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

Deep Autoencoders and Local Charts 2022
- Trained deep autoencoder in Pytorch to predict future frames in a movie, subject to constraints in latent code.
- Practical demonstration of theoretical disentanglement work, showing emergence of local charts in coding layer.

Form and Motion Disentanglement 2019-2021
- Joint work with Ho Yin Chau and Yubei Chen. Proposed, analyzed, and tested various unsupervised models that separately learn the content and variation of image data [1]. Implemented in Python, using primarily Pytorch.

Neural Dynamics and Sparsity 2020
- Course project in physical systems modeling using differential algebraic equations.
- Derived dynamics, constructed solvers, and ran simulations of a system of neurons, whose synaptic connections were driven by anti-Hebbian learning. Extended previous work of emergent sparsity in single-layer systems to multi-layer neural systems.

Invariant Theory in Computer Vision 2019
- Computational project leveraging algebraic invariant theory in the construction of robust deep image classifiers.
- Computed algebraic invariants for each transformation group and trained a deep classifier in Python (Tensorflow).

Psychiatric Genetics: Analysis and Database Construction 2013-2017
- Performed genomic analyses on bipolar/schizophrenic subjects, identifying genetic risk factors: GWAS and linkage studies.
- Performed end-to-end statistical analyses of temperament and comorbidity data and linked to genomic results [2].
- Designed and constructed database for Greenwood lab, from user interface to internal structure. Used SQL/Visual Basic.

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

Last updated: May 2, 2023