

Title: A Decision Tree Approach to Bot Design: Performance Analysis and Heuristic Evaluation

Abstract: This paper presents a MCMC based bot design for a competitive gaming environment similar to TRON, achieving over an 80% win rate against basic bots and competitive outcomes against more advanced opponents. Initially conceived as a reinforcement learning agent, the project transitioned to a decision tree algorithm with alpha-beta pruning for practicality and efficiency. The bot employs a heuristic evaluation framework focusing on area acquisition and strategic positioning, with experimental variations revealing trade-offs between expansion and risk mitigation. Despite successes, shortcomings include vulnerability in close-range engagements and susceptibility to stalemate situations, suggesting avenues for heuristic refinement and proactive gameplay adjustments in future iterations.