JIANZONG PI

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EDUCATION

The Ohio State University, Department of Electrical and Computer Engineering — Expected graduation: May 2025
Ph.D. in Electrical and Computer Engineering, Advisor: Prof. Abhishek Gupta
M.S. in Mathematics, Advisor: Prof. Dustin Mixon

The Ohio State University, Department of Electrical and Computer Engineering — May 2020
B.S. in Electrical and Computer Engineering (GPA: 3.95 / 4.0), with minor in mathematics and research distinction
Thesis: A Reinforcement Learning Framework for Autonomous Eco-Driving

SELECTED PROJECTS

Neural Collapse with Unconstrained Features — Oct. 2020 – Present
- Proposed and proved conjectures on an emergent phenomenon "neural collapse" in deep learning. Developed "unconstrained feature model" to analyze geometric properties of feature vectors in neural networks. Raised conjectures of "neural collapse" for n-class, imbalanced training problems.

Functional Properties of f-divergences — May. 2021 – Present
- Identified some sufficient conditions under which the continuity of dissimilarity metrics such as f-divergences, Bregman divergence and capacitory discrimination can be established. The continuity results were then extended to f-mutual information.

Algorithm for Computing Approximate Nash Equilibria — Jul. 2020 – July. 2021
- Developed a polynomial time algorithm for computing approximate Nash Equilibria for bi-matrix games by affine transformations. Proved the theoretical performance bound. Conducted simulations for verification, then compared the running-time performance of the proposed algorithm to the classical algorithms.

Multi Objective Vehicle Rebalancing for Ridehailing System — Dec. 2019 – Jun. 2020
- Applied reinforcement learning techniques to NYC taxi dataset to develop a large-scale taxi ridehailing system for Manhattan area. Modeled the rebalancing problem as a Markov decision problem with stationary but asymmetric demand in each area.

Limit Properties of Markov Chains — Dec. 2019 – Apr. 2020
- Conducted simulations to verify the convergence results of random processes to empirical value iteration and empirical Q value iteration for finite state, finite action Markov decision processes.

AWARDS & HONORS

University Fellowship, The Ohio State University — Aug. 2020
EE/ECE Alumni Society non-Ohio Residents Scholarship, The Ohio State University — Sep. 2018

COURSES & SKILLS

Programming Languages: Python, C++, Java
Statistical Software: R, MATLAB
Courses (Engineering): Optimization, Machine Learning, Reinforcement Learning, Information Theory
Courses (Mathematics/Statistics): Real Analysis, Topology, Probability and Statistics, Statistical Time Series Analysis

PUBLICATIONS

[4] Jianzong Pi, Joseph L. Heyman, and Abhishek Gupta, "Two Algorithms for Computing Exact and Approximate Nash Equilibria in Bimatrix Games," Submitted to Conference on Decision and Game Theory for Security, 2021
[3] Dustin G. Mixon, Hans Parshall, and Jianzong Pi, "Neural collapse with unconstrained features," Submitted to SIAM Journal on Mathematics of Data Science
[2] Yuntian Deng, Hao Chen, Shiping Shao, Jiacheng Tang, Jianzong Pi, and Abhishek Gupta, "Multi-Objective Vehicle Rebalancing for Ridehailing System using a Reinforcement Learning Approach," Journal of Management Science and Engineering, Accepted with Revisions
[1] Abhishek Gupta, Hao Chen, Jianzong Pi, and Gaurav Tendolkar, "Some Limit Properties of Markov Chains Induced by Recursive Stochastic Algorithms," SIAM Journal on Mathematics of Data Science, 2(4), 967-1003.