

CSCI 4350/5350

Homework 1

Due: Tue. Sep. 11, 11:00 PM

1. (1 point) What are the "four corners" of Artificial Intelligence?

1.) Acting Rationally 3.) Acting Humanly
2.) Thinking Rationally 4.) Thinking Humanly

2. (1 point) *Where* was the first conference in Artificial Intelligence held in 1956?

-- Dartmouth College

3. (1 points) What is an *agent function* and how is it different from an *agent program*?

-- An agent function is a function that describes how a history of perceptions by an agent maps to corresponding actions, and it differs from the agent program in the sense that the agent program is an instantiation of the agent function encoded in an agent's behavior.

4. (2 points) Is there a problem/task such that the environment is *fully observable* to the agent, but the agent cannot behave *optimally*? If yes, why? If no, why?

-- I would contend that there exists problems where it is impossible for an agent to behave optimally, but it would seem to be in a sense where behaving optimally is ill-defined, which may render my argument moot. If we consider a type of problem which is impossible to optimize due to having a divergent optimum (such as a hypothetical problem where an agent is paid every day until it tells the payer to stop, and the agent is tasked to maximize income), then such a problem does not allow optimality since the agent could obtain a new maximum from waiting longer than any stopping point, however the statement of the problem seems to assume that a maximum exists, which may entail that the problem is ill-formed.

5. (2 points) In complexity theory, NP-Complete problems are a subset of problems in NP to which any problem in NP can be reduced in polynomial time.

6. (4 points) Draw the complete state space for the vacuum cleaner problem with three locations (A,B,C). Be sure to clearly label each state and the transition arcs between states.

States:

D -- Dirty

C -- Clean

V -- Vacuum present

Actions:

S -- Suck

R -- (Go) Right

L -- (Go) Left

