Linxing Preston **Jiang**

Theoretical neuroscience, machine learning, and brain-computer interfaces.

https ://homes.cs.washington.edu/p̃restonj/
+1 203 832 0800 @ prestonj@cs.washington.edu
Seattle, WA

Education

2018-2020 Master of Science in Computer Science, **University of Washington**
2016-2018 Bachelor of Science in Computer Science with School Honors, **University of Washington**
2014-2016 Associate of Science in Computer Science, **Seattle Central College**

Professional Experience

Current
September 2018

Graduate Research Assistant | Advisors : Rajesh P.N. Rao, Andrea Stocco
Paul G. Allen School of Computer Science & Engineering, **UW**

- Predictive Coding (ongoing)
  - Expand the original Rao & Ballard predictive coding model into multi-layer networks with sparse coding and adaptive neural response pooling
  - Build the predictive coding network as a generative model with hierarchical filters resembling receptive field profiles in primate visual cortex
  - Extend the predictive coding framework to temporal scale by training the model on natural scene videos and allowing temporal neural response predictions
- Computational models on cognitive architectures (ACT-R) development
  - Applied dynamic causal modeling (DCM) on fMRI data to compute the effective connectivities between brain regions as a novel verification method for selecting the most suitable models for common cognitive tasks (e.g. the Stroop task)
  - (ongoing) Use latent variable models such as hidden semi-Markov models (HSMM) to infer the best cognitive model from real fMRI data
- Deep learning for electroencephalography (EEG) data
  - (paper in prep) Apply deep learning methods such as recurrent neural networks (RNNs) and the attention mechanism to decode sensory information of limbs from EEG in a virtual reality (VR) setting [**Joint work with Facebook Research**]
  - (ongoing) Create Neural "Co-Processors" in the brain using deep learning methods which combine encoding and decoding in brain-computer interfaces to produce optimal stimulation patterns for co-adaptive learning

Predictive Coding | ACT-R | DCM | HMM | EEG | fMRI | PyTorch | Matlab | Julia

Dec 2018
June 2018

Research Associate | Advisors : R. Alison Adcock, Kathryn Dickerson
Adcock Lab, **Duke Institute for Brain Sciences**

- Built biacpype, an automated pipeline in Python to convert fMRI data from Duke & UNC imaging center to the standard BIDS format
- Used FSL to perform data analysis in a fMRI neurofeedback project which uses real-time signal feedback to assist clinical therapy for depression
- Integrated Docker images for fMRI analysis such as MRIQC and FMRIPREP with HTCondor, a high-throughout computing system, for performance boost

FSL | MRIQC | FMRIPREP | BIDS-format | Docker | HTCondor

June 2018 – January 2017

Undergraduate Researcher | Advisors : Rajesh P.N. Rao, Andrea Stocco
Paul G. Allen School of Computer Science & Engineering, **UW**

- Built a multi-person bi-directional brain-to-brain interface through which subjects collaborated to complete a simplified Tetris game
- Used two major kinds of brain computer interfaces : Steady State Visually Evoked Potentials (SSVEPs) to decode binary information (Yes/No) from human brain and Transcranial Magnetic Stimulation (TMS) to deliver binary information to human brain
- Maintained BrainNet's software system which interacts with multiple hardware interfaces (EEG, TMS, Arduino), TCP communication network, and classifies live EEG signals from BrainAmp and OpenBCI devices

EEG | TMS | SSVEP | BrainAmp | OpenBCI | Python

Publications and Talks

2019 Ketola, M., **Jiang, L.**, Stocco, A. (2019). Comparing Alternative Computational Models of the Stroop Task Using Effective Connectivity Analysis of fMRI Data. *Proceedings of the 41th Annual Conference of the Cognitive Science Society* (accepted for oral presentation)

2019 **Jiang, L.**, Stocco, A., Losey, D. M., Abernethy, J. A., Prat, C. S., & Rao, R. P. N. (2019). BrainNet : A Multi-Person Brain-to-Brain Interface for Direct Collaboration Between Brains. *Scientific Reports*, 9(1). https ://doi.org/10.1038/s41598-019-41895-7

2018 **Jiang, L. et al.** BrainNet : A Multi-Person Brain-to-Brain Interface for Direct Collaboration Between Brains. *Brain Informatics 2018* (Oral Presentation)

Volunteer Experience

2019 Reviewer for the Society for Mathematical Psychology (MathPsych) and the International Conference on Cognitive Modelling (ICCM)

Honors and Awards

2018 Outstanding Computer Science Senior Award, UW
2018 Computing Research Association Outstanding Undergraduate Researcher
2017-2018 Levinson Emerging Scholars Award
2017-2018 James A. Hewitt, Jr. Endowed Scholarship
2017-2018 Washington Research Foundation Innovation Undergraduate Fellow
2016-2018 Annual Dean's List, UW
2014-2015 International Merit Scholarship, Seattle Central College

Teaching and Mentoring

Current

Undergraduate Mentoring , UW

- Luciano de la Iglesia, Senior, Computer Science, UW
- Devyansh Gupta, Junior, Electrical & Computer Engineering, UW
- Michelle Ly, Sophomore, Symbolic Systems, Stanford University (UW YSP Program)

Autumn 2019 & Autumn 2017

CSE 332 : Data Structures and Parallelism , UW

- This is a junior-level computer science class focusing on core data structures and algorithms in computer science. It also touches on modern parallel program design (with Java)
- Held office hours twice a week to help students with homework problems and project development
- Graded exercises whose topics include algorithm & data structure design and analysis, parallelized programs
- Helped with exam making

Spring 2018 | CSE 160 : Data Programming , UW

- This is an introductory level computer science in Python, designed to give students experience working with real-word data and performing analysis with Python.
- Held office hours twice a week to help students with homework problems and project development
- Held review sessions for the class (size 116 people) during midterm and final's week
- Helped with exam making

Spring 2017 | CSE 351 : Hardware Software Interface , UW

- This is a junior-level computer science class focusing on the concepts of low-level hardward architecture and operating systems.
- Led a section group (size 30 people) each week for topic review, project tutorials and exam preparation
- Held office hours once a week to help students with projects in Assembly, Stack Overflow, and Memory Management in C

References

Rajesh P.N. Rao
Computer Science & Engineering
University of Washington
@ rao@cs.washington.edu

Andrea Stocco
Psychology
University of Washington
@ stocco@uw.edu

R. Alison Adcock
Center for Cognitive Neuroscience
Duke University
@ alison.adcock@duke.edu

Kathryn Dickerson
Center for Cognitive Neuroscience
Duke University
@ kathryn.dickerson@duke.edu