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Thinking About AI

1. If we are building a rational agent that's performance measure and goal is to get a high score on an IQ test then Emily has technically created a rational agent that achieves its performance measure and acts rationally. The statement that her program is more intelligent than a human depends on how you define intelligence. If we are defining intelligence by the IQ test then yes Emily's system is more intelligent than a human.

2. This statement depends on how you believe the brain works and thinks. If you believe that there is a soul or other non-human entity within your body that allow humans to think then this statement is true, however, I disagree with this statement. I believe that the brain, as complex as it is, is a simple structure that can efficiently and quickly process and store information. Although we have been able to develop algorithms and software to mimic what we believe thinking is, we have not been able to create an intelligent system due to hardware limitations and the fact that we still do not understand how the human brain thinks. We have been able to view how the brain works using brain images and we can test humans to see how they make decisions in a given environment but these are all inferences about how the brain thinks, not how the brain actually does its thinking. I believe that programmers will eventually be able to create a truly intelligent system once we break the barrier and figure out how the brain actually thinks.

3. Whenever people think about AI they immediately think of **Terminator** or **I Robot.** Robots that become so powerful or so logical that they begin to kill humans. I personally believe that this will not happen because of the fear of this happening, however, it is still a possibility. The bigger problems that I see AI causing are in how it can affect people's lives in the job markets. By creating more and more robots to do simpler and easier tasks we are actively getting rid of jobs for humans with uneducated jobs. We are pushing people into a world in which they are required to have a college education in order to do anything in life. However, even though we are removing jobs we are creating more than we are removing. I think that the threats of AI are less threatening the threats of bio-, nano-, nuclear technologies. If a robot becomes unresponsive and starts killing humans we are going to be able to stop that very quickly and like i said before because of the fear of this i don't think that we will ever get to that point. Nuclear technology however has the ability to wipe entire regions off the face of the earth. The piece of this that worries me and becomes a bigger threat is 'What happens when we use AI to decide when to launch a nuke?'. If we ever use AI to do such acts then the threats overcome the benefits.

Rational Agents

1. When looking at a rational agent we can measure how effective it is by looking at the performance measure. In this example we are measured by getting a point for each clean room. Because we are not penalized, or lose points, for any actions and rooms never get dirty again after cleaning them we are guaranteed to act 100 percent rational. To demonstrate this we can look at the possible states we will start in. First all square can be clean. If this is the case because moving back and forth does not reduce points and the squares never get dirty again we achieve 2000 points, the maximum score. Second we could start in a clean square and the second square is dirty. If this happens we will only get one point the first tick and then we will move to the next square and clean in it on the second tick there for getting 1999 points which again is the maximum for that situation. Third we could start in a dirty square and the other square is clean. In this situation we will first clean the square giving us a score of 2000 again. The last possible situation is both squares are dirty. If this happens we will first get no points, then clean our current square and get 1 point then move and clean the next square and get 2 points. We end with a score of 1998 again the best we could do in our given situation. Because we were able to achieve the highest possible score each time our agent is therefore rational.

2. If we have the same agent as the previous question but we add in being penalized for moving we now do not have a rational agent because the agent will continue to pace back and forth between rooms and therefore constantly be decreasing its score and not achieve the rational outcome. For example is we take situation 1 from the previous question, where we start with both squares clean, a rational agent would not do anything because both squares are clean and will never be dirty again. Our agent will not do this. Our agent will continuously move between each room checking if they are dirty and therefore losing points.

3. There is alway more than one way to do something. Because the agent program is just the programmers implementation and solution to the problem each programmer can therefore have their own way of implementing the given problem. Take this assignments pacman project as an example. If there were only one possible agent program then each student would have the exact same code, however, that will never be the case.

4. Yes there are agent functions that cannot be implemented by an agent program to be 100 percent accurate and rational. If we were able to modify the problem a bit to say that given a certain amount of parameters or thresholds or bounding cases then maybe we would be able to fit an agent program to a modified agent function. For example, if we took the problem of knowing whether a program would run or stop after a while to solve this with 100 percent accuracy is impossible, but if we were to add a timeout to our agent that says after x amount of time we believe that, with some amount of probability, the program will not halt then we can create an agent program for that.

5. By keeping the agent program fixed and improving the hardware we can effectively increase the speed and ability of the agent. The agent will be able to take in percepts from its environment and process them faster, however, not more efficiently. The agent may be able to store more information and process it faster but this will only affect an agent that has a complex environment. If we take the vacuum cleaner world example for instance by increasing the hardware of that system that comes a point where it is mute because it no longer will affect how well the agent does its job because it is such a simple task. Upgrading hardware on an agent that is using a LIDAR to 3d map its environment could have improve the system astronomically. If the agent started out with a LIDAR that could get a datapoint once every 5 milliseconds and we upgraded that to a LIDAR that could get a datapoint once every 1 millisecond the agent would have a huge improvement that would allow them to get the data they were getting at a faster speed or even get more data than they were getting before.

Task Environments

1. Participating in an eBay auction
    - P: Winning the auctions
    - E:
        - Observability: partially
            - -We are unable to know what the other bidders are going to do and how much they will bid.
        - Agents: Single (Competitive)
            - -We are fighting against all other bidders in order to win the bid therefore we are not working together but as a single agent and competing against others.
        - Certainty: Deterministic
            - -We know that no matter what happens the outcome of our action is going to be to raise the price by the amount that we bid. We will never bid $1 and raise the price by $0.50.
        - Temporal independence: Sequential
            - -We are bidding sequentially because each bid builds off of each other and the price doesn't reset after each bid.
        - Environmental Change: Dynamic
            - -We could make a bid and another bidder could make a bid while we are making ours and therefore could change the price before we are able to finish placing our bid.
        - Representation: Discrete
            - -Ebay has a max bid and money has a max value you can't bid $0.001 therefore we are discrete.
        - A priori environmental model: Known
            - -We know how our actions have affected the price and how everyone elses actions have affected it as well

A: HTTP POST/GET
S: camera?/HTTP POST/GET to API?

2. Throwing a frisbee on the quad with your friends
    P: Successful throws and catches
    E: Observability: partially
        -We cannot see weather such as wind and therefore can't be 100% sure how to throw the frisbee. If there is a gust of wind 50 feet away after the frisbee is in the air we cannot see that.
    Agents: Multi (Cooperative)
        -We need atleast one other agent to catch the frisbee and throw it back.
    Certainty: Stochastic
        -Because we don't know how wind is down the quad we could throw a frisbee the exact same way and receive different results.
    Temporal independence: Eposodic
        -Each frisbee throw and catch is not connected to the last and therefore has no impact on the next throw or catch.
    Environmental Change: Dynamic
        -Weather can change, people can move, frisbee shape can change.
    Representation: Continuous
        -there is an unlimited amount of angles in all directions that the frisbee can be thrown as well as an unlimited amount of places people can stand or run, as well as unlimited speed for wind.
    A priori environmental model: Unknown
        -We don't know how the weather is on all parts of the quad.
    A: Motors, servos, wheels, some form of clamp for hands.
    S: temperature sensor, wind sensors, camera, microphone maybe.