Chuhuan Huang 黄楚焕

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Education

Ph.D. in Mathematics @ Johns Hopkins University, starting from 08/2023
M.A. in Applied Mathematics @ University of Southern California, 08/2021 - 08/2023
B.S. in Math – Computer Science @ University of California San Diego, 08/2016 - 03/2020

Languages / Skills

Mandarin/Chinese (native language), English (daily working language with high proficiency), Python/LaTeX (Daily programming language with high proficiency), C++/java/R (Proficient degree-level training), Stochastic Analysis, Reinforcement Learning Theory & Algorithms.

Thesis

A Survey on the Computational Hardness of Linear-structured Markov Decision Processes, ongoing,
advised by Professor Steven M. Heilman @ University of Southern California

- we are investigating i) the equivalent condition for the computational-statistical gap in Reinforcement learning ii) the relationship between the computational hardness of the linear-structured Markov decision processes and the rank of the transition matrix in the corresponding Markov chain. We typically need to carefully design a reduction from a linear-structured MDP to a well-known computationally hard problem.

Awards

Graduate Fellowship @ Department of Mathematics, Johns Hopkins University, starting from 08/2023
Graduate Teaching Assistantship @ Department of Mathematics, University of Southern California, 08/2022- 05/2023
Provost Honors of Thurgood Marshall College @ University of California, San Diego, 09/2017- 03/2019

Internships

Data Analyst Assistant @ Founder Securities, Institute of Financial Technology, 01/2021- 04/2021

- analyzing the correlations and connections between and within the stock communities, using TensorFlow-implemented convolutional neural networks.

Physical Therapist Assistant @ UC San Diego Health, 12/2018- 01/2019, 04/2019- 06/2019

- assisting PT to analyze the structural and mechanical weakness of the patient in rehabilitation phase, for further injuries prevention.

Recent Projects

Chuhuan Huang, Deep Reinforcement learning-based travel recommender system, independent project, 2023 (ongoing)

- Our goal is to design a Tinder-like, user-super-friendly online travel plan evaluating system, to bypass the tedious filter-setting user operations in traditional travelling/booking Apps and provide a super-easy user experience.
- Our model is built and trained based on the Deep Q Network. Thru some initial and subsequent user interactions in the user interface, the model learns and privatizes user's preference on date of the flights, price and total durations, depending on user's choice on modules. The learning is few-shot and online: the model continues to learn in the subsequent interactions and provides updated recommendations.
- Our system is designed to fetch real-time ticket price and schedules data using APIs like Skyscanner and Expedia.

Chuhuan Huang, Approaching MAX-CUT thru reinforcement learning, independent research supervised by Professor Steven Heilman, 2022

- we approach the MAX-CUT problem by using Actor-Critic algorithm-trained LSTM-based pointer networks and compared with known Semidefinite programming benchmarks, using LSTM framework in Keras.
- Our approach is averagely 33% faster SDP benchmark in predicting and reaches 86% accuracy of the benchmark.
- Our approach is unfortunately unstable: when graphs with more than 150 vertices are fed, we sometimes run into NaN error in the training phase and sometimes poor performance in predicting phase.

Chuhuan Huang, Simulation of MDP and Decision-generating thru Value Iteration , independent project, 2021

- modeling the transition distribution and cumulative reward in a game-related stochastic process using the Markov decision process, and implementing the policy generating mechanism through Value Iteration, a dynamic-programming-based algorithm, in Python.