CS-331 | Intro to Artificial Intelligence

Josh Bell

Written Assignment 1

1. **The Starship robots (such as the one shown below) deliver food on OSU's campus. Parts (a)-(c) ask you to develop a description of a Starship robot's environment and design using your knowledge of AI agents.**
    a. **Develop a description of the task environment using the PEAS description.**

    Performance: Delivers food to the requested location.
    Environment: OSU's Campus and Restaurant.
    Actuators: Cargo holder to secure package safety, wheels to move to final destination.
    Sensors: Visual sensors to see its current surroundings and map senor to see where it needs to end up.

    b. **Then describe the environment according to the following properties.**

    Partially Observable, the agent can have a map of the area but will not be able to know when cars will be there or what each person moving around them will do.
    Stochastic, due to the verity of things that may occur while completing their task.
    Episodic, while the agent moves it will consistently scan the environment for certain obstacles and will make its action then repeat.
    Dynamic, the agent will consistently being evolving and performing better, there is no set database that it gets all its info from.
    Continuous, the agent will be continuously adapting to its surroundings.
    Single Agent, to perform its task it solely needs a single agent.

    c. **Suggest the most appropriate agent design by choosing the most appropriate of the following agent types.**

Utility-Based Agent, there are multiple paths to a certain destination when delivering food so when the slides describe, "What if there are many paths to the goal?" this type of agent felt the most appropriate.

2. **For each statement, say whether it is true or false. Provide a one-sentence example, counterexample, or justification.**

    a. **An agent must have an accurate model (i.e., encoding of how the world works) in order to be rational**

According to the Agent slides on slide 7 it reads: “for each possible percept sequence, a rational agent should select an action that is expected to maximize its performance measure, given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.” Given this definition the agent does not need to have an accurate model to be considered rational. FALSE.

    b. **A rational agent will always win a game of rock-paper-scissors.**

A rational agent will play whatever strategy it can to win the game, in this game there is no strategy and is almost purely random, therefore the agent will not always win. FALSE.

    c. **Suppose that an agent selects randomly between two actions. There is a stochastic environment where the agent is rational.**

Stochastic considers the possibility of random chance. TRUE.

    d. **An agent that is not rational in one task environment may be rational in another.**

An agent will always have an environment where it is considered rational due to the infinite environment possibilities. TRUE.

3. Consider a modified version of the vacuum environment
    - Performance measure: one point awarded for each clean square at each time step.
    - Environment: geography of the environment (its extent, boundaries, obstacles, etc.), and initial location are known. Dirt distribution is unknown. Clean squares may become dirty again with a low probability each time step.
    - Actuators: Suck cleans dirt, Left moves left, Right moves right, Up moves up, Down moves down.
    - Sensors: Location and dirt sensors.

    a. **What is the optimal behavior for an agent in this environment?**

    The agent reads the environment and moves to the nearest square with dirt to clean up then checks its surrounding and repeats.

    b. **Can a simple reflex agent with a randomized agent function be rational for this environment? Why or why not?**

    Due to the agent needing to be cleaning each square with speed and consistency for it to be considered rational, a randomized function would make the agent un-rational.

    c. **Consider the probability that a clean square will become dirty again. Is there a probability for which a simple reflex agent with a deterministic agent function can be rational? Explain why not or provide the probability and agent function.**

    An agent that will makes its actions on reflex and the outcome is determined by the current state of the environment is considered a rational agent, given the environment above.