Jake Tuero

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Summary

Ph.D. Candidate in Computer Science at the University of Alberta specializing in machine learning for sequential decision making, search, planning, and reinforcement learning. Published at ICML and AAAI, with experience developing learning-guided algorithms and high-performance research systems in C++, Python, and PyTorch. Seeking industry roles at the intersection of machine learning research and engineering.

Technical Skills

- **Programming Languages:** C++, Python, C, Java
- **Frameworks:** PyTorch, Libtorch, CUDA
- **Core Areas:** Machine Learning, Reinforcement Learning, Search & Planning, Sequential Decision Making

Education

University of Alberta – Ph.D. Candidate in Computer Science — Expected 2026
Thesis: Learning-Based Search Control for Policy Tree Search

Wilfrid Laurier University – B.S. in Computer Science & Mathematics — 2017

Research Experience

University of Alberta: Ph.D. Research – Edmonton, AB — 2018 – Present

- Developed learning-guided methods for search and planning in sparse-feedback decision-making problems
- Designed subgoal-based policy tree search methods that improved sample efficiency on complex domains where prior approaches struggled due to computational cost [1]
- Developed rerooting-based methods that allocate search effort using lightweight structural signals, improving the speed and scalability of policy tree search without explicit subgoal generation [2]
- Developed Bayesian models for algorithm runtime distribution prediction, improving performance in low-data settings and under censored observations [4]

Projects & Open Source Contributions

- **libpolicyts** (C++): Built a modern C++23 library for policy tree search algorithms and supporting research utilities, designed for reusable experimentation and high-performance search workloads.
- **tinytensor** (C++): Developed a tensor and automatic differentiation library with CUDA acceleration, including efficient implementations of core neural network layers and optimizers to better understand ML systems performance bottlenecks.
- **muzero-cpp** (C++): Implemented MuZero using Libtorch, with multi-threaded asynchronous actor inference, complex action representations, and efficient batched GPU inference.
- **Stones n Gems** (C++): Contributed the Stones n Gems environment to DeepMind's OpenSpiel framework, providing a complex domain for reinforcement learning and search research.

Professional Experience

AI4Good Lab: Teaching Assistant, Mentor – Edmonton, AB — 2021-2025

- Prepared and delivered machine learning instructional material and mentored project teams in a national ML training program for women and gender diverse people across Canada

University of Alberta: Principal Instructor – Edmonton, AB — 2022/2024

- Designed and delivered an upper-year course covering C++, game AI, and RTS engine internals

CGI: Java Developer – Markham, ON — 2018

- Developed backend features for a Java Spring Boot dashboard used by financial institutions
- Increased automated test coverage from 20% to 80%
- Contributed early exploratory work on using machine learning to improve product experience

Selected Publication

[1] **J. Tuero**, M. Buro, and L. Lelis, "Subgoal-guided policy heuristic search with learned subgoals", ICML 2025.

[2] **J. Tuero**, M. Buro, L. Orseau, and L. Lelis, "Structure-induced information for rerooting levin tree search", ICML 2026.

[3] J. He, R. N. Makarov, **J. Tuero**, and Z. Wang, "Performance evaluation metric for statistical learning trading strategies", *Data Science in Finance and Economics*, vol. 4, no. 4, pp. 570–600, 2024.

[4] **J. Tuero** and M. Buro, "Bayes distnet - a robust neural network for algorithm runtime distribution predictions", *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 35, no. 14, pp. 12 418–12 426, May 2021.