. Qin. Brain Regions Engaged by Part- and Whole-task Performance in a Video Game: A Model-based Test of the Decomposition Hypothesis. Journal of Cognitive Neuroscience, 2011, 23, 3983-3997.

CONFERENCE ABSTRACTS, PRESENTATIONS, AND PREPRINTS

- A. Alemi, **B. Poole**, I. Fischer, R. A. Saurous, K. Murphy. An information-theoretic analysis of deep latent-variable models. arXiv preprint.
- B. Poole***, A. Williams*, N. Maheswaranathan*, B. Yu, G. Santhanam, S. Ryu, S. Baccus, K. Shenoy, S. Ganguli. Time-warped PCA: simultaneous alignment and dimensionality reduction of neural data. COSYNE 2017.
- B. Poole**, J. Sohl-Dickstein, A. Angelova. Improved generator objectives for GANs. NIPS Adversarial Training Workshop 2016.
- J. Leong*, **B. Poole***, S. Ganguli, T. Clandinin. Constraining the mechanisms of direction selectivity in a fruit fly elementary motion detector. COSYNE 2015.
- B. Poole**, L. Groseknick, M. Broxton, K. Deisseroth, S. Ganguli. Robust non-rigid alignment of volumetric calcium imaging data. COSYNE 2015.
- Y. Zhang, X. Li, J. Samonds, **B. Poole**, T.S. Lee. Relating functional connectivity in V1 neural circuits and 3D natural scenes using Boltzmann machine. COSYNE 2015.
- J. Sohl-Dickstein, N. Maheswaranathan, **B. Poole**, S. Ganguli. Efficient fitting of large-scale neural models. COSYNE 2014.
- B. Poole**, J. Sohl-Dickstein, S. Ganguli. Analyzing noise in autoencoders and deep networks. NIPS workshop on deep learning 2013.
- E.A. Pnevmatikakis, T.A. Machado, L. Groseknick, **B. Poole**, J.T. Vogelstein and L. Paninski. Rank-penalized nonnegative spatiotemporal deconvolution and demixing of calcium imaging data, COSYNE 2013.
- G. Lindsay, **B. Poole**, B. Doiron, J. Samonds, T.S. Lee. Quality of tuning curves and their effect on population coding. COSYNE 2011.
- J.M. Samonds, **B. Poole**, T.S. Lee. V1 interactions reduce local uncertainty about binocular disparity over time. SFN 2010.
- B. Poole**, I. Lenz, G. Lindsay, J.M. Samonds, T.S. Lee. Connecting scene statistics to probabilistic population codes and tuning properties of V1 neurons. SFN 2010. Oral presentation.

* indicates equal contribution