Report On RaceCar Rule based Agent

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Phase 1: Understanding the problem

First, I tried just the basic code by just returning a random choice to see how it affects as a result and tried to understand the observations that are lidar sensors and the velocity.

Phase 2: Design and Coding Process

After understanding the problem, I divided my logic into 2 parts. One for Steering the direction and the other for controlling the acceleration. I wrote my code based on the lidar-10 sensors to steer and velocity and center distance(lidar[2]) to control velocity. My initial values were if the left distance is less go right and vice versa with a bit of margin because it can't possibly go perfectly in the middle always and also the margin helps in reducing the number of actions taken. So I could achieve it quickly.

Phase 3: Challenges and Modifying

With my initial code set, I ran a few runs and concluded that lidar-10 is too sensitive for my logic where the car stays at the center for the most of the time. So, I chose lidar-45 sensors which are better to keep the car in the middle without pulling it to the edges, since the basic condition is not to crash. With this I achieved my first goal which is making the car stay in the middle. Now I changed the velocities after each run using trial and error method and then understanding the observations. I added a heuristic which makes it sense when it's about to crash and apply brakes to avoid crashing.
I maintained the skeleton of the code the same as design but I changed its values based on the observations. First it worked on some tracks but failed on difficult ones like small circle and spiral tracks. But after many modifications of values and conditions it passed all the tracks with good scores.

My previous run scores were between 105 and 125 with lower scores for difficult tracks. After making changes to the heuristic by using velocity as a factor and increasing the maximum acceleration condition to <0.35 and also decreasing the center distance condition to >0.45 to accelerate gave me better results in between 110 and 140 while lower scores being for difficult tracks.