Matthew Macfarlane

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EDUCATION

PhD candidate Artificial Intelligence   2021 - Present
University of Amsterdam, Netherlands
- Deep Reinforcement Learning with Search for optimization and control problems.
- Supervised by Herke van Hoof, within the AMlab group.

MSc in Artificial Intelligence (Distinction)   2019 - 2020
University of St Andrews, UK
- Graduated with distinction, scoring the highest average grade in the cohort.
- Thesis: Application of Reinforcement Learning for Combinatorial Optimisation

BSc in Mathematics with Economics (First Class)   2014 - 2017
The London School of Economics, UK
- First class honors with highest marks in the cohort for Algebra and its Applications.
- Modules: Real Analysis, Complex Analysis, Optimization Theory, Probability, and Distribution Theory.

EXPERIENCE

Visiting Researcher University of Alberta   2024 - 2025
Alberta, Canada
- Working with Levi Lelis on learning programmatic representations of policies for Reinforcement Learning

Deep Reinforcement Learning Intern   2023 - 2024
InstaDeep, Amsterdam, Netherlands
- Developed algorithms combining probabilistic inference with amortization for control problems.
- Implemented scalable reinforcement learning environments using Python and JAX.

Artificial Intelligence Intern   2020
Techspert.io, Cambridge, UK
- Applied reinforcement learning to large-scale web scraping.

Multi-Asset Quantitative Analyst   2017 - 2019
Aberdeen Standard Investments, UK
- Conducted quantitative analysis using time-series econometrics and machine-learning methods for multi-asset investment funds

Part-time Live Sports Trader   2016 - 2017
Kambi, UK
- Managed live in-play sports betting odds for up to 10 football matches simultaneously.

Project Assistant   2012 - 2014
Epidemiology Group, University of Aberdeen, UK
- Assisted with data collection for studies on Ankylosing Spondylitis and performed statistical analysis using SPSS.

PUBLISHED RESEARCH

SPO: Sequential Monte Carlo Policy Optimisation 2024
- NeurIPS 2024.
- *Available on arXiv: 2402.07963*

SMX: Sequential Monte Carlo Planning for Expert Iteration 2024
- ICML 2024 Foundations of Reinforcement Learning and Control Workshop.
- *OpenReview Link: a5hWhriatS*

Jumanji: A Diverse Suite of Scalable Reinforcement Learning Environments 2024
- Co‑author. Accepted as a full paper at ICLR 2024.
- *Available on arXiv: 2306.09884*

Graph Neural Networks with Policy Gradients for Tree Search 2022
- NeurIPS 2022 Deep Reinforcement Learning Workshop.
- *OpenReview Link: 0Hm6VYaAiRP*

OPEN SOURCE CONTRIBUTIONS

Flashbax
- Co‑author of open source repositary for high speed implementation of replay buffers in jax for Reinforcement Leanring.

Jumanji RL Environments
- Contributed to the Jumanji library, a diverse suite of scalable reinforcement learn‑ing environments written in JAX, including implementing Sokoban environments.

Stoix RL Library
- Contributed to the development of Stoix, an open‑source reinforcement learning research library.

SKILLS

Programming
- **Python (Advanced):** Expertise in designing and implementing machine learning algorithms, using a range of libraries such as Jax and Pytorch.
- **JAX:** Extensive experience in building high‑performance reinforcement learning environments and algorithms leveraging JAX for scalable, efficient computation.
- **Cluster Computing:** Proficient in managing GPU and TPU clusters (TPU‑v4, TPU v3‑8) for large‑scale machine learning training tasks. Skilled in utilizing SLURM for workload management.

TEACHING

Reinforcement Learning Teaching Assistant 2021 ‑ 2023
University of Amsterdam, Netherlands
MSc Thesis Supervision 2021 ‑ 2023
University of Amsterdam, Netherlands
- Supervised 5 MSc thesis projects
- Topics including Financial Time Series Prediction, Reinforcement Learning for Schedul‑ing and Fine‑tuning Language Models with Reinforcement Learning

CERTIFICATIONS & AWARDS

- UK Mathematics Trust Challenge, Gold Medal (2009‑2014)
- CFA level 2