Xinhao Fan

📞 6679105626 @ xfan20@jh.edu

Education

JOHNS HOPKINS UNIVERSITY
Graduate student in Neuroscience
📅 Sept 2020-present 📍 Baltimore, MD

NANKAI UNIVERSITY
BS in Physics
📅 July 2020 📍 Tianjin, China
Graduated with Honors (Boling Program)

Links

🐙 GitHub **WOOOOOOOOOOOOOO**
🌐 Personal Website **XINHAO FAN**

Coursework

GRADUATE
-Neuroscience and Cognition
-Theoretical and Computational Neuroscience
-Circuits and Brain Disorders
-Quantitative Methods for Brain Sciences
-Principles of Complex Networked Systems
-Current Issues in Systems and Cognitive Neuroscience

Skills

PROGRAMMING
Python • Matlab • R • C++

MISCELLANEOUS
Artificial neural networks • Reinforcement learning • Manifold learning • Information theory • Dynamical systems

Honors

NATIONAL SCHOLARSHIP
Nankai University
Awarded to the best 2% students who have extraordinary performance in their academic performance.

PHYSICS TOURNAMENT
Nankai University
Our team of six people reached the best among 40+ other teams in doing research on given physics tournament problems.

Experience

ROTATION STUDENTS
Johns Hopkins University
📅 Jan 2021 – Aug 2021 📍 Baltimore, MD
- With *Dr. Mysore*, I was introduced to the study of anxiety-like behavior in animal models, and started working on computationally modelling anxiety states
- With *Dr. Charles*, I studied the memory capacity of recurrent neural networks in reservoir computing.
- With *Dr. Shadmehr*, I studied the mechanisms of reinforcement learning in cerebellum by computer modelling and simulation.

UNDERGRADUATE RESEARCHER
Johns Hopkins University
📅 July 2019 – Dec 2019 📍 Baltimore, MD
- With *Dr. Niebur* and *Dr. Stuphorn*, I studied human decision making process by building and comparing multiple models including Bayesian Inference and prospect theory models. Our original model, AMP, reaches the best performance, which led to one publication.

UNDERGRADUATE RESEARCHER
Brown University
📅 July 2018 – Sept 2018 📍 Providence, RI
- With *Dr. Serre*, I applied information theory to study the dynamics in gated recurrent neural networks.

UNDERGRADUATE RESEARCHER
Kavli Institute for Theoretical Physics
📅 July 2017 – Oct 2017 📍 Beijing, China
- With *Dr. Zhou*, I investigated how to transfer the algorithm of AlphaZero to a np-complete problem in logic science (k-satisfiability problem).

Publication

Overt visual attention and value computation in complex risky choice
Fan et al. December, 2020, bioRxiv

Recent Projects

INFORMATION THEORETIC TOOLS FOR NEUROSCIENCE
In neural coding, is the whole more than the sum of its parts?
A population of neurons contains more information about a target variable than a single neuron. But, is this information gain simply due to a greater number of neurons, or alternatively, emergent from the interactions across neurons? This project aims to build a tool to quantify such "synergistic" information.

NEURAL CODING FOR ANXIETY
How does neural population activity represent anxiety?
This project aims to study the coding of anxiety in neural population activity imaged in freely behaving mice. The hypothesis is that it is able to encode steadier and richer information about anxiety than single neurons.

NEUROMORPHIC COMPUTATION
Neuroplasticity solves np-complete problem?
Owls' midbrain networks employ a specific neural wiring that enables efficient stimulus selection. This project studies how neuroplasticity managed to solve that complex wiring problem, which is np-complete.