

RESEARCH INTERESTS

I am broadly interested in machine learning and statistics with recent interests in:

- **Probabilistic Machine Learning:** Latent variable models, deep generative models, variational inference
- **Computational Neuroscience:** Neural decoding, brain-computer interfaces, population neural dynamics
- **Data Valuation:** Influence functions for black-box models, time series data valuation

EDUCATION

Columbia University

Ph.D. in Statistics

Advisor: Dr. Liam Paninski

New York, NY, USA

2021 - Current

Duke University

M.S. in Statistics

Advisor: Dr. David Dunson

Durham, NC, USA

2019 - 2021

University of California, Davis

Double major: B.S. in Statistics & Neuroscience

Davis, CA, USA

2015 - 2019

PUBLICATIONS & PREPRINTS

1. **Bypassing spike sorting: Density-based decoding using spike localization from dense multielectrode probes** In *NeurIPS*, 2023

Yizi Zhang*, Tianxiao He*, Julien Boussard, Charlie Windolf, Olivier Winter, Eric Trautmann, Noam Roth, Hailey Barrell, Mark Churchland, Nick Steinmetz, Erdem Varol, Cole Hurwitz, Liam Paninski
A spike sorting-free neural decoding algorithm that allow neuro-scientists to decode animal behavior robustly without relying on spike sorting.

2. **Motion-invariant variational auto-encoding of brain structural connectomes** In review at *Imaging Neuroscience*

Yizi Zhang*, Meimei Liu, Zhengwu Zhang, David Dunson

A variational graph auto-encoder that learns invariant latent representations to remove undesirable motion artifacts from the diffusion neuroimaging data.

3. **Predicting rare outcomes in abdominal wall reconstruction using image-based deep learning models** In *Surgery, Elsevier*, 2023

Sullivan A. Ayuso*, Sharbel A. Elhage*, **Yizi Zhang**, Bola G. Aladegbami, Keith S. Gersin, John P. Fischer, Vedra A. Augenstein, Paul D. Colavita, B. Todd Heniford

An anomaly detection algorithm based on generative adversarial networks that improves the ability for surgeons to accurately foresee surgical outcomes by 20%.

MANUSCRIPTS IN PREPARATION

1. Time series data valuation with influence functionals

Yizi Zhang*, Yongchan Kwon

Data valuation methods that use influence functionals to assess the impact of past time points on future predictions, as well as the impact of auxiliary covariates on time series forecasting.

2. Neural decoding with side information

Yizi Zhang*, Hanrui Lyu*, Cole Hurwitz, Erdem Varol, Liam Paninski

Neural decoding algorithms that use state-space models and multi-task neural networks to leverage neural signals and animal behaviors from multiple input sources, improving parameter estimation and enhancing decoding accuracy.

INVITED TALKS AND PRESENTATIONS

Bypassing spike sorting: Density-based decoding using spike localization from dense multielectrode probes In *International Brain Lab U19 Site Visit*, New York, NY. 2023.

Motion-invariant variational auto-encoding of brain structural connectomes In *Statistical Methods in Imaging Conference*, Minneapolis, MN. 2023.

Density-based neural decoding using spike localization from dense neuropixels recordings In *Computational and Systems Neuroscience (COSYNE) 2023*, Montreal, QC. 2023.

Predicting rare outcomes in abdominal wall reconstruction using image-based deep learning models In *American Hernia Society Annual Meeting*, Austin, TX. 2021.

Motion-invariant variational auto-encoding of brain structural connectomes In *Asilomar Conference*, Pacific Grove, CA. 2021.

SKILLS

Programming: Python (PyTorch, TensorFlow, etc), R, Stan, MATLAB