

Tutorial Sheet 12

Intelligent Agents

1. Define in your own words the following terms (Problem 2.1 from Russell and Norvig's book):

(a) Agent

Answer

An entity that perceives and acts; or, one that can be viewed as perceiving and acting. Essentially any object qualifies; the key point is the way the object implements an agent function. (Note: some authors restrict the term to programs that operate on behalf of a human, or to programs that can cause some or all of their code to run on other machines on a network, as in mobile agents.)

(b) Agent function

Answer

A function that specifies the agent's action in response to every possible percept sequence.

(c) Agent program

Answer

A 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.

(d) Rationality

Answer

A property of agents that choose actions that maximize their expected utility, given the percepts to date.

(e) Autonomy

Answer

A property of agents whose behavior is determined by their own experience rather than solely by their initial programming.

(f) Reflex agent

Answer

An agent whose action depends only on the current percept.

(g) Model-based agent

Answer

An agent whose action is derived directly from an internal model of the current world state that is updated over time.

(h) Goal-based agent

Answer

An agent that selects actions that it believes will achieve explicitly represented goals.

(i) Utility-based agent

Answer

An agent that selects actions that it believes will maximize the expected utility of the outcome state.

(j) Learning agent

Answer

An agent whose behavior improves over time based on its experience.

2. Explain the concept of *performance measure* in intelligent agents.

Answer

Performance measure is the criterion for 'success' and is objective: it is used by an outside observer to evaluate how successful an agent is.

3. Explain the concept of a *utility function* in intelligent agents.

Answer

A utility function is used by an agent to evaluate how desirable states or histories are.

4. What is the difference between the performance measure and utility function?

Answer

In our framework