

# Frank Qiu

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## EDUCATION

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### Ph.D. in Statistics

2017 - May 2023

University of California, Berkeley

Berkeley, CA

- Advisors: Giles Hooker (Statistics) and Bruno Olshausen (Electrical Engineering and Computer Science).
- Thesis: Graph Embeddings, Disentanglement, and Algorithm Maps
- Research areas: Machine Learning, Graph Embeddings, Disentangled Representation Learning
- Sample Coursework: Theoretical Statistics, Probability, Numerical Simulation, Statistical Consulting, etc.

### B.S. in Mathematics/B.S. in Physiology and Neuroscience

2013 - 2017

University of California, San Diego

La Jolla, CA

- *Summa Cum Laude*
- Honors Thesis: *Factor Analysis of Temperament and Personality Traits in Bipolar Patients* under Tiffany Greenwood.
- Sample Coursework: Statistics, Probability, Linear Programming, Differential Geometry, Analysis, Algebra, etc.

## TEACHING EXPERIENCE

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### Graduate Student Instructor

2017 - 2022

University of California, Berkeley

Berkeley, CA

- Courses: Computing with Data (STAT133), Concepts in Probability (STAT 134), Concepts in Statistics (STAT 135), Time Series (STAT 153), Modern Statistical Prediction and Machine Learning (STAT 154), Intro to Probability at an Advanced Level (STAT 201A), Probability I (STAT 205A).

### Education Corps Tutor

2013 - 2017

University of California, San Diego

La Jolla, CA

- Volunteered at local elementary-high schools as a tutor, helping in both one-on-one and in class-wide lectures.
- Class tutor to same group of students from 2014-2017, gaining valuable experience in long-term mentorship and guidance.

## DATA ANALYSIS/COMPUTATIONAL PROJECTS

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### Disentangled Representation Learning in Computer Vision

2018-2023

- Research projects focused on design and implementations of learned representations that automatically encode interesting data variations.
  - Lie group-sparse coding: research project on Bayesian model with two modules that respectively learn image templates and image manipulations.
  - Local chart autoencoders: project demonstrating emergence of semantically meaningful dimensions in the latent code of autoencoders trained on movies with temporal constraints.
  - Invariant classifiers: project leveraging invariant theory to build image classifiers robust to specific data perturbations.
- Models mainly implemented in Python (numpy, Pytorch, scikit-learn, opencv, etc).

### Course Project: Simulating the Visual Cortex

2020

- Course project in modeling physical systems using differential equations.
- Simulation of early visual processing pathway in brain, with goal of demonstrating emergent sparsity in neuron activities.
- Derived differential equations for neuron system and constructed solvers, running simulations in Python and Matlab.

### Undergraduate Researcher: Statistical Analyst

2013-2017

- Statistical analyst in the Greenwood lab, focusing on genetics of bipolar disorder and schizophrenia.
- Performed end-to-end statistical analyses, from exploratory phase to model fitting to genetic analysis. Analysis goal was discovering genetic risk factors and their clinical correlates.
  1. Techniques included ANOVA, PCA, linear regression, clustering, and hypothesis testing.
  2. Mainly used R and SPSS during analysis.
- Designed and constructed database for Greenwood lab, using SQL/VBA.

## PUBLICATIONS AND PREPRINTS

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- [1] **F. Qiu**. “Commutativity and Disentanglement from the Manifold Perspective”. (under review). 2022. URL: <https://arxiv.org/abs/2210.07857>.
- [2] **F. Qiu**. “Graph Embeddings via Tensor Products and Approximately Orthonormal Codes”. (under review). 2022. URL: <https://arxiv.org/abs/2208.10917>.
- [3] **F. Qiu**. “Memory and Capacity of Graph Embedding Methods”. (under review). 2022. URL: <https://arxiv.org/abs/2208.08769>.
- [4] H.Y. Chau, **F. Qiu**, Y. Chen, and B. Olshausen. “Disentangling images with Lie group transformations and sparse coding”. In: *Poster at Neurips Workshop 2022* (2020). URL: <https://arxiv.org/abs/2012.12071>.
- [5] **F. Qiu**, H. Akiskal, J. Kelsoe, and T. Greenwoon. “Factor analysis of temperament and personality traits in bipolar patients: Correlates with comorbidity and disorder severity”. In: *Journal of Affective Disorders* (2017). URL: <https://pubmed.ncbi.nlm.nih.gov/27741464/>.

## COMPUTER SKILLS

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Python	Fluent
R	Fluent
MATLAB	Experienced
SQL	Experienced
Visual Basic	Experienced

## HONORS, AWARDS, AND SCHOLARSHIPS

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<b>Outstanding Graduate Student Instructor</b>	2021
<b>Berkeley AI Scholarship</b>	2017-2018
<b>Frontiers of Innovation Scholarship</b>	2016-2017
<b>Phi Beta Kappa</b>	2016-present
<b>Provost Honors</b>	2013-2017
<b>Regents Scholarship</b>	2013-2017
<b>National Merit Scholarship</b>	2013

Last updated: September 5, 2023