Intelligent Racecars:

Comparing the effectiveness of Q Learning and Value Iteration in a race track setting

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**Abstract**

This paper analyzes the use of two algorithms, Q Learning and Value Iteration, in a race track setting. A race car is initialized with one of these two algorithms and told to reach the finish line. Each movement has, in addition to a negative cost, only a chance of being executed successfully. The racer is tested across a multitude of tracks with different shapes, different learning constants, and various punishments for not staying on track. The time in which the racer took to finish is recorded, as well as number of movements, consistency of path, and how close to optimality the path chosen was.

**1 Introduction**

Reinforcement learning is a vital tool used in Artificial Intelligence. Reinforcement learning focuses on taking an agent

These two algorithms employ different strategies to reach a nearly-optimal path. The model-based Value Iteration algorithm focuses on a greedy approach to rank the value of certain states over others, while needing a model of the environment to perform in. The model-free Q Learning algorithm doesn’t have knowledge of the environment’s model, so it must find a near-optimal path through the use of exploration and trial-and-error methods.