

Development Log – Racecar Project

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File: MyAgent.py

Course: Intro to Artificial Intelligence

Goal: Design an agent that drives around racetracks efficiently and safely.

Step 1: Understanding the Environment

Initial exploration focused on:

- Observation dictionary: ``'lidar'`` and ``'velocity'``
- Action space: 9 combinations of direction and acceleration control.
- Reward feedback: Encourages progress along track and penalizes collisions.

Step 2: First Attempt – Static Logic

Used basic logic to:

- Accelerate when velocity is low.
- Coast when velocity is mid-range.
- Brake when velocity is high.

Issue: Car stayed around 0.3 velocity. Very slow lap times and low reward.

Step 3: Improved Thresholds + LIDAR Steering

Modified ``MyAgent.py``:

- Lowered the "accelerate" threshold to < 0.8 .
- Added obstacle avoidance using front and side LIDAR.
- Action logic:
 - Steer away from closer obstacle (left vs. right).
 - Brake if obstacle is close in front.
 - Accelerate otherwise.

Step 4: Results

- Before:
 - Avg speed: 0.29
 - Max speed: 0.30
 - Total reward: ~134
- After Fix:
 - Avg speed: ~0.71
 - Max speed: ~0.81
 - Total reward: ~184
 - Behavior: Smooth, faster, and still safe

Future Work

- Add centerline steering using difference between ``lidar[0]`` and ``lidar[4]``
- Explore Q-learning or SARSA-based learning agent
- Tune parameters further for different tracks