

Samuel Yang-Zhao

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Summary

I am interested in the practical and theoretical aspects of designing machine learning systems with a particular focus on reinforcement learning. I have recently worked on approximating the AIXI agent, a theoretically optimal bayesian reinforcement learning agent, through the use of tools from supervised learning, online learning, data compression and knowledge representation. I am also interested in the ethical considerations surrounding the wider adoption of machine learning systems and have investigated ensuring data privacy for reinforcement learning systems via differential privacy.

Research Interests: Reinforcement Learning, Decision Making Under Uncertainty, Online Learning, Deep Learning, Data Compression, Planning, Differential Privacy.

Education

The Australian National University, Canberra, ACT, Australia

(Anticipated Graduation Jul 2024)

Doctor of Philosophy in Computer Science

Jul 2019 - Current

- Supervisors: Dr. Kee Siong Ng, Prof. Hanna Kurniawati, Prof. Marcus Hutter

The Australian National University, Canberra, ACT, Australia

1st Class Honours

Bachelor of Science, Mathematics (Honours)

Feb 2018 - Nov 2018

- Thesis: Sufficient Conditions for Divergence in Projected Bellman Equation Methods
- Supervisors: Prof. Marcus Hutter, Prof. Markus Hegland

The University of Melbourne, Melbourne, VIC, Australia

1st Class Honours

Bachelor of Science, Computing and Software Systems

Feb 2014 - Nov 2017

- Diploma in Mathematical Sciences (Statistics and Stochastic Processes)

Academic Publications

PUBLISHED

- Yang-Zhao S.**, Ng K.S., Hutter M., *Dynamic Knowledge Injection for AIXI Agents*, AAAI 2024
- Yang-Zhao S.**, Wang T, Ng K.S., *A Direct Approximation of AIXI Using Logical State Abstractions*, NeurIPS 2022
- Hutter M., **Yang-Zhao S.**, Majeed S. *Conditions on Features for Temporal Difference-Like Methods to Converge*, IJCAI 2019

PRE-PRINTS/UNDER REVIEW

- Yang-Zhao S.**, Ng K.S., *Privacy Preserving Reinforcement Learning for Population Processes*, under review 2024
- Chen D., **Yang-Zhao S.**, Ng K.S., Lloyd J., *Factored Conditional Filtering: Tracking States and Estimating Parameters in High-Dimensional Spaces*, arXiv pre-print 2022, under review

Work Experience

Data Scientist (Part-time)

Canberra, Australia

Diversity Arrays Technology

Feb 2022 - Present

- Developing machine learning and statistical algorithms for genome wide discovery of DNA signatures linked to agricultural traits.
- Commercial application is to facilitate better data-driven crop breeding programs for clients.

Associate Training Officer (Casual)

Canberra, Australia

National Computational Infrastructure

Jan 2023 - December 2023

- Developed and ran short training courses teaching Australian scientific researchers parallel computing using multi-threading/processing and GPUs.
- Topics covered include parallel computing in Python, Cython, PyTorch, and CUDA.

Course Tutor

Canberra, Australia

The Australian National University

July 2019 - December 2019

- COMP4260 - Advanced Topics in Artificial Intelligence (Head tutor)
- COMP3600/6466 - Algorithms (tutor)
- MATH3512 - Matrix Computations (tutor)

Sequential Monte-Carlo Methods - Research Assistant

Canberra, Australia

The Australian National University

Feb 2019 - June 2019

- Developed a sequential Monte-Carlo algorithm to simultaneously track the simulated spread of an epidemic process across graphs representing contact networks and learn the epidemic's spread parameters.
- Work done during this period resulted in the pre-print [4] that is currently under review.

Course Tutor

Melbourne, Australia

The University of Melbourne

July 2016 - December 2017

- COMP10002 - Algorithms (tutor)
- COMP20003 - Algorithms and Data Structures (tutor)

Technical Skills

Programming	Python (Adv.), Cython (Adv.), C/C++ (Adv.), CUDA (Inter.), Java (Inter.), R (Inter.), OCaml (Basic), Haskell (Basic)
Machine Learning	PyTorch (Adv.), NumPy (Adv.), Pandas (Adv.), Scikit-learn (Adv.), JAX (Inter.), Tensorflow (Inter.)
Other	TeX (Adv.), Git (Adv.), Bash (Adv.), Docker (Inter.)

Achievements

2019 **Scholarship**, Australian Government Research Training Program

Australia

Other

Citizenship Australian.

References Available upon request.