IFT 360

Assignment 1

AI Definitions

1. What are the four categories of definitions for AI? List them with a brief explanation of each.
   1. Think like humans - how humans think (neuroscience)
   2. Act like humans - how humans behave (psychology)
   3. Think rationally - how to make rational decisions (logic)
   4. Act rationally - how to act rationally to achieve a certain goal (economics)
2. What is the one definition category that is mostly used in AI, and we will rely on in this course?
   1. Rational Action / Act rationally
3. What is an "Agent" within the context of AI?
   1. an entity that is able to perceive the environment in which it exists, process those perceptions, and act upon the environment using sensors and actuators
4. Define an "Agent Function".
   1. A mathematical function that maps every percept sequence to an action and describes the agent’s behavior.
5. Define "Percept Sequence".
   1. All of the content an agent has acquired from the environment through its sensors - everything they have perceived from their environment
6. In the context of trying to define an Intelligent Agent, how is "intelligence" or "rationality" defined?
   1. Rationality is defined as an agent selecting an action that is expected to maximize its performance measure given the evidence provided by the percept sequence and whatever built-in knowledge it has, for each possible percept sequence.
7. What are the four factors defining a "Task Environment"?
   1. Performance measure
   2. Environment
   3. Actuators
   4. Sensors
8. Define "Deterministic" vs "Stochastic" Task Environments. Give an example for each.
   1. Deterministic
      1. The next state of the environment is determined only by the current state of the environment and actions of the agent performed on the environment.
   2. Stochastic
      1. The next state of the environment is determined by the current state of the environment, the actions of the agent performed on the environment, and other factors
9. Define "Single-" vs "Multiagent" Task Environments. Give an example for each.
   1. A single-agent environment is an agent in which its performance measure is not dependent on the behavior of another agent. An example is an agent solving a crossword puzzle.
   2. A multiagent environment is one in which an agent’s behavior is described as maximizing a performance measure value that depends on the behavior of another agent. An example of a multiagent environment is two agents playing chess.
10. Define "Goal-based" and "Learning" Agents. Which one is simpler?
    1. Goal-based agents require goal information that describes desirable situations in addition to the description of the current state. They select an action that moves them towards their goal.
    2. Learning agents are able to learn how to function given a goal, performance metric, and a feedback mechanism to evaluate and refine performance. A learning agent has a learning element that is responsible for making improvements and changes to the agent to improve the performance.
    3. Goal-based agents are simpler