Xiaotong (Kary) Fang

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Education

University of Southern California, Dornsife **LA, CA**

PhD in Neuroscience | GPA: 3.77/4.0 | Enrolled Fall 2022, expected graduation May 2027

Relevant Coursework: Deep Learning and its Applications (CSCI), Machine Learning (DSCI), Computing Principles for EE (C++), Probability for ECE, Data Analysis & Neurotech Design (EE), Decision Neuroscience (PSYC)

Emory University, Emory College **Atlanta, GA**

BS in Quantitative Statistical Science and Computer Science | GPA: 3.75/4.0 | Graduated December 2021

Research Summary

I build data-centric systems and models: sequential/latent-state modeling of behavior; rigorously evaluated ML; and production-minded pipelines & services for large-scale online experiments (Java/JS backend + PostgreSQL), with open, reproducible analysis in Python/MATLAB.

Experience

Piray Lab **USC, CA**

Research Assistant *May 2023 - Present*

- Designed sequential decision-making tasks to study learning under uncertainty; shipped a web-based interactive behavioral platform (Java, JavaScript, HTML) for online data collection.
- Developed a Distributed-HMM with trial-by-trial latent state inference for binary outcomes to jointly infer volatility and stochasticity; conducted lesion/ablation analyses with recoverable parameters (≤1 SD)
- Integrated Kalman and Particle Filters for fast, interpretable sequential prediction, achieving ~90% accuracy; compared model-neutral vs. model-based results with rigorous evaluation and reporting.
- Led the end-to-end pipeline for online tasks: JSON logs (behavioral events, timestamps, survey/demographics) → extraction to CSV (preprocessing missingness/type casting and data-quality filters) → analysis and visualization in Python/MATLAB; open-sourced code on GitHub for reproducibility.
- Building a compact, data-efficient RNN that ingests behavioral inputs to infer latent dynamics across human and animal datasets; benchmarking interpretability against RL and Bayesian model variants.
- Implementing an immersive VR paradigm with multimodal sensing (pupillometry, motion, physiology) to support real-time adaptive modeling and online evaluation loops.
- Mentored collaborators and communicated findings to non-technical audiences and partners

Neural Modeling and Interface Lab **USC, CA**

Rotation Researcher *Sep - Nov 2022*

- Built neural decoding models with transfer learning, achieving 80% accuracy across sessions/subjects.
- Delivered interpretable analyses of learned representations.

Berman Lab **Emory, GA**

Undergraduate Researcher (Honors Thesis) *Jun 2019 - May 2022*

- Modeled animal and fly behavior using RNNs (LSTM and LFADS) architectures to extract latent structure from sequential movement and neural data.
- Performed dimensionality reduction and fixed-point analysis to interpret learned model dynamics.

Beijing Topjoy Technology Co. Ltd. **Beijing, China**

Data Analyst and Modeling Intern *May - Aug 2021*

- Designed and deployed churn prediction models (Random Forests; Python) on million-scale behavior logs.
- Improved retention insights used by product/operations teams.
- Automated recurring analytics with SQL and Python visualization; enabled scalable weekly reporting.

NeuroImaging with Deep Learning Lab **USC, CA**

Rotation Researcher *Feb - Apr 2023*

- Investigated glymphatic system functionality using FA value with Alzheimer's Disease indicators.
- Preprocessed diffusion-weighted imaging data with Eddy correction, QIT pipeline, and registration, ensuring rigorous analysis.
- Found FA values of whole brain white matter follow the trend of AD<MCI<CN patients, indicating isotropic diffusion in AD patients due to degeneration
- Found FA values decrease with aging, indicating possible lower glymphatic function

- Found FA values within PVS has negative correlation with A-beta around PVS, indicating slower glymphatic flow may lead to lack of A-beta clearance, evidence of the impairment of the glymphatic system is a main pathogenesis of AD

Selected Project

Clearance Prediction Modeling (2025)
- Conducted EDA; built preprocessing (imputation, outlier handling, scaling) pipeline; engineered features
- Trained and compared Random Forest, Gradient Boosting, regularized linear with cross-validation.

Publications

- **Fang, X**., Piray, P. (2025). Inferring the causes of noise from binary outcomes: A normative theory of learning under uncertainty. Psychological Review (under review). doi.org/10.31219/osf.io/vuc5g_v1
- Zhang, X.; Ivanovic, S.; Moore, B.; **Fang, X.**; Song, D. 2025. Topological Masking and Attention for Universal Decoding of Spiking Neural Dynamics. In NeurIPS '25 (under review). OpenReview: A6WQTfLqJ7.

Core Competencies & Technical Stack (RS/MLE/SWE)

- **RS:** statistical modeling, sequential inference (**HMM, Kalman, Particle Filters, compact RNN**), uncertainty & calibration, GLMs & factor analysis, ablations/reporting.
- **MLE:** feature engineering, train/validate/test splits, error analysis, vectorization & profiling, reproducible pipelines & notebooks, experiment telemetry and data quality gates.
- **SWE (backend):** OOP (Java/Python/JS/C++), schema design & SQL (PostgreSQL), CSV/JSON ETL, input validation, logging, Git-based workflows, Linux/CLI.
- **Languages:** Python, SQL (PostgreSQL), Java, JavaScript (ES6+), HTML/CSS, MATLAB, R, C++
- **Libraries/ML:** NumPy, pandas, scikit-learn, PyTorch, TensorFlow
- **Tools:** Git/GitHub, Jupyter, VS Code/IntelliJ, Linux/Unix shell

Community Involvement

Young Researchers Program **USC, CA**
Treasurer *Fall 2023 - Present*
- Managed funding and logistics, enhancing teamwork and organizational skills.

Distinguished Speakers Committee **USC, CA**
Member *Fall 2023 - Present*
- Organized and invited speakers to visit and give presentation

Foundation of Modern Biology Lab Teaching Assistant **Emory, GA**
Teaching Assistant *Fall 2019*
- Assisted lab instructor with weekly Biology lab
- Served as out-of-class resources for lab

Chinese Student Association **Emory**
Member of Public Relations Division *Fall 2018 - Fall 2019*
- Acquires corporation with businesses and planned festivity events for students
- Offered guidance mentorship to new international students

Goizueta (Emory School of Business) Data Analysis Club **Emory, GA**
General Member *Fall 2018*
- Attend Python and MySQL workshops