Xinhao Fan

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Education

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

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

Links

 GitHub **WOOOOOOOOOOOOOOO**
🌐 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 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 estimated mice anxiety level by applying maximum likelihood estimation to describe mice behavior. Knowing such anxious level is the first step for decoding the neural signals.
- 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. Ernst and Dr. Stuphorn, I studied human's decision making process by building and comparing multiple models including Bayesian Inference model 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 THEORY TOOLS FOR NEUROSCIENCE
Is population 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 amount of neurons, or alternatively, emergent from the interaction across neurons thus does not exist in any single neuron? This project aims to build a tool to quantify such interaction called synergistic information.

NEURAL CODING FOR ANXIETY
How does neural population activity represent anxiety?
This project studies the coding of anxiety in neural population. 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 network employs 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.