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Part 1. (20 points) Consider the following potential AI problems. For each of them, describe whether the environment is: a) static or dynamic b) fully or partially observable c) episodic or sequential d) deterministic or stochastic. Please explain your reasoning.

I. **A robotic medical assistant that can assist a doctor or nurse. It communicates with patients, administers bloodwork, and takes vitals.**
   A. This has a **dynamic** environment since it is interacting constantly with different users from different environments and being an assistant, it will be in motion which physically changes the environment.
   B. Since there is an inconsistent change in the environment, this would be a **partially observable** environment and it would need to make decisions based on what it observes.
   C. This would be a **sequential** environment since the agent will need to recall what happened in the past and analyze and apply that based on the current input.
   D. This would be a **stochastic** environment since the actions might have different outcomes and the agent needs to keep track of all of those.

II. **An agent that plays poker against a human player. Assume that the cards are digital and that the player interacts with the agent via a touchscreen.**
   A. This would be a **static** world since in this case once the user has made his move, only then would the agent make their move based on the input of the human.

   B. In this case, all the agent needs are the decision of the turn of the human and once that is received, it can decide on what card to place to make it in its favor making a **fully observable** world since our agent can sense what it needs to make a decision.

   C. This is an **episodic** environment since there is a specific perceived set of actions or combinations the human can do in poker and the agent needs to.

   D. This is a **stochastic** environment since an action can have many different outcomes or combinations especially in the game of poker and the player can select anything and the computer needs to know what to counter, it is not a linear based selection.

III. **An agent that can select TV shows and movies for a user. It watches the user's choices, asks the user to rate shows, and gives new shows the user is predicted to like.**

A. This would be a **static** environment since the input data does not change, but rather is just a selection of a list of TV shows or movies that are infrequently updated and can be somewhat static.
B. This is a **fully observable** environment in which the agent has all the necessary information in order to make the decisions and senses what it needs.
C. In this case, the environment is **sequential** since the agent needs to recall where the user is and think ahead to provide the next set of suggestions.
D. I think this would be a **deterministic** environment since only one outcome, suggesting movies are coming into place and that will always be that.

IV. **A digital chatbot for diagnosing mental health issues. It interacts with the user via SMS and makes a prediction about their mental health based on responses.**

A. This would be a **static** environment since the chatbot can hold still while it gets the response and nothing would change in the environment.
B. This is a **fully observable** agent since it has all the senses in order to make the decisions based on the incoming text
C. This is a **sequential** environment since it needs to interpret the text message and provide a response based on what came in.
D. This is a **deterministic** environment since the outcome could either be a mental health issue or not.

V. **A robotic submarine for scientific exploration. It's able to autonomously travel to the ocean floor and collect samples.**

A. This is a **dynamic** environment since the robot is going through the ocean floor which is constantly changing
B. This is a **partially observable** environment in which not all the information through the inputs is available for the agent and the agent needs to make educated guesses.
C. This is a **sequential** environment since the agent needs to think ahead and remember all the places it traveled prior.
D. This is a **deterministic** environment since there is only one outcome and it is for it to take the samples and return them back to the researchers.

Part 2: (20 points) Monkey and Bananas. This is a classic toy problem. For this version, let's assume the following: Some bananas are hanging from the ceiling in the center of the room. There is a chair in one corner, and a stick on the floor. If the monkey stands on the chair under the bananas, he can hit the bananas with the stick and knock them down. Our state will have the following variables:

