Louis Fiacco

homework1

1. I cannot say with certainty that the latter statement is true or false because I believe it actually both. Obviously, computers can only do what they are programmed to do, but what if they are programmed to learn more than the programmer (like to be able to beat master chess players with machine learning)? With that being said, the second part of the question is both yes and no. Computers can be programmed to behave intelligently and that is why we use the Turing test to legitimize that.
2. (a) Robots playing soccer.

   Performance measure: Play a game of soccer, know the rules of the game, fundamentals (passing the ball, shooting, throw-ins, etc.)

   Environment: Soccer ball, the field, nets

   Actuators: running, passing, shooting, communication

   Sensors: video, audio, position sensors, velocity sensors.

   (b) Streaming video (e.g., Netflix) online recommendation system.

   Performance measure: user satisfaction with suggested material, user watches suggested material

   Environment: The UI

   Actuators: Finding the interests of the user by collecting info on shows/movies they have previously watched.

   Sensors: genre of material (horror, action, comedy, etc.), IMDB ratings, film rating (PG-13, R, etc.)

   (c) Playing chess interactively (software only).

   Performance measure: Winning a game of chess against the user

   Environment: Chess board, chess pieces

   Actuators: Moving chess pieces to get closer to winning the game

   Sensors: View possible outputs of opponent and itself for different moves

3.

a. An agent that senses only partial information about the state cannot be perfectly rational.

False. In the vacuum cleaning example, the vacuum cleaner is rational even though it doesn't observe the square next to it before acting.

B. There exist task environments in which no pure reflex agent can behave rationally.

True. Pure reflex agents ignore previous percepts. So for example, a streaming video recommendation algorithm would require previous percepts (memory) to suggest future content.

C. There exists a task environment in which every agent is rational.

True. For example, is an environment where there is only one state and only one action is possible, the agents would be rational.

d. The input to an agent program is the same as the input to the agent function.

False. The agent function maps from percep histories to actions, where an agent program runs on the physical architecture to produce an output.

E. Every agent function is implementable by some program/machine combination.

False. There are programs that run in infinite time which means there will be infinite space needed.

F. Suppose an agent selects its action uniformly at random from the set of possible actions. There exists a deterministic task environment in which this agent is rational.

True. If the agents are in an environment where they all receive the same reward, it has no effect on the rationality when selecting the agent at random.

G. It is possible for a given agent to be perfectly rational in two distinct task environments.

True. In a game of craps, lets say for two rolls of the dice, the agent can bet that a seven will come up because it has the best odds.

H. Every agent is rational in an unobservable environment.

False. If the vacuum cleaner cannot see if the surrounding rooms are dirty and does not store visited rooms, it will keep cleaning rooms that are already clean.

I. A perfectly rational poker-playing agent never loses.

False. The agent can only see the communal cards and its personal cards. This leaves the opponents cards as unobservable and therefore can lose.

4.

A. Using only four colors, you have to color a planar map in such a way that no two adjacent regions have the same color.

Initial state: No regions are colored

Actions: designate a color for each of the regions

Transition model: color in the regions

Goal test: all regions are colored and no two adjacent regions have the same color

Path cost: number of regions

B. A 3-foot-tall monkey is in a room where some bananas are suspended from the 8-foot ceiling. He would like to get the bananas. The room contains two stackable, movable, climbable 3-foot-high crates.

Initial state: monkey does not have bananas

Actions: move first crate to desired location. Stack the second crate on top of the first crate. s

Transition model: Climb crates. Retrieve bananas. Climb down the crates

Goal test: monkey has the bananas

Path cost: number of actions

D. You have three jugs, measuring 12 gallons, 8 gallons, and 3 gallons, and a water faucet. You can fill the jugs up or empty them out from one to another or onto the ground. You need to measure out exactly one gallon.

Initial state: three empty jugs measuring 12, 8, and 3 gallons, and a water faucet

Actions: fill up and empty the jugs into one another in different ways to achieve 1 gallon of water

Transition model: fill up the 12 gallon jug and empty it into the 8 and 3 gallon jugs. The leftover water in the 12 gallon jug will yield 1 gallon of water

Goal test: one of the jugs contains only one gallon of water

Path cost: number of actions to get one gallon of water

5. a. For my solution, I implemented a breadth first search strategy where I stored my frontier in a deque and my explored words in a list. I useds a while loop to iterate through the frontier and for loops to iterate through the letters of the words.

b. Result of rain to snow

Reading dictionary: words

-- Shortest path from rain to snow --

snow

show

shop

ship

shin

chin

cain

rain

c. Result of large to small

Reading dictionary: words

-- Shortest path from large to small --

small

shall

shale

shane

shine

thine

taine

maine

marne

marge

large

d. Result of any other pairs of words

Reading dictionary: words

-- Shortest path from plane to chair --

chair

clair

flair

flail

frail

trail

trawl

crawl

craws

claws

clans

plans

plane

Discussion Log:

I did not consult with anyone on this homework assignment besides Professor Fitzsimmons when I asked him to clarify the Node class on 09/08/2020.