Frank Qiu

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EDUCATION

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

Graduate Student Instructor 2018 - 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

Representation Learning in Computer Vision 2018-2023
- Ph.D. focused on design and implementation of algorithms that learn good data representations of image data.
- Specialized in algorithms that automatically identify interesting data variations.
    - Applications of representation/invariant theory to build tractable models with good theoretical motivation.
    - Included both deep learning models (autoencoders, CNNs) as well as more classical models (Bayesian, sparse coding).
- Models mainly implemented in Python (numpy, Pytorch, scikit-learn, opencv, etc).

Simulating the Visual Cortex: Sparsity 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. Goal was identify genetic risk factors and their clinical correlates, using approrpriate statistical analyses and visualization to pain a convincing picture.
    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

[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

Python	Fluent
R	Fluent
MATLAB	Experienced
SQL	Experienced
Visual Basic	Experienced

Honors, Awards, and Scholarships

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