



## education

### phd | machine learning

uc berkeley | '17-present  
research: interpretable ml  
advisor: bin yu  
gpa: 3.95

### ms | data science

uc berkeley | '17-present  
research: statistical biology

### bs | cs & math

university of virginia | '14-'17  
double major: cs, math  
concentration: statistics

## skills

### machine learning

pytorch • scikit-learn • jax  
aws ec2 • s3 • sagemaker  
keras • mllib • tensorflow

### languages

experienced  
python • java • matlab  
proficient  
r • c/c++ • web basics  
human languages  
english • spanish • hindi

## awards

berkeley grad slam semifinalist '19  
outstanding teaching award '18  
uva rader research award '17  
uva undergrad symposium winner '17  
raven honor society '16-'17  
icpc regional qualification '14-'16  
1st place microsoft code jam '16  
3rd place google games uva '17  
2nd place apt puzzle competition '17  
intermediate honors '16  
dean's list '14-'17

### funding awards

pdsoros fellowship finalist '19  
ircn workshop travel award '19  
vidya shelat fund award '16  
rodman scholarship '14-'17

## experience

### berkeley | ml research (bin yu lab %)

fall '17 - present

- developed interpretation methods for ml models (e.g. neural nets)
- created interpretable models in medicine, biology, and computer vision

### aws | research internship (pietro perona lab %)

summer '20

- testing for bias with causal matching using GANs
- interpreting semantic directions in generative models

### response4life | volunteer data scientist

spring '20

- helped develop, integrate, and deploy models to forecast covid-19 severity

### pacmed ai | interpretable ml internship

summer '19

- developed techniques to interpret machine-learning models for healthcare
- integrated interpretability techniques for predicting icu re-admission

### facebook | computer vision internship

summer '17

- investigated unsupervised deep learning for segmentation of satellite imagery
- implemented crfs for segmentation post-processing

### uva | ml research (yanjun qi lab %)

fall '16 – spring '17

- developed novel weighted- $\ell_1$ , multi-task gaussian graphical model
- analyzed large-scale functional brain connectivity with graphical models

### hhmi | ml research (srini turaga lab %)

summer '15, winter '15, summer '16

- extended cnns and watershed algorithms for neural image segmentation
- implemented distributed random forests for image segmentation

### uva | comp. neuroscience research (william levy lab %)

fall '14 - fall '16

- developed detailed biophysical models of neural computation
- analyzed energy efficiency, noise, and variability in stochastic neurons

### hhmi scientific computing | comp. neuroscience research

summer '14

- analyzed backpropagating action potentials via biophysical simulations

### research innovations inc. | web dev + android internship

summer '13 - spring '14

- developed web/mobile app for task coordination with 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  
information retrieval  
computer architecture

### 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

### interpretability

- interpretations are useful: penalizing explanations to align neural networks with prior knowledge: rieger, singh, murdoch, & yu, *icml 2020* [🔗](#)
- transformation importance with applications to cosmology: singh\*, ha\*, lanusse, boehm, liu & yu, *iclr 2020 workshop (spotlight talk)* [🔗](#)
- hierarchical interpretations for neural network predictions: singh\*, murdoch\*, & yu, *iclr 2019* [🔗](#)
- interpretable machine learning: definitions, methods, and applications: murdoch\*, singh\*, kumbier, abbasi-asl, & yu, *pnas 2019* [🔗](#)
- disentangled attribution curves for interpreting random forests and boosted trees: devlin, singh, & yu *arXiv 2019* [🔗](#)

### interpretable data science projects

- curating a covid-19 data repository and forecasting county-level death counts in the united states: altieri, barter, ..., singh\*, ..., & yu\* *harvard data science review 2020* [🔗](#)
- developing reliable clinical decision rules: a case study in identifying blunt abdominal trauma in children: kornblith, singh et al. *in prep* [🔗](#)
- predicting successful clathrin-coated pits in clathrin-mediated endocytosis via auxilin: singh\*, li\* et al. *in prep* [🔗](#)

### software packages

- imodels: a python package for interpretable modeling: singh\*, nasser\*, & yu, 2021 [🔗](#)
- pcs-pipeline: a python package for facilitating stable data analysis [🔗](#)

### causal inference / ml theory

- matched sample selection in face datasets via GAN projections: singh, balakrishnan, & perona 2020 *in submission* [🔗](#)
- revisiting complexity and the bias-variance tradeoff: dwivedi\*, singh\*, yu, & wainwright *arXiv 2020* [🔗](#)

### statistical neuroscience

- large scale image segmentation with structured-loss-based deep learning for connectome reconstruction: funke et al. *tpami 2018* [🔗](#)
- a weighted- $\ell_1$ , multi-task graphical model with applications to heterogeneous brain connectivity: singh, wang, & qi, *neurips 2017 amlicd workshop* [🔗](#)
- linearized synaptic integration at no extra cost: morel, singh, & levy, *journal of computational neuroscience 2018* [🔗](#)
- a consensus layer V pyramidal neuron can sustain interpulse-interval coding: singh & levy *plos one 2017* [🔗](#)

### selected talks

- interpreting ml models: *uc berkeley bair seminar, 2020* [🔗](#)
- uncovering brain connections underlying autism via graphical models: *tom tom founder's machine learning conference, 2017* [🔗](#)

## teaching

### berkeley | student instructor

summer 2018  
cs 189/289: machine learning  
(lectures to class of 80+ students [🔗](#))  
fall 2019  
cs 188: artificial intelligence [🔗](#)

## projects / activities

notes, blog, & slides [🔗](#)  
covid-19 forecasting [🔗](#)  
hummingbird tracking [🔗](#)  
news balancer django app [🔗](#)  
madison house volunteering  
java mini-games [🔗](#)

'14-'20  
'20  
'18  
'17  
'15-'16  
'14-'16

## academic service

basis education volunteering '19-'20  
bair undergrad mentoring '18-'20  
cvpr reviewer '21  
aaai xai workshop reviewer '21  
neurips ml4h workshop reviewer '20