Matthew R. Kleinman, PhD

Data Scientist
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TECHNICAL SKILLS

Programming Languages: Python | MATLAB | SQL

Tools and Techniques: Generalized Linear Models | Regression | Reinforcement Learning | Machine Learning | Non-Parametric Statistics | Time Series Analysis | Classification | Model Comparison | Data Visualization | Project Management | numpy | pandas | pytorch | scikit-learn | NetworkX | JupyterLabs | git | mySQL

WORK EXPERIENCE

Assistant Project Scientist, University of California, Berkeley 10/2021 – 6/2025

- Led neuroscience research program leveraging machine learning approaches to study how experience memory replay in rodents is controlled by value learning and reward prediction errors (publication link)
- Wrote custom Python and Matlab code to analyze high-dimensional neural time series datasets, with millisecond resolution monitoring of hundreds of neurons simultaneously and over 30 GB of data per session, using Bayesian classification, dimensionality reduction, and mixed effects linear models
- Created and implemented algorithms to automate classification of behavior from raw video and detection and correction of noise events in neural data, replacing 2+ hours of manual curation per each 1 hour long experimental session
- Trained supervised learning models on behavioral correlates of memory replay content, finding SVM and random forest models could achieve 65% accuracy, saving certain experiments weeks in prep time
- Collaborated with two colleagues to devise novel statistical analyses to account for different sampling biases across specific experimental conditions, validate them in simulated data, and apply to real data
- Onboarded and mentored new members of the team, directly training new students and postdocs

Postdoctoral Researcher, University of California, Berkeley 6/2017 – 9/2021

- Optimized Bayesian models decoding animal position from neural activity in large arenas, overcoming sparse sampling and irregular signal times to reduce decoding errors to within 1-2% of the environment
- Collected and analyzed incoming experimental data, updating quality metrics and model predictions

Postdoctoral Researcher, Johns Hopkins University 10/2015 – 5/2017

- Created a processing pipeline with custom code for extracting, cleaning, aligning, and combining analysis of diverse timescale data streams, including behavior and neural activity time series

EDUCATION

Ph.D. in Neurobiology, Yale University 8/2009 – 9/2015

B.S. in Psychology, University of Arizona 8/2005 – 5/2009

PROJECTS AND AWARDS

- **Peer-Reviewed Publications**: **1.** **Kleinman** and Foster, 2025, *eLife*: Revealed memory replay in novel environments requires dopamine reward prediction errors | **2.** **Kleinman**, Sohn, and Lee, 2016, *J. Neurophysiol*: Developed a novel behavioral task to probe temporal perception for simultaneous visual targets, parsimoniously modeled eye-tracking choice behavior using point process modeling | **3.** Vickery, **Kleinman**, Chun, and Lee, 2015, *J. Neurosci*: Modeled how human choices in simple economic games depend on contextual information with reinforcement learning and logistic regression
- **Conference Presentations**: 10 abstracts at national neuroscience conferences (2010 – 2023)
- **Awards**: National Research Service Award, NIH, 2012 – 2014 ($93,000 total) | Patricia Goldman-Rakic Pfizer Fellowship, Yale University, 2011 – 2012 ($50,000 total)