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
Related courses: Computational Neuroscience, Neuronal Dynamics, Quantitative Systems Neuroscience, Neural Plasticity, Deep Learning, Machine Learning, Artificial Intelligence

TECHNICAL SKILLS

Machine Learning: various neural network models, Bayesian inference, HMM, GLM, sparse coding, reinforcement learning, SVM, random forest, KMeans, HDBSCAN, etc.
Analysis: dimensional reduction (PCA, tSNE, UMAP), spike sorting, statistical tests, frequency analysis, phase plane analysis
Computational Modeling: neural encoding & decoding, single neuron models, population models, behavioral models, learning models
Programming: Python (Scipy, Pandas, Pytorch, Scrapy, etc.), C/C++, Matlab, R, Java, etc.

RESEARCH EXPERIENCES

Independent Research / CS Major Capstone **2019/09 - Present**
Advisor: Dr. Paul Munro University of Pittsburgh
A Model of the Evolution of Retina Lateral Inhibition

- Writing a manuscript for publication as the first author
- Simulating the evolution of lateral inhibition and searching for its alternatives using genetic algorithm
- Formulated methods to compare different neural networks in terms of graph theory, dynamics and the receptive fields of retina ganglion cells

Independent Research **2019/09 - 2020/07**
Advisor: Dr. Nathan Urban Urban Lab, University of Pittsburgh
Analysis and Modeling of Mouse Trajectories during Olfactory Navigation

- Exploratory data analysis and applied machine learning on the real behavioral data
- Modeled mousing trajectories during olfactory navigation using multiple methods, such as decision tree models, modified 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

- Incorporated Li-Hopfield network, associative memory, generalized Hebbian algorithm to enable dual sensory integration and Hebbian association in Braitenberg vehicle
- Constructed a Braitenberg vehicle that associates stimuli of one sense with the “preference” of another sense in a virtual two-sensory environment

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 3 journal discussions, participated in weekly trainings, and presented at CTMHR

PREPRINT / PUBLICATION

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

Alicea, B., Dvoretskii, 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**

Helped Chinese freshmen adapt to campus life, get used to university policies, and tailor course plans

Scientific Writer (Chinese), ibrain-talk **2019/05 - 2019/08**

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