chandan singh

cs1@berkeley.edu | csinva | 571-315-5748 | csinva.github.io

education

phd | computer science
uc berkeley | 2017-present
- research: interpretable ml
- advisor: bin yu
- gpa: 3.94

bs | computer science & math
university of virginia | 2017
- concentration in statistics
- graduated with high distinction

skills

machine learning
frameworks
pytorch • tensorflow • scikit-learn
keras • mllib • caffe
algorithms
cnns • graphical models • rfs

languages
experienced
python • java • matlab
proficient
r • c++ • c • mathematica
web/mobile
basic languages • javascript • django

general
languages
english • spanish • hindi
ides
jupyter • intellij • eclipse • vim
software
LaTeX• photoshop • NEURON
os
linux • mac • windows

teaching

berkeley | student instructor
summer 2018
- cs 189/289: machine learning
- lectures to class of 80+ students

fall 2019
- cs 188: artificial intelligence

experience

berkeley b. yu research lab | ml research
fall 2017 - present
- investigated methods to interpret machine-learning models
- developed machine-learning algorithms to model neural data

pacmed ai | interpretable ml internship
summer 2019
- developed new techniques to interpret machine-learning models for healthcare
- integrated cutting-edge interpretability techniques into predictive pipelines on tabular data

facebook | computer vision internship
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 research
fall 2016 – spring 2017
- developed novel weighted-ℓ_1, multi-task gaussian graphical model
- analyzed large-scale functional brain connectivity with graphical models

hhmi s. turaga research lab | ml research
summer 2015, winter 2015, summer 2016
- extended novel watershed algorithms for neural image segmentation
- contributed to development of novel 3d unet cnn architecture with malis loss
- distributed mllib random forest over compute cluster with apache spark

uva w. levy research lab | comp. neuroscience research
fall 2014 - fall 2016
- simulated detailed biophysical neurons to understand neural computation
- analyzed energy efficiency, noise, and variability of neural computation via stochastic sodium-channel gating

hhmi scientific computing | research internship
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

research innovations inc. | web dev + android internship
summer 2013 - spring 2014
- developed web application to simultaneously coordinate different tasks
- developed android app to increase data storage capacity of qr codes

coursework

computation

machine learning
computer vision
structure learning
algorithms
artificial intelligence
deep learning
learning theory
ai in graphics
cs theory
data structures
software dev. I & II
possible minds

stat/math

statistical models
probability
statistics
optimization
linear algebra
info theory
real analysis
linear models
stochastic processes
chaos theory I & II
multivariate calculus
discrete mathematics
differential equations
abstract algebra

neuroscience

neural coding
neural network models
neurobiology
visual neuroscience
cognitive science

papers

published/accepted

- murdoch*, singh*, kumbier, abbasi-asl, & yu 2019: "interpretable machine learning: definitions, methods, and applications" *pnas*
- singh*, murdoch*, & yu 2019: "hierarchical interpretations for neural network predictions" *iclr* </>
- funke*, tschopp*, grisaitis, sheridan, singh, saalfeld, & turaga 2018: "large scale image segmentation with structured-loss-based deep learning for connectome reconstruction" *tpami* </>
- 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" *neurips 2017 amlicd workshop* </>
- singh & levy 2017: "a consensus layer V pyramidal neuron can sustain interpulse-interval coding" *plos one.* </>

under review

- rieger, singh, murdoch, & yu 2019 "interpretations are useful: penalizing explanations to align neural networks with prior knowledge" </>
- devlin, singh, & yu 2019: "disentangled attribution curves for interpreting random forests and boosted trees" </>
- singh, ruhe, cina, & tonutti 2019 "sensible local interpretations via class-weight uncertainty and conditional perturbation" </>

selected talks

- singh 2017: "a novel machine-learning algorithm for uncovering brain connections underlying autism" *uva undergraduate research & design symposium*, design category winner
- 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)

posters

- singh*, murdoch*, & yu 2018: "interpretable machine learning with applications to neuroscience" *utokyo neurcomputing workshop 2019*
- singh*, murdoch*, & yu 2018: "hierarchical interpretations for neural network predictions" *berkeley bair workshop fall 2018, iclr 2019*
- singh, hewitt, & turaga 2015: "optimizing random forest image segmentation for connectomics" *janelia undergraduate scholar poster session*

funding awards

pdsoros fellowship finalist	2019
ircn workshop travel award	2019
vidya shelat fund award	2016
rodman scholar	2014-2017

projects (non-research)

notes, blog, & slides </>	2014-2019
hummingbird tracking </>	2017-2018
news balancer django app </>	2017
java mini-games </>	2014-2016

awards

berkeley grad slam semifinalist	2019
outstanding student instructor award (10%)	2018
uva rader research award	2017
uva undergraduate research symposium winner	2017
raven honor society	2016-2017
icpc regional qualification	2014-2016
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