# David Yu-Tung Hui

## Education

**Mila, Quebec AI Institute, Université de Montréal**
MSc, CGPA 4.15/4.3: Computer Science (AI). Sept 2020 – Feb 23

**Trinity College, University of Cambridge**
BA (Hons), II.1: Computer Science with Physics and Mathematics. Oct 2015 – Jul 18

## Academic Research Experience

**MSc Student, Mila Quebec AI Institute, Université de Montréal** Sept 2020 – Feb 23
MSc thesis: 'Stabilizing Q-Learning for Continuous Control', co-advised by Pierre-Luc Bacon and Aaron Courville.

- Improved stability of reinforcement learning algorithms for (simulated) robots by finding a convergence condition for $Q$-learning with the Neural Tangent Kernel.
- Identified that deep networks induce heteroscedastic Gumbel noise in $Q$-learning.

**Research Assistant, Mila Quebec AI Institute, Université de Montréal** Jan – Dec 2019
Advised by Yoshua Bengio.

- Improved sample efficiency of imitation learning and reinforcement learning algorithms used to train an agent to follow instructions in a gridworld by improving architecture design and incorporating generative adversarial imitation learning.
- Also applied deep learning to computational chemistry and medical imaging.

**BA Student, Trinity College, University of Cambridge** Oct 2017 – Jul 18
BA thesis: 'Deep Reinforcement Learning for Chess', advised by Sean Holden.

- Augmented the C++ Stockfish chess agent to use a value function trained by Deep Reinforcement Learning.

**Undergraduate Research Opportunities Programme (UROP), University of Cambridge** Summer 2016
Advised by Alan Blackwell.

- Invented algorithms to track and keep objects in focus across multiple videos.

## Industrial Experience

**Deep Learning Research Intern, Tractable, London, UK** Jul – Dec 2018
TensorFlow: Few-shot transfer of classifiers to Talanx RFP dataset with 3x winning margin.

**Undergraduate Group Project, ARM, Cambridge, UK** Spring 2017
C++, Assembly: Map a 2x2 $m^2$ floor in $< 5$ minutes with a Pololu robot swarm.

**Data Science Intern, Facebook London, UK** Summer 2017
Python, SQL: Measure user-ad conversion rate and matching quality, improving reliability of revenue-ad attribution.

## Awards

**Scholar Award** NeurIPS 2023
Free registration and travel to NeurIPS ($\sim$ \$2500 USD) for first-authoring spotlight paper.

**Bourse C-Scholarship, Universite de Montreal** Sept 2020 – Aug 21
Tuition fee exception (equivalent to \$22315.59 CAD) for high academic achievements.

**Science Essay Prize, Trinity College, Cambridge** 2017
For 'Descartes and Spinoza in the 21$^{st}$ Century', on the respective merits of symbolic AI and machine learning.

**British Mathematical Olympiad**
Top 100: Senior Olympiad. 2013
Top 50, invited to a Summer School: Intermediate Olympiad. 2012

**National Research Project Award, First Lego League** 2011
Captained a team representing the UK at the Open European Championships. Wrote the winning research presentation.

## Talks and Seminars

**Presentations**

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| Double Gumbel $Q$-Learning | NeurIPS 2023 |
| Double Gumbel $Q$-Learning (**Invited Speaker**) | SynAGI Seminar, IBM, Jul 18 2023 |
| BabyAI | Poster Session, Hitachi-Mila Workshop, Oct 11 2019 |
| BabyAI | Poster Session, ElementAI Montreal, Jul 4 2019 |

**Research Seminars while studying at Mila, Quebec AI Institute**

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| Tunable Asymmetric $Q$-Learning | Feb 3 2023 |
| Convergence of Deep $Q$-Learning | Nov 22 2022 |
| Continuous $Q$-Learning with LayerNorm | Oct 25 2022 |
| Maximum-Entropy RL | Aug 11 2022 |
| Solving MuJoCo by Scaling | Apr 7 2022 |
| Neurosymbolic Agents: A Proposal | Nov 9 2021 |
| Policy Evaluation Networks | Oct 14 2021 |

**Reading Group Discussion Leader/Presenter**

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| Graph Attention Networks | Mila, Sept 14 2021 |
| Program Synthesis with Pragmatic Communication | Mila, Aug 3 2021 |
| Discovering Reinforcement Learning Algorithms | Mila, Jun 8 2021 |
| Emergent Symbols through Binding in External Memory | Mila, Mar 17 2021 |
| MDP Homomorphic Networks | Mila, Nov 2 2020 |

## Service

**Workshop Organizing**

AIPLANS (Advances in Programming Languages and Neurosymbolic Systems) Virtual, NeurIPS 2021
- Co-wrote workshop proposal, determining scope and content of submissions and speakers; organized and oversaw reviewing logistics; created graphic design and online content; moderated online discussion.

Neural Scaling Laws Mila, Oct 2021
- Set schedule for a three-day workshop and moderated online discussion.

**Refereeing**

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| Datasets and Benchmarks Track | NeurIPS 2021 |
| Theory and Foundation of Continual Learning Workshop | ICML 2021 |
| Workshop on Ecological Theory of Reinforcement Learning | NeurIPS 2021 |

**Reading Group Organizing**

ML4Code Reading Group Mila, 2021
Presented papers, sent reminders to scheduled speakers and Mila mailing list.

**Teaching Assistant**

Interaction Design: Undergraduate course lectured by Hatice Gunes. University of Cambridge, Mar – Jun 2017

## Skills

**English**, **Cantonese**: Bilingual speaker
**French**: Conversational
**Python**, **JAX**, **NumPy**, **SLURM**: Daily usage
**PyTorch**, **TensorFlow**, **C++**, **Java**