CS338 - Homework 1

Prof. Andrew Shallue – Fall 2024

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1 Instructions

Starter code can be found on Canvas. For submission, I want you to do your coding individually, then submit through the HW 1 canvas portal. Submit one file with a .py extension. For written questions, add them in comments to your file.

In addition to correctness, I will grade based on style and documentation.

2 Problems

1. [2 points] Give a PEAS description for the vacuum-cleaning robot we worked with in the class activity. There is no single right answer here - I am looking for a reasonable amount of detail, but not an extraordinary amount.

2. [2 points] If the vacumm-cleaning robot is in a deterministic environment, it can clean up all the dirt by passing over each square once. Suppose the environment is instead stochastic, where at each time step each square has a 10% chance of becoming dirty. Now what behavior for the robot would you call rational?

   Again, no single correct answer. I'm looking for a couple of sentences that describe a rough algorithm

3. The remaining questions will be programming in python. You are given a Environment class that contains a list of boxes. When the Environment is created, each box may contain `"cake"` or `"nothing"`.

   (a) [4 points] Write an Agent method `get_percept(self, env)`. This function looks inside the box at the agent's current position. Increment the `boxes_opened` counter, and return the percept the agent sees.

   (b) [2 points] Write an Agent method `move_agent(self, new_pos)`. This function has no return, simply changes the agent's position to the new position.

   (c) [4 points] Write an Agent method `grab_cake(self, env)`. If the box at the agent's current position contains cake (make sure to use the function that returns the percept), then modify the environment so the box contains nothing. In addition, increment the agent's `cake_eaten` counter.

(d) [6 points] Write a function `strategy(env)` that is not part of the Agent class. This function will create an instance of the Agent class. Then, traverse the environment using a strategy of your own choosing. At the end of the traversal, return the ratio `cake_eaten` over `boxes_opened`. Your goal is to craft a strategy where this ratio is as large as possible, but I will give full credit for any reasonable strategy.