



EDUCATION

PHD | COMPUTER SCIENCE

UC Berkeley | Fall 2017-Present

- Major Area: Learning
- Minor 1: Statistics
- Minor 2: Comp. Neuroscience
- Advised by Bin Yu & Jack Gallant

BS | COMPUTER SCIENCE & MATH

University of Virginia | May 2017

- Conc. in Probability/Statistics
- Graduated with high distinction

RESEARCH INTERESTS

Computational neuroscience

Computer vision

Interpretability

COURSEWORK

COMPUTATION

Computer vision

Learning theory

Machine learning

Structure learning

Algorithms

Artificial intelligence

Deep learning seminar

Neural network models

Visual neuroscience

Neurobiology

Cognitive science seminar

Deep learning in graphics

Theory of computation

Program & data representation

Information retrieval

Software dev. I & II

MATHEMATICS

Statistical models

Optimization

Probability, statistics

Linear algebra

Real analysis

Linear models

Stochastic processes

Chaos theory I & II

Multivariate calculus

Discrete mathematics

Differential equations

Abstract algebra

EXPERIENCE

BERKELEY B. YU RESEARCH LAB | AI RESEARCHER

Fall 2017 - Present

- Applying statistical learning techniques to model neural data
- Fitting and interpreting neural spiking data with 3D convolutional neural networks

FACEBOOK | COMPUTER VISION INTERN

Summer 2017

- Worked on deep learning for semantic segmentation of satellite imagery
- Developed autoencoders for unsupervised layer-wise pretraining
- Implemented CRFs for segmentation post-processing

UVA Y. QI RESEARCH LAB | ML RESEARCHER

Fall 2016 - Spring 2017

- Contributed to development of novel weighted- ℓ_1 , multi-task Gaussian graphical models
- Developed learning for sparse graphical models across several tasks
- Applied novel graphical models to functional brain connectivity

HHMI S.TURAGA RESEARCH LAB | ML RESEARCHER

Summer 2015, Winter 2015, Summer 2016

- Implemented and extended novel watershed algorithms for neural image segmentation performance evaluation
- Contributed to GPU CNN implementation using fork of Caffe with malis training objective
- Set up distributed mllib implementation to run in parallel on compute cluster using Apache Spark

UVA W.LEVY RESEARCH LAB | COMPUTATIONAL NEUROSCIENCE RESEARCHER

Jan 2015 - Fall 2016

- Simulated stochastic neurons to determine mutual information, variability, energy efficiency, and threshold
- Visualized and analyzed data in Matlab, Python, calculated mutual information in Mathematica
- Simulated stochastic gating of sodium channels via NEURON software
- Performed background research to determine parameters for simulation

HHMI SCIENTIFIC COMPUTING | RESEARCH INTERN

Summer 2014

- Simulated extracellular neural recordings via Neurocube Matlab scripts
- Simulated intracellular neural firing via NEURON software package
- Visualized action potential firing in Matlab

RESEARCH INNOVATIONS INC. | WEB DEV / ANDROID INTERN

Summer 2013 - Spring 2014

- Developed web application to simultaneously coordinate different tasks
- Developed Android app to increase data storage capacity of QR Codes

SKILLS

LANGUAGES

Experienced

Python • Java • Matlab • \LaTeX

Proficient

R • C++ • C • Android • Mathematica

Familiar

Scala • Javascript • Django

MACHINE LEARNING

Frameworks

Tensorflow • Scikit-learn • Keras •

Mllib • Caffe

Algorithms

CNNs • Graphical Models • RFs

GENERAL

Software

Photoshop • NEURON

OS

Linux • Mac • Windows

IDEs

IntelliJ • PyCharm • Eclipse • Vim

Collaboration

Slack • Github • Markdown

Languages

English • Spanish • Hindi

ANDROID




Activity Lifecycle • UI Design • Graphics

WEB

Basic Languages • Django • Mapping

PAPERS / POSTERS





Published/Accepted

- Morel, Singh, & Levy, 2018: "Linearized synaptic integration at no extra cost" *Journal of Computational Neuroscience* 
- Singh, Wang, & Qi, 2017: "A weighted- ℓ_1 , multi-task graphical model with applications to heterogeneous brain connectivity" *NIPS 2017 Workshop on Advances in Modeling and Learning Interactions from Complex Data* 
- Singh & Levy, 2017: "A consensus layer V pyramidal neuron can sustain interpulse-interval coding" *PLOS One*. 


Under Review

- Funke, Tschopp, Grisaitis, Sheridan, Singh, Saalfeld, & Turaga, 2017: "A Deep Structured Learning Approach Towards Automating Connectome Reconstruction from 3D Electron Micrographs" *AAAI 2018* 

Posters / Talks

- Singh, 2017: "A novel machine-learning algorithm for uncovering brain connections underlying autism" *UVA Undergraduate Research & Design Symposium, Winner in Design Category* 
- Singh, 2017: "Uncovering brain connections underlying autism via graphical models" *Tom Tom Founder's Machine Learning Conference* 
- Singh, 2017: "Complexity leads to simplicity: Investigating neural linearization via biophysical simulations" *UVA Undergraduate Research & Design Symposium Semifinalist in Research Category* (1 of 6 undergraduates) 
- Singh, Hewitt, & Turaga, 2015: "Optimizing random forest image segmentation for connectomics" *Janelia Undergraduate Scholar Poster Session* 

In Preparation

- Levy lab: "Neural computation at the thermal limit" 
- Levy lab: "Action potential velocity optimization via biophysical simulation"

AWARDS

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| UVA Rader Research Award | 2017 |
| Raven Honor Society | 2016-2017 |
| ICPC Regional Qualification | 2014, 2015, 2016 |
| 1st Place Microsoft Code Competition | 2016 |
| 3rd Place Google Games UVA | 2017 |
| 2nd Place APT Puzzle Competition | 2017 |
| Intermediate Honors | 2016 |
| Dean's List | 2014-2017 |

FUNDING AWARDS

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| Graduate Student Researcher Appointment | 2018 |
| EECS Departmental Fellowship | 2017 |
| Vidya Balvantrai Shelat Fund Award | 2016 |
| Rodman Scholar | 2014-2017 |

OUTSIDE ACTIVITIES

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| APDA, PF Debate | 2010-2017 |
| Indian Student Association | 2014-2017 |
| Madison House Volunteering (Computer Literacy) | 2014-2017 |
| IM Basketball, Soccer | 2015-2017 |
| Chinmaya Mission Volunteering | 2010-2014 |