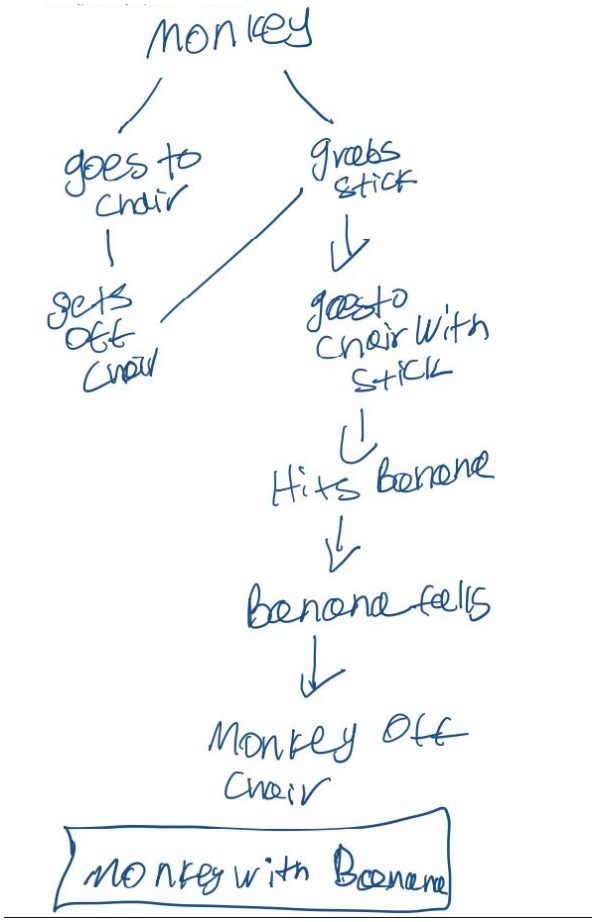
- holdingStick
- chairInMiddle
- onChair

Our initial state is: <!holdingStick, !chairInMiddle, !onChair> Our actions are: grabStick, moveChair, dropStick, getOnChair, getOffChair. moveChair will move the chair from the corner to the middle, or vice versa. Actions that don't make a change have no effect. (for example, grabStick when already holding the stick.)

a) what is the goal state?

The goal state for this problem is for the monkey to be able to get the bananas by standing on the chair and knocking down the bananas.

b) Draw the state space for this problem. You can leave out actions that don't change the state. (For example, grabbing the stick when you already have the stick.)



Part 3: (20 points) Turing Test. Kuki is a chatbot developed using Pandorabots chatbot technology. Kuki has won the Loebner Prize for the last five years. You can interface with Kuki in quite a few ways here. If you talk with Kuki, you'll see the limits of her responses pretty quickly. Try talking with her about different subjects - movies, music, games, life.

What are places where Kuki's responses seem artificial? What sorts of responses or conversations does she have problems with?

- I think Kuki seems very artificial when it comes to responses that have hidden subliminal messages or meaning since she is not able to understand those and interprets certain words rather than the whole message and cannot connect it contextually with things that were said before. I tried to make sure that I would refer to conversations that we were having earlier and the agent was unable to understand my references. Using ambiguous phrases like that also does not help for her since she cannot understand how to go back and forth between the conversation. It is hard to keep a consistent conversation with a lot of effort and often if she would get confused, the topic would suddenly. But I really liked how she was able to get information and try and figure out emotions and relate to you to make sure that you could continue chatting, but the overall experience was interesting but there needs to be more improvement to make it feel much more human-like.

Now try to have a conversation that generates responses that seem as human as possible. What sorts of phrases and discussions does Kuki do well with?

This is so fun! I love testing this…. Any name that did not exist on the database and was unique, was addressed as an unusual name with asking of the meaning response with an interesting name without understanding why it is interesting

- Once I said thank you no follow up about me
- I'm doing great for how are you doing. Asking what is new?
- Nothing much -> response fair enough…. Interesting
- I like how she is insisting I interact even though I do not want to make sure the user will chat.
- Her responses are too fast, no human can think and type that fast…..
- She is good with quantifiable things
- Her conversation changes topics I tried to do some unintentional phrases, and that did not work
- She gets stuck easily and it's like she knows the definition of things.
- She did have some reactions when I said I do not have a mirror but then got confused and now has typos
- I played games with her and was good at tic-tac-toe and knew a lot about movies and music and had her own Spotify playlist
- There was a lot of information she had access to and she would use the web to scrap and get her information.
- She often changes topics and says different things regarding the same topic, like she has a father but then mentions her human programmers and says she has no father as if she is herself confused.
- As long as you are clear with her and specific, it was not bad talking about things but you had to make sure that you were clear about it.