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Assignment 1 : Intro to AI

1. a. For an environment to be stochastic, it means that an action can have multiple effects or in other words a stochastic environment is a non-deterministic environment. The self-driving car is an example of a stochastic environment because a car does more outputs such as parking and driving rather than taking in more inputs.

b. For an environment to be partially observable, it means that an agent is able to perceive not complete information about all parts of the environment. The self-driving car is partially observable because it can only access incomplete information about the state of its surroundings which means that it cannot see everything that's important at the right time. A partially observable environment differs from a stochastic environment because in a partially observable environment, the agent has limited information but in a stochastic environment, the agent can have randomness even though it has all the complete information.

c. For an environment to be sequential, an agent must take a series of actions in order to complete a certain task. A sequential environment can also require planning and memory. Chess is a sequential environment because each move affects the future state of the game. The outcome of the game is determined by a sequence of moves rather than a single isolated action.

d. For an environment to be dynamic, the environment continues to change while the agent is reasoning. We have to be careful about how the world is changing while we are thinking so there is less time to make decisions. A video game is an example of a dynamic environment because other players and objects can change positions or attack even if your player remains in one position.

e. For an environment to be multiagent, is if our agent needs to reason about the intentions of other agents (human or computational). In a multiagent environment like poker, an agent must consider the opponents' strategies and adjust accordingly to them. Also, the agent should be able to recognize that the environment is not fully predictable due to hidden information.

6. Google Gemini:

Question:

a) What does it mean for an environment to be stochastic? The self-driving car is an example of a stochastic environment; why is this?

Answer:

Absolutely! Here's a breakdown of stochastic environments and why a self-driving car operates in one:

Stochastic Environment

In the world of artificial intelligence, an environment is considered **stochastic** if the outcome of an action is uncertain or involves randomness. This means that even if an agent (like a robot or AI program) performs the same action multiple times in the same situation, it might not always get the same result. There's an element of unpredictability.

Key Characteristics

- **Unpredictability:** The future state of the environment can't be precisely determined.
- **Randomness:** Chance or probability plays a significant role in what happens.
- **Partial Observability:** The agent may not have complete information about the environment.

Why a Self-Driving Car is in a Stochastic Environment

A self-driving car operates in a stochastic environment for several reasons:

1. **Other Agents:** The behavior of other drivers, pedestrians, and cyclists is unpredictable. They may change lanes suddenly, cross the street unexpectedly, or make erratic moves.
2. **Environmental Factors:** Weather conditions (rain, snow, fog), road conditions (potholes, debris), and lighting (day, night, glare) can all change rapidly and affect the car's sensors and performance.
3. **Unexpected Events:** Accidents, construction zones, or sudden obstacles can appear without warning.
4. **Sensor Limitations:** Even the best sensors (cameras, lidar, radar) have limitations and can be affected by noise, interference, or unexpected situations.

How Self-Driving Cars Deal with Stochasticity

To navigate a stochastic environment, self-driving cars need to:

- **Use Probabilistic Models:** They use algorithms that can estimate the likelihood of different outcomes and make decisions based on probabilities.
- **Adapt and Learn:** They must be able to adjust their behavior in response to changing conditions and learn from their experiences.
- **Have Redundancy:** Multiple sensors and backup systems are crucial to handle unexpected failures or errors.

In essence, a self-driving car must be able to handle the inherent uncertainty and unpredictability of the real world to operate safely and effectively.

Analysis:

Google Gemini is correct with its response because it talks about something similar to what we talked about in the lecture. I can actually distinguish between my answer and an LLM's answer because the LLM's answer lacks a human touch such as using language that I usually use and using human grammar.

