Assignment 1 Discussion

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With the given input file, over 15 test runs, the second version of the vacuum had an average score of 108.2, which the first version had an average of 84.7. At first, I had done the only ten trials, but it seemed the first robot was getting very lucky in its runs, so I decided to do some more trials to get a better average. Only the average was held to the 15 trials. The rest of the observations were held over many more. The second version seemed to clean up both piles of dirt much more frequently before jumping into the goal. If the metric is the number of steps to completion, then I’d say the first vacuum was better, assuming “completion” only means getting to the goal.

First designing the robot, I figured the second version would perform much better than version one because the first one is mostly relying on luck unless something is right next to it, or it bumps into something. The second one can “think” about things, like if it just turned left, the next move should probably not be to turn right. Given the performance data, my hypothesis is backed up, but not as drastically as I expected. The second version is still relying on quite a bit of luck, and with only having 3 steps to look at, you can’t make all that many new rules for it to follow.

I think the second version outperformed the first because it was not just relying on luck. It would not crash into walls as much or spend as much time sitting in corners because it had some info about the world. The biggest thing I implemented with the second version was that if it just turned left, do not turn right immediately after that, and if it just turned right, do not turn left immediately after that. The first version of the robot spent a lot of time just sitting somewhere spinning back and forth wasting a lot of power, and drastically reducing its score. In the 5x5 board we were given, the first vacuum would tend to go straight up the left wall, suck up the dirt at 0,4, spin in the corner for a second, then go straight up in x values to the goal, not allowing it to reach a score over 100 very frequently. The second version even if it ended up taking more steps to reach the goal, it more frequently vacuumed up both piles of dirt, so it bought itself more time. I also did not have the second vacuum run out of power in any of the trials. I think the closest was reaching the goal with 12 power left. The first vacuum ran out a few times, one of which was during the 15 trials, but I didn’t use that run because it would have destroyed the data with a -1000 score.

I would consider the first vacuum to have pretty much zero intelligence. It does not think at all. It simply responds to its immediate environment through its percepts, without using any prior data. At least the second version can seem like it is thinking the smallest bit because it has a memory, so I would say the second version has at least a little intelligence.

The most generalized thing that I’ve learned about these reflex agents is that they perform very poorly, to the point where if I saw a vacuum behaving like this, I would not be able to prevent myself from laughing at it.

Based on my experience with these agents, there is an advantage to them, and that advantage is that if you choose, they will have no unpredicted behavior. You can hard code every condition they will ever meet, and never have to worry about them behaving in unexpected ways. It’s not very practical, but it is possible. The biggest disadvantage is that they are very slow both in their performance and in coding every condition that you want them to know what to do for. They often act randomly because hard coding every condition is not practical, even in a 5x5 room.

The data from the 15 trials:

5x5

vac 2 vac1

1 127 137

2 141 58

3 151 86

4 173 16

5 149 32

6 72 40

7 151 85

8 135 86

9 121 64

10 -37 84

11 82 111

12 90 143

13 56 107

14 81 74

15 131 147

108.2 84.7