Jingyuan Li

+1 (412) 509 7858
jingyua1@andrew.cmu.edu, lijingyuandr1@gmail.com
https://christincha.github.io

Research Interest

Computational Neurosciecce, Machine Learning, Signal Processing, Cognitive Neuroscience.

Education

08/16-05/18 **Master, Electrical and Computer Engineering**, *Carnegie Mellon University, Pittsburgh, PA*, Courses: Machine Learning, Deep Learning, Reinforcement Learning., GPA:3.82/4.

11/15-04/16 **Internship, Biomedical Engineering**, *Tsinghua University, Beijing, China*.

09/12–05/16 **Bachelor, Biomedical Engineering**, *Huazhong University of Science and Technology, Wuhan, Hubei, China*, Courses: Linear algebra, Calculus, Probability theory, Anatomy and Physiology, GPA: 3.87/4.

Research Experiences

08/17-Present **Neural Representation Space Transformation by Modifying Connection in V2 Neurons**.
- Data: ECoG recordings from V2 of macaque monkey.
- Investigated functional connectivity based on Noise Correlation and Cross Correlation Histogram Analysis. We found connection was strengthened for co-activated neurons.
- Analyzed neural representation changes based on t-Distributed Stochastic Neighbor Embedding, Principal Component Analysis and sparsity analysis.

08/17-12/17 **Discrimination Ability of V1 and V2 Neurons on Cartesian Stimuli (macaque monkey)**.
- Applied Support Vector Machine decoding frequency and orientation of stimuli based on V1 and V2 neuron responses.
- Orientation accuracy, V2:78%, V1:48%, chance:16%. Frequency accuracy: V2:54%, V1:42%, chance:12.5% (20 neurons).

08/17-12/17 **Neural Network Models of Primary Visual Cortex**.
- Applied Convolutional Neural Network for fitting V1 neural responses of macaque monkey.
- Approved sparsity property of Neuron responses, by adding L1 Norm which improved prediction correlation from 0.599 to 0.63.

08/16-06/17 **Hierarchical Subcortical Sub-regional Shape Network Analysis**.
- Computed global and local efficiency of subcortical brain networks using graph theory[1].
- Segmented template surfaces for subcortical structure into multiple functionally distinct subregions to study functions of each region[2].

11/15–04/16 **Deep Networks for Lung Cancer Detection**.
- Auxiliary diagnosis for Lung cancer based on CT(Computer Tomography) images with semi-supervised Ladder network.

09/14–08/15 **A Near-Infraed Light Based Wearable Breast Cancer Detector**.
- Designed a DSP based imaging system based on near-infrared light detecting oxygenated and deoxygenated hemoglobin in breast tissue.

Course Project

08/17-12/17 **Deep Learning**.
- Implemented Stochastic Gradient Descent & Batch Normalization from scratch for FCN and RBM reaching the same performance as exiting framework (Pytorch).
- Sequence to Sequence prediction of 4-grams.

01/18-05/18 **Reinforcement Learning**.
- Implemented Deep Q Network (DQN) and Duling DQN on both CartPole-v0 and MountainCar-v0 environment.
- Applied Actor-critic network with Hindsight Experience Replay for robotic arm control in simulated environment and improved the performance with prioritized experience replay (PER).

01/18-05/18 **Volume and Shape Features based Alzheimer's Disease (AD) and Mild Cognition Impairment**.
- Compared difference machining learning techniques in Alzheimer's disease detection based on volume and shape features.
- Proposed Shape-Embedding network. Improved classification accuracy to 82.00% in the MCI vs HC classification.

Skills

Programming Python, MATLAB, C^{++}, R.

Software Tools Keras, TensorFlow, PyTorch, Numpy, Matplotlib, AWS, Git, Bash.

Publications

[1] Jingyuan Li, Yujing Gong, and Xiaoying Tang. Hierarchical subcortical sub-regional shape network analysis in alzheimer's disease. *Neuroscience*, 366:70–83, 2017.

[2] Xiaoying Tang, Na Chen, Siyun Zhang, Jeffery A Jones, Baofeng Zhang, Jingyuan Li, Peng Liu, and Hanjun Liu. Predicting auditory feedback control of speech production from subregional shape of subcortical structures. *Human Brain Mapping*, 2017.

Abstract Training transforms neural representational space by modifying the connectivity in V2, Submitted to COSYNE conference in 2019.

Abstract Subcortical Surface Brain Network Abnormality in Alzheimer's Disease, 2017th Organization for Human Brain Mapping Conference.

Conference & Competition

- Canonical Computation in Brains and Machines, New York University, 2018.
- Society of Neuroscience, 2018.
- Brainhub NEUROHACKATHON, Carnegie Mellon University, 2018.