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CS165A

Homework 1

1. A. The vacuum cleaner needs to meet 4 requirements to prove that it is rational. The first is the performance measure, which is determined by the number of clean squares. The second criteria is the agent’s prior knowledge of the environment, which is true because diagram 2.2 shows the squares where the vacuum can go. The third criteria is that the agent has actions that it can perform. In our case, the vacuum can move left, move right, and suck. The last criteria is correct sequential perception, which is fulfilled because the vacuum perceives its location and only sucks if the floor is dirty.

B. If each movement generates a cost, the vacuum must maintain an internal state to remember if it has cleaned the other squares, and if it has been long enough for the other squares to be dirty again. A possible state could be that the vacuum has visited one or more squares and checked that they are clean in the current time period.

C. To modify the vacuum for this new environment, I would have it check both squares after each time step.

1. A. Weak AI is when machines act as if they were intelligent, but strong AI is when machines actually are intelligent. An example of weak AI is an AI learning to play board games, by being fed information about all possible moves. An example of a strong AI is an Ai that is indistinguishable from a human, in terms of perception, decision making, self-awareness, and other human characteristics, not just in the narrow scope of one application (i.e. playing a board game).

B.

Soccer Agent:

Performance measure of the soccer-playing robot would be the number of goals scored by the robot.

Environment would be the soccer field, and the robot’s ability to stay in bounds.

Actuators would be the robot’s ability to move around, kick the ball and make tackles.

Sensors would be the robot’s ability to recognize other players, the ball, current and current field position. This could possibly be done with a camera and image recognition.

Internet laptop-shopping agent:

Performance measure of this agent would be if the agent finds the laptop matching the criteria if there is one present.

Environment of this agent would be different online marketplaces such as amazon, best buy website, newegg, etc.

Actuators of this agent would be buying the laptop online by sending payment and delivery information to the retailers.

Sensors of the agent would be to take the user’s input on price range, performance, battery life, screen size, etc.

C. I believe the biggest threat of AI is the end of the human race and the technological singularity. As soon as an AI can create its own AI that is better than itself, the new, superior AI will take its place, over and over at an exponential rate. This risk can only be mitigated by creating weak AI that cannot reproduce better versions of themselves. Another way to mitigate this risk would be to limit the resources of the AI or isolate the AI so that it cannot learn about the methods to create an AI.

1. A. The probability that the second tallest boy will be in the same group as the tallest boy is n-1/2n-1. The numerator is n-1 because the tallest boy has already been placed in a group leaving n-1 remaining spots to be placed in that same group. The denominator is 2n-1 because there are 2n-1 remaining total boys because one of them (the tallest) has already been placed.

B. The probability that the second tallest boy is in the other group than the tallest boy is 1-the probability that they are in the same group. Therefore, the probability the two tallest boys are in different groups is 1 – (n-1/2n-1).

1. P(correct answer | knows solution) = .99

P(correct answer | doesn’t know the solution) = 1/k

Bayes formula

P(knows solution | correct answer) = P(knows solution ^ correct answer)/P(correct answer)

=P(knows solution ^ correct answer)/P(knows solution ^ correct answer) + P(doesn’t know solution ^ correct answer)

=P(knows solution)P(correct answer | knows solution)/P(knows solution)P(correct answer | knows solution) + P(doesn’t know solution)P(correct answer | doesn’t know solution)

P(knows solution | correct answer) = P \* (.99) / ( p \* (.99) + (1-p) \* (1/k) )

Lim(k->infinity) = p \* (.99) / (p \* (.99) + 0) = 1 (1/k goes to 0 as k goes to infinity)

1. A.

Age

Recovers

Gets Drug

Gender

B. P(Age) \* P(Gender) \* P(Gets Drugs | Age, Gender) \* P(Recovers | Gets Drug)

C. P(Recovers) = ∑i ∑j P(Ai, Gj, D, R)/ ∑i ∑j ∑k P(Ai, Gj, D, Rk)

Letters of Rec

GPA

P(GRE)

High: 0.41

Med: 0.26

Low: 0.20

P(GPA)

High: 0.5

Med:0.34

Low: 0.14

P(LoR)

Strong: .40

Weak: .21

GRE

|  |  |  |  |
| --- | --- | --- | --- |
| GPA | GRE | LoR | P(Accepted|  GPA,GRE,LoR) |
| High | High | Strong | .25 |
| High | High | Weak | .12 |
| High | Med | Strong | .08 |
| High | Med | Weak | .05 |
| High | Low | Strong | .04 |
| High | Low | Weak | .04 |
| Med | High | Strong | .04 |
| Med | High | Weak | .03 |
| Med | Med | Strong | .03 |
| Med | Med | Weak | .02 |
| Med | Low | Strong | .02 |
| Med | Low | Weak | .01 |
| Low | High | Strong | .04 |
| Low | High | Weak | .03 |
| Low | Med | Strong | .01 |
| Low | Med | Weak | .01 |
| Low | Low | Strong | .01 |
| Low | Low | Weak | .01 |

|  |  |
| --- | --- |
| Accepted | P(Friends think you’re smart) |
| T | .80 |
| F | .15 |

|  |  |
| --- | --- |
| Friends think you’re smart) | P(You’re happy) |
| T | .71 |
| F | .09 |

Friends think you’re smart

You’re happy

Accepted to Grad

1. P(Smart | GPA-high, GRE-high) = P(Smart, GPA-high, GRE-high)/P(GPA-high, GRE-high)

=∑i∑j∑k P(Smart, GPA-high, GRE-high, LoRi, Happyj, Acceptedk)/ ∑i∑j∑k∑l P(Smarti, GPA-high, GRE-high, Acceptedj, LoRk, Happyl)

1. P(Smart | LoR-strong) = P(Smart, LoR-strong)/P(LoR-strong)

=∑i∑j∑k∑k P(Smart, GPAi, GREj, LoR-strong, Happyk, Acceptedl)/ ∑i∑j∑k∑l∑m P(Smarti, GPAj, GREk, Acceptedl, LoR-strong, Happym)

1. P(Happy) = ∑i∑j∑k∑l∑m P(Happy, Smarti, Acceptedj, GPAk, GREl, LoRm)/ ∑i∑j∑k∑l∑m∑n P(Happyi, Smartj, Acceptedk, GPAl, GREm, LoRn)
2. P(Happy | Accepted)= P(Happy, Accepted)/P(Accepted)

= ∑i∑j∑k∑l P(Happy, Smarti, Accepted, GPAj, GREk, LoRl)/ ∑i∑j∑k∑l∑m P(Happyi, Smartj, Accepted, GPAk, GREl, LoRm)