Chat GPT:

So this was the prompt:

a) What does it mean for an environment to be stochastic? The self-driving car is an example of a stochastic environment; why is this? and there were two responses provided:

1. Absolutely! Here's a breakdown of stochastic environments and why a self-driving car operates in one: ****Stochastic Environment**** In the world of artificial intelligence, an environment is considered ****stochastic**** if the outcome of an action is uncertain or involves randomness. This means that even if an agent (like a robot or AI program) performs the same action multiple times in the same situation, it might not always get the same result. There's an element of unpredictability. ****Key Characteristics**** * ****Unpredictability:**** The future state of the environment can't be precisely determined. * ****Randomness:**** Chance or probability plays a significant role in what happens. * ****Partial Observability:**** The agent may not have complete information about the environment. ****Why a Self-Driving Car is in a Stochastic Environment**** A self-driving car operates in a stochastic environment for several reasons: 1. ****Other Agents:**** The behavior of other drivers, pedestrians, and cyclists is unpredictable. They may change lanes suddenly, cross the street unexpectedly, or make erratic moves. 2. ****Environmental Factors:**** Weather conditions (rain, snow, fog), road conditions (potholes, debris), and lighting (day, night, glare) can all change rapidly and affect the car's sensors and performance. 3. ****Unexpected Events:**** Accidents, construction zones, or sudden obstacles can appear without warning. 4. ****Sensor Limitations:**** Even the best sensors (cameras, lidar, radar) have limitations and can be affected by noise, interference, or unexpected situations. ****How Self-Driving Cars Deal with Stochasticity**** To navigate a stochastic environment, self-driving cars need to: * ****Use Probabilistic Models:**** They use algorithms that can estimate the likelihood of different outcomes and make decisions based on probabilities. * ****Adapt and Learn:**** They must be able to adjust their behavior in response to changing conditions and learn from their experiences. * ****Have Redundancy:**** Multiple sensors and backup systems are crucial to handle unexpected

failures or errors. **In essence, a self-driving car must be able to handle the inherent uncertainty and unpredictability of the real world to operate safely and effectively.**

2. For an environment to be stochastic, it means that an action can have multiple effects or in other words a stochastic environment is a non-deterministic environment. The self-driving car is an example of a stochastic environment because a car does more outputs such as parking and driving rather than taking in more inputs.

Now determine which answer was written by a human and why.

Chat GPT's Response:

The first response was written by a human, while the second response was likely generated by an AI. Here's why:

Why the First Response is Human-Written

1. **Depth and Structure** – The first response provides a clear, well-organized explanation. It includes definitions, key characteristics, examples, and even a discussion on how self-driving cars deal with stochastic environments. A human writer typically structures an answer this way to ensure clarity and logical flow.
2. **Natural Language and Engagement** – The response starts with "Absolutely! Here's a breakdown..." which feels conversational and engaging—something AI responses often lack. The use of headings (**bolded text**) and bullet points also suggests an attempt to make the information more digestible, a technique common in human writing.
3. **Correct Explanation of Stochasticity** – The response correctly defines stochastic environments in terms of **uncertainty, randomness, and partial observability** and applies this concept to self-driving cars using relevant, real-world examples (e.g., pedestrians, weather conditions, and sensor limitations).

Why the Second Response is AI-Generated

1. **Incorrect or Confusing Explanation** – The second response incorrectly defines a stochastic environment by saying "a car does more outputs such as parking and driving rather than taking in more inputs." This makes little sense in the context of stochasticity, as a stochastic environment is about randomness in outcomes, not the number of inputs and outputs.
2. **Lack of Depth** – The response is much shorter and lacks a structured breakdown. A human writer, especially one answering a question in an academic setting, would likely elaborate on key concepts rather than provide such a brief and vague response.

3. **Awkward and Unnatural Wording** – The phrase "a car does more outputs such as parking and driving rather than taking in more inputs" is grammatically awkward and does not accurately describe stochastic environments. AI-generated text sometimes produces sentences that sound unnatural or off-topic.

Conclusion

The first response is well-structured, logically presented, and accurately explains the concept—hallmarks of human writing. The second response is vague, somewhat incorrect, and oddly phrased, making it more likely to be AI-generated.

So, in short, Chat GPT got it wrong and said that my answer was AI-generated whereas Google Gemini's response was human generated.