# chandan singh

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## education

### phd  | computer science
uc berkeley | fall 2017-present
- major: learning
- minor 1: statistics
- minor 2: comp. neuroscience
- advised by bin yu & jack gallant

### bs  | computer science & math
university of virginia | spring 2017
- conc. in statistics
- graduated with high distinction

## research interests
computational neuroscience
interpretability
computer vision

## coursework

### computation
computer vision
machine learning
structure learning
algorithms
artificial intelligence
deep learning seminar
learning theory
deep learning in graphics
theory of computation
data structures
software dev. I & II

### neuro
neurobiology
cognitive science seminar
neural network models
visual neuroscience

### 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
- developed machine learning techniques to model high-dimensional neural data
- investigated methods to interpret deep learning methods
- examined brain-inspired models for computer vision

### facebook  | computer vision intern
summer 2017
- improved deep learning models for semantic segmentation of satellite imagery
- investigated autoencoders for unsupervised layer-wise pretraining
- implemented crfs for segmentation post-processing

### uva y. qi research lab  | ml researcher
fall 2016 – spring 2017
- developed novel weighted-$\ell_1$, multi-task gaussian graphical models
- applied novel graphical model techniques to large-scale 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 development of novel 3d unet cnn architecture with malis training objective
- set up distributed mllib implementation to run in parallel on compute cluster using apache spark

### uva w. levy research lab  | comp. neuroscience researcher
fall 2014 - fall 2016
- simulated biophysically detailed neurons to understand the computations of real neurons
- simulated stochastic gating of sodium channels to analyze noise, variability, and mutual information
- analyzed energy efficiency of neurons, particularly with regard to interpulse interval coding
- performed calculations for top-down and bottom-up partitioning of the brain's energy budget

### hhmi scientific computing  | research intern
summer 2014
- examined effects of back-propagating action potentials by simulating intracellular neural firing with detailed biophysical models
- simulated extracellular recording from neurons and measured noise
- made detailed visualizations of action potential firing

### 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-$\ell_1$ 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" *tpami* ∞

**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

| | |
|---|---|
| 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

| | |
|---|---|
| graduate student researcher appointment | 2018 |
| eecs departmental fellowship | 2017 |
| vidya balvantrai shelat fund award | 2016 |
| rodman scholar | 2014-2017 |

## outside activities

| | |
|---|---|
| im basketball, soccer | 2015-2018 |
| apda, pf debate | 2010-2017 |
| indian student association | 2014-2017 |
| madison house volunteering (computer literacy) | 2014-2017 |
| chinmaya mission volunteering | 2010-2014 |