

## Environments

- 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?

An environment is stochastic if the same action can have multiple effects, including not working. It can be necessary to check if the action worked or not. A self-driving car might intend to move forward, but fail due to an obstacle in the road, low fuel, or a flat tire.

- b) What does it mean for an environment to be partially observable? The self-driving car is also partially observable. Why is this, and how does it differ from a stochastic environment?

An environment is partially observable when some relevant information in the environment is hidden to the agent, leaving the agent to have to guess about it. A self-driving car cannot see around the corner or see an accident ten cars ahead. Observability is a matter of what inputs an agent is able to receive. Stochasticity is a matter of an agent's outputs: how they affect the environment and the agent's progress toward its goals.

- c) What does it mean for an environment to be sequential? Chess is an example of a sequential environment. Why is this?

An environment is sequential if an agent's actions are affected by its past and/or future actions, requiring memory and/or planning. Chess is sequential because a current move must be decided based on future moves that the agent and the opponent might make.

- d) What does it mean for an environment to be dynamic? A video game is an example of an environment that is usually dynamic. Why is this?

An environment is dynamic if it continues to change while an agent is reasoning. Many video games are dynamic because they have characters or other players move around and affect the player in real time, for example by attacking, stealing resources, or running faster toward a target.

- e) What does it mean for an environment to be multiagent? Card games such as poker can be treated as multiagent. How does this approach change the way we think about the problem?

An environment is multi-agent if there are multiple intelligent actors. Card games are multiagent because every player is an intentional actor. This changes the problem from a simpler matter of building a good hand and planning moves based on that to considering what the other agents' hands are and what their strategies might be.