Chapter 2 Exercises

Jacob Taylor Cassady

CECS 545 : Artificial Intelligence

# Exercise 2.3 - For each of the following assertions, say whether it is true or false and support your answer with examples or counter examples where appropriate.

## An agent that sense only partial information about the state cannot be perfectly rational.

False

## There exist task environments in which no pure reflex agent can behave rationally.

True

## There exist a task environment in which every agent is rational.

True

## The input to an agent program is the same as the input to the agent function.

False

## Every agent function is implementable by some program/machine combination.

True – False. [For example, the environment may contain Turing machines and input tapes and the agents job is to solve the halting problem..]

## Suppose an agent selects its action uniformly at random from the set of possible actions. There exists a deterministic task environment in which this agent is rational.

True

## It is possible for a given agent to be perfectly rational in two distinct task environments.

True

## Every agent is rational in an unobservable environment

False

## A perfectly rational poker-playing agent never loses.

False.

# Exercise 2.5 – Define in your own words the following terms:

## Agent

An Agent is anything that interacts with its environment through some sensory system and performs actions in response to the sensory input.

## Agent Function

An agent function takes in a single precept and produces an action as a response.

Specifies the agent’s action in response to every possible percept sequence.

## Agent Program

An agent program takes in a set of precepts and produces an action response.

The program which, combined with a machine architecture, implements an agent function. In our simple designs, the program takes a new percept on each invocation and returns an action.

## Rationality

To use rationality is to attempt to make the right decision for a given precept.

## Autonomy

Autonomy is the ability to make decisions on one’s own.

## Reflex Agent

A reflex agent reacts to its environment without utilizing memory of previous experiences.

## Model-based Agent

A model agent utilizes an internal model developed from precepts to perform tasks or actions.

## Goal-based Agent

A goal-based agent utilizes some internal goal to help make decisions that maximize the internal goal.

## Utility-based Agent

A utility-based agent attempts to maximize some utility it finds important such as taking more of its opponent’s checkers.

## Learning Agent

A learning agent improves its model of the environment, as it exists to become better at maximizing its goals or utility.

# Exercise 2.6 – This exercise explores the differences between agent functions and agent programs.

## Can there be more than one agent program that implements a given agent function? Give an example, or show why one is not possible.

Yes the agent function’s goal could be to stop before the agent when it perceives an object in the way. More than one agent program could utilize this agent function.

## Are there agent functions that cannot be implemented by any agent program?

Yes.

## Given a fixed machine architecture, does each agent program implement exactly one agent function?

Yes.

## Given an architecture with n bits of storage, how many different possible agent programs are there?

2^n programs.