

ZIYI GONG

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EDUCATION

BS, Computer Science, University of Pittsburgh, 2017 - 2020 (Expected)

Minor in Neuroscience and Mathematics

Cumulative GPA: 3.94 / 4.00; Major GPA: 3.98 / 4.0

TECHNICAL SKILLS

Machine Learning & Quantitative Analysis: deep neural network models, Bayesian inference, Bayesian network, reinforcement learning, GLM, HMM, random forest, sparse coding, SVM, KMeans, HDBSCAN, spike sorting, statistical tests, frequency analysis, phase plane analysis, etc.

Computational Neuroscience: single neuron models, population models, learning models

Programming: Python (Scipy, Pandas, Pytorch, etc.), C/C++, Matlab, R, Java, HTML & CSS, etc.

RESEARCH EXPERIENCES

Independent Research / CS Major Capstone

2019/09 - Present

Advisor: Dr. Paul Munro

University of Pittsburgh

Modeling the Evolution of Retina Neural Network

- Proposed an efficient way to encode retina neural networks and adapted the genetic algorithm
- Simulated the retina neural networks and the evolution of lateral inhibition and center-surround structure, and searched for the alternatives using genetic algorithm
- Discussed the potential impacts of evolutionary programming to artificial neural network

Independent Research

2019/09 - 2020/07

Advisor: Dr. Nathan Urban

Urban Lab, University of Pittsburgh

Analyzing and Modeling Mouse Trajectories during Olfactory Navigation

- Applied exploratory data analysis and machine learning (BSOiD) on the real mouse trajectories
- Modeled mouse trajectories during olfactory navigation with multiple methods, such as decision tree with infotaxis, multi-order continuous HMM, linear decomposition, and bag of segments

Independent Research

2019/04 - 2020/03

Advisor: Dr. Bradly Alicea

Orthogonal Research and Education Lab

Modeling Neural Plasticity with Multisensory Braitenberg Vehicles

- Proposed and constructed a Braitenberg vehicle that associates stimuli of one sense with the “preference” of another sense in a virtual two-sensory environment
- Enabled Hebbian association between two senses using the Li-Hopfield network and Hebbian associative memory network

Summer Research Fellowship

2018/05 - 2018/08

Advisors: Dr. Yanhua Huang and Dr. Yao Wang

Huang Lab, University of Pittsburgh

Developing Optogenetic Tools for Studying Sleep-mediated Reward Processing

- Constructed Cre-dependent luciferase and channelrhodopsin, and learned to do patch clamp
- Led journal discussions, participated in weekly observational trainings at UPMC

PREPRINTS & PUBLICATION

Gong, Z., Munro, P. (2020). Modeling the Evolution of Retina Neural Network. *arXiv preprint*. arXiv:2011.12448.

Dvoretzskii, S., **Gong, Z.**, Gupta, A., Parent, J., and Alicea, B. (2020). Braitenberg Vehicles as Developmental Neurosimulation. *arXiv preprint*. arXiv:2003.07689.

Alicea, B., Dvoretzskii, S., Felder, S., **Gong, Z.**, Gupta, A., and Parent, J. (2020). Developmental Embodied Agents as Meta-brain Models. *DevoNN Workshop, Artificial Life 2020*.

SELECTED CLASS PROJECTS

Reconstruction of Visual Patterns From V4 Firing and Local Field Potentials

Course Instructors: Dr. Aaron Batista and Dr. Bistra Iordanova

Wrote detailed mock NIH grant for my proposal on applying generative adversarial network to reconstruct seen visual patterns from macaques' V4 spiking activities and local field potentials

Generative Model for Visual Storytelling with Stick Figures

Course Instructor: Dr. Adriana Kovashka

Proposed and implemented a stacked generative adversarial network to randomly create series of moving stick figures that tell stories via their bodily interactions

HONORS

- Center for Translational Mental Health Research (CTMHR) Summer Research Fellowship 2018
- Dean's List (all semesters)

OTHER ACTIVITIES

Peer Tutor, Pitt CUSA

2018/08 - 2020/08

Volunteer to assist Chinese freshmen in adapting to campus life, getting used to university policies, and making course plans

Scientific Writer (Chinese), ibrain-talk

2019/05 - 2019/07

Wrote for non-professional Chinese readers 2 introductions of recent interesting papers published on neuroscience-related journals, and a detailed historical review on phrenology