

# Michael Painter

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CONTACT INFORMATION	<i>E-mail:</i> mpainter.thts@gmail.com <i>LinkedIn:</i> <a href="https://www.linkedin.com/in/michael-painter-599b09b2/">https://www.linkedin.com/in/michael-painter-599b09b2/</a>	<i>Tel (UK):</i> (+44) 789-551-0611
EDUCATION	<b>University of Oxford, Oxford Robotics Institute, Pembroke College</b> <b>DPhil Engineering Science (Robotics/Machine Learning)</b> • Research focuses: <i>Monte Carlo Tree Search</i> and (multi-objective) <i>sequential decision making</i> • Teaching: masters project supervision and teaching assistant for robotics/software engineering courses • Presenting (my own/others) research, and reviewing for conferences such as IJCAI, ICRA and AAAI <b>Stanford University</b> <b>MS Computer Science</b> • Main courses: AI, Machine Learning, Reinforcement Learning, Robotics, Computer Vision, NLP with Deep Learning, Randomised Algorithms, Optimisation and Algorithmic Paradigms, Data Mining • Course staff (CA) for Probability, Principles of Computer Systems and Reinforcement Learning <b>University of Cambridge, Churchill College</b> <b>BA (Hons) Computer Science</b> • Algorithms, Concurrent/Distributed Systems, Networks, Software Engineering, Databases, Security	<b>Oct 2018 – Apr 2024</b> <b>Sep 2016 – Jun 2018</b> <b>Oct 2013 – Jun 2016</b>
EMPLOYMENT	<b>Software Engineer Intern — Google, Display Ads Predictions</b> • Worked on estimating parameters in <i>Generalised Linear Mixed Models</i> with billions of data points • Used <i>variational inference</i> to optimise the model, outperforming the baseline with less training time • Documented how to distribute the algorithm across multiple machines to exploit model sparsity • Technologies used: Python, TensorFlow, Borg (including BCL) <b>Applied Scientist Intern — Microsoft, DNN Frameworks Team</b> • Used <i>Generative Adversarial Networks</i> to produce <i>3D human pose estimates</i> given a single RGB image • Improved robustness to “in the wild” images using <i>data augmentation</i> and <i>semi-supervised</i> techniques • Incorporated <i>depth estimation networks</i> to produce global 3D pose predictions, for <i>Kinect for Azure</i> • Technologies used: Python, PyTorch, NumPy, SciPy, ONNX	<b>Jul 2019 – Oct 2019</b> <b>Jul 2018 – Sep 2018</b>
SELECTED PROJECTS	<i>Code for most projects found at: <a href="https://github.com/MWPainter">github.com/MWPainter</a></i> <b>THTS++</b> • Open source parallelised implementation of <i>Trial Based Heuristic Tree Search</i> in C++ <b>MCTS with Boltzmann Exploration (NeurIPS2023)</b> • Developed two <i>Monte Carlo Tree Search</i> (MCTS) algorithms using <i>Boltzmann search policies</i> • Proved <i>exponential convergence bounds</i> for the performance of both algorithms using <i>simple regret</i> • Used the <i>Alias Method</i> for faster sampling and improving the <i>asymptotic complexity</i> of the algorithms • Technologies used: C++, KataGo <b>Convex Hull Monte-Carlo Tree Search (ICAPS2020)</b> • Adapted <i>Monte Carlo Tree Search</i> for multi-objective planning using <i>convex hull backups</i> • Novel analysis of <i>sample based multi-objective planning</i> algorithms using <i>contextual regret</i> • <i>Improved scalability</i> over prior works, demonstrated with <i>Generalised Deep Sea Treasure</i> environments • Technologies used: Python, NumPy, SciPy <b>Sequential Variational Autoencoders — SAIL/Ermon Group</b> • Work on applying <i>Variational Autoencoders</i> (VAEs) sequentially to generate “sharper” images • Developed novel objective functions and used multiple VAE architectures to improve image quality • Technologies used: Python, TensorFlow, NumPy <b>CNNs for Visual Recognition — Efficient Architecture Search</b> • Implemented novel <i>network preserving transformations</i> for <i>Convolutional Neural Networks</i> . • Demonstrated training speed up on simple classification tasks, by utilising the transformations. • Used the transformations with <i>neuroevolution</i> and parameter sharing in an <i>efficient architecture search</i> . • Technologies used: Python, PyTorch, NumPy.	<b>Oct 2022 – Ongoing</b> <b>Jan 2022 – May 2023</b> <b>Apr 2019 – Jan 2020</b> <b>Jan 2018 – Jun 2018</b> <b>Apr 2018– Jun 2018</b>
LANGUAGES	Python, C++, C, Cython, Java, Javascript, Matlab, PHP, MySQL, HTML.	
PACKAGES	PyTorch, TensorFlow, NumPy, SciPy, GTest, Git, SKLearn, ONNX, Microsoft Azure, AWS.	
ACTIVITIES AND INTERESTS	Trying not to burn my food; Keen hiker; Ex-competitive track and field athlete; Picking up skills, such as juggling, slacklining and cocktail making; Getting lost in a novel; Struggling to find shoes that fit	

LIST OF PUBLICATIONS	2023	Painter, M.; Baioumy, M; Hawes, N; and Lacerda, B. Monte Carlo Tree Search With Boltzmann Exploration. <i>Advances in Neural Information Processing Systems (NeurIPS)</i>
	2020	Painter, M.; Lacerda, B.; and Hawes, N. 2020. Convex Hull Monte Carlo Tree Search. <i>Int.Conf on Automated Planning and Scheduling (ICAPS)</i>
	In Progress	Multi-Objective Maximum Entropy Tree Search (Sep 2022 - Ongoing)  Using Tree Search To Integrate Skills From Multiple Agents (Jun 2022 - Ongoing)