Alex J. Chan

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Education

University of Cambridge Cambridge, UK

PhD Applied Mathematics and Theoretical Physics *Oct. 2020 – Present*

- Penultimate year PhD student under the supervision of Professor Mihaela van der Schaar, working on machine learning with applications in medicine. My main area of focus is probabilistic methods for understanding decision making through interpretable imitation learning and inverse reinforcement learning.

MPhil Machine Learning and Machine Intelligence *Oct. 2019 – Sep. 2020*

- Awarded with Commendation and an average of 79%.
- 92% for my thesis "Interpretable Policy Learning" - developing interpretable imitation learning algorithms for decision making in high stakes environments.
- Taught component focusing on probabilistic machine learning, with modules on natural language processing, reinforcement learning, and computational neuroscience.

University College London London, UK

BSc Statistics *Oct. 2016 – June 2019*

- 1^{st} Class Honours - 81% average (Equivalent American GPA: 3.94). Achieved 84% on my final year project on probabilistic deep learning, focusing on flexible Bayesian approximations in deep neural networks.
- Modules include significant mathematical and statistical content covering probability, linear models, mathematical analysis, and advanced linear algebra.

Hampton School London, UK

A-Levels/GCSEs *2016 – 2015*

- A*A*A*A* at A-Level in Maths, Further Maths, Chemistry, and Physics. Further AA at AS-Level in Biology and General Studies. 9A*1A at GCSE. Gold, Silver and Bronze Duke of Edinburgh Awards.

Awards/Prizes

Microsoft Research PhD Scholarship

- Received the award for full funding of my PhD co-supervised with Microsoft Research (Dr Danielle Belgrave and Dr Aditya Nori) "A Smart Care System for Healthcare using Contextual Reinforcement Learning".

G-Research PhD Prize in Maths and Data Science - 2nd Place Value: £7,000

- Runner up in the G-Research competition for best draft PhD dissertation.

Hex Cambridge Hackathon Optiver Challenge - 1st Place

- Developed an algorithmic trading strategy for market making a dual listed product on an Optiver proprietary exchange, beating out about 40 teams.

EPSRC Vacation Bursary Value: £2,000

- Awarded funding grant to conduct a research project during the summer on Markov chain Monte Carlo supervised by Dr Sam Livingstone, specifically comparing theoretical bounds with traditional practical convergence diagnostics.

Skills

Machine Languages: Python, R, MATLAB, PostgreSQL, HTML
Human Languages: English, Conversational French
Libraries/Tools: PyTorch, JAX, TensorFlow, pandas, NumPy, Matplotlib, Git

Supervision

University of Cambridge Cambridge, UK

MPhil Machine Learning and Machine Intelligence Theses *Mar. – Aug. 2021*

- **Tennison Liu:** *Fair Policy Learning.*
- **Alizée Pace:** *Adaptive Decision Tree Policies* (Resulted in a Spotlight at ICLR 2022).

University of Oxford Oxford, UK

MSc Statistical Science Thesis *Mar. – Aug. 2021*

- **Yuling Chen:** *Clustered Bayesian Inverse Reinforcement Learning Via Variational Inference.*

Publications

Synthetic Model Combination: An Instance-wise Approach to Unsupervised Ensemble Learning
A. J. Chan and M. van der Schaar. In *Neural Information Processing Systems (NeurIPS)* 2022.

Inverse Online Learning: Understanding Non-Stationary and Reactionary Policies
A. J. Chan, A. Curth, and M. van der Schaar. In *International Conference on Learning Representations (ICLR)* 2022.

POETREE: Interpretable Policy Learning with Adaptive Decision Trees
A. Pace, A. J. Chan, and M. van der Schaar. In *International Conference on Learning Representations (ICLR)* 2022.

The Medkit-learn(ing) Environment: Medical Decision Modelling through Simulation
A. J. Chan, I. Bica, Alihan Hüyük, D. Jarrett, and M. van der Schaar. In *Proceedings of the Neural Information Processing Systems (NeurIPS) track on Datasets and Benchmarks* 2021.

Scalable Bayesian Inverse Reinforcement Learning
A. J. Chan and M. van der Schaar. In *International Conference on Learning Representations (ICLR)* 2021.

Generative Time Series Modelling with Fourier Flows
A. M. Alaa, A. J. Chan, and M. van der Schaar. In *International Conference on Learning Representations (ICLR)* 2021.

Unlabelled Data Improves Bayesian Uncertainty Calibration under Covariate Shift
A. J. Chan, A. M. Alaa, Z. Qian, and M. van der Schaar. In *International Conference on Machine Learning (ICML)* 2020.

In Preperation

Practical Approaches for Fair Learning with Multitype and Multivariate Sensitive Attributes
T. Liu, A. J. Chan, B. van Breugel, and M. van der Schaar.

Assessing and Enforcing Agent Fairness in Sequential Decision Making
A. J. Chan and M. van der Schaar.

Interactively Learning an Individual's Most Convincing Explanations
Alihan Hüyük, A. J. Chan, and M. van der Schaar.

Employment, Volunteering and Experience

ICML/ICLR/NeurIPS
Invited Reviewer *Jan. 2021 – Present*

- I have served as an invited peer-reviewer for all three of the major machine learning conferences (ICML21, NeurIPS21, ICLR21-22).

University of Cambridge Cambridge, UK
Club Captain, Wolfson College Boat Club *Aug. 2021 – Aug. 2022*

- As Captain of the boat club, I was in charge of the overall running of the club, organising the training of the members as well as broader events and the alumni network.

University College London London, UK
Vice President/Treasurer - Pure Krav Maga Society *Oct. 2018 – June 2019*

- I oversaw the organisation and finances behind sessions and social events while helping to run classes as a trainee instructor.

Welfare Officer, Effective Altruism Society *Oct. 2018 – June 2019*

- I was responsible for engaging with the wider community to develop more of an understanding of the aims of Effective Altruism as well as looking out for the welfare of our members and helping develop the society further.

Electric Eels Swimming Club Windsor, UK
Volunteer Swimming Coach *2011 – 2015*

- I spent four years volunteering with the club, which aims to provide special coaching for children with Down syndrome, coaching both groups and 1-on-1 at a range of swimming ability
- I became ASA Lv1 certified in Teaching Aquatics, allowing me to develop my technical and communication skills to be a more effective coach.