Shiyang Pan

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Education

Duke University Durham, NC
Ph.D. in Electrical and Computer Engineering, ***GPA****: 4.00/4.00* *Aug 2024 – May 2028 (Expected)*
M.S. in Electrical and Computer Engineering *Aug 2022 – May 2024*

- **Research Interests**: Computational Neuroscience, Machine Learing, Real-Time Algorithm Development
- Finished all Ph.D. coursework requirements, with concentrations on Machine Learning and Software Engineering

Xi'an Jiaotong-Liverpool University (XJTLU) Suzhou, China
University of Liverpool Liverpool, UK
Dual Bachelor's Degree: B.S. in Mathematics (First Class Honor), ***GPA****: 3.96/4.00* *Sep 2018 – Jun 2022*

Recent Research Experience

Research Assistant, Pearson Lab, Duke University May 2023 – Present
PI: Prof. John Pearson, Department of Neurobiology *Durham, NC*

Glow-SPLAT: Online Computational Modeling of sparse neural population dynamics

- Developed a statistical generative model to discover functional clusters of neurons from large-scale sparse calcium imaging recordings.
- Fitted model using EM algorithm; incorporated particle filtering for E-step and gradient descent for M-step; implemented model in JAX.
- Outperformed other dimension reduction algorithms on finding latent cluster dynamics from temporally sparse neural activity, providing more accurate neural activity reconstructions from latent dynamics.

Real-Time Data Analysis Software Development for Zebrafish Experiments

- Developed a real-time algorithm to classify zebrafish neurons based on the neural responses to visual stimuli.
- Built a graphical user interface to visualize zebrafish whole brain activity and algorithm outputs in real-time.

Research Assistant, Kwok Lab, Duke Kunshan University Mar 2023 – Sep 2023
PI: Prof. Sze Chai Kwok, Department of Cognitive Neuroscience *Remote*

- Designed and developed an eye-tracking and behavior data preprocessing pipeline in Python to support the study of monkeys' conscious memory and eye movement.
- Conducted exploratory data analysis to discover the correlations between pupil size, eye fixation, eye saccade and recognition memory.
- Developed a Python workflow for iEEG data proprocessing and analysis to study the influence of information content density on memory normalization.

Research Assistant, Meng Lab, XJTLU Apr 2021 – Mar 2022
PI: Prof. Jia Meng, Department of Biological Science *Suzhou, China*

- Proposed deep learning models to classify 2'-O-Methylation from RNA direct sequencing and derived features.
- Built a Gaussian mixture model to identify RNA modification sites from Nanopore sequencing data.
- Discovered attribution maps and consensus motifs as sequence patterns with high contributions to prediction.

Publication

Shiyang Pan, Yuxin Zhang, Zhen Wei, Jia Meng, Daiyun Huang (2022 Prediction and Motif Analysis of 2'-O-methylation Using a Hybrid Deep Learning Model from RNA Primary Sequence and Nanopore Signals. *Current Bioinformatics 2022; 17(9).*

Talks

Glow-SPLAT: Discovering neuronal ensembles from calcium imaging on sparse neural population dynamics 2024
Electrical Computer Engineering Master's Graduation Talk *Durham, NC*

DeepNm: A deep learning model that better capture the 2'-O-Methylation sequence features from Nanopore Signals 2021
Summer Undergraduate Research Showcase *Suzhou, China*

Poster Presentation

Voluntary and reflexive components of oculomotor behavior for recognition memory in macaque monkeys 2024
J. Liu, Z. Jin, R. Yang, J. Cai, ***S. Pan****, M. Cao, H. Wang, S. Kwok, in Society for Neuroscience* *Chicago, IL*

Teaching Experience

Advanced Algebra Peer Tutor, XJTLU Sep 2020 – Aug 2021
Department of Mathematical Science

- Conducted weekly lecture using the textbook *Linear Algebra Done Right*; held mentoring sessions to review key concepts and provide instruction on practice problems.

Internship Experience

Bosch China (Suzhou) Co., Ltd Feb 2022 – May 2022
Data Engineer Intern *Suzhou, China*

- Designed and implemented data processing workflows in Python and MATLAB for vehicle sensor data, and adapted the workflows to accommodate datasets for five different vehicle types.
- Developed a web application for data analysis with Python Flask to simplify the process of uploading, pre-processing and labeling vehicle sensor datasets.

Skills

Languages: Python, Java, C/C++, SQL, R, MATLAB, HTML/CSS, JavaScript
Scientific Computing: JAX, PyTorch, Numpy, SciPy, Pandas, Keras
Tools: Linux, Git, Emacs, GDB, Valgrind, PostgresDB, MySQL, Docker, LaTeX, Markdown

Awards & Achievements

University Academic Excellent Scholarship for 2020-2021 (Top 2%)
XJTLU 2021 Summer Undergraduate Research Fellowship
University Academic Excellent Scholarship for 2019-2020 (Top 1%)
University Academic Achievement Scholarship for 2018-2019 (Top 7%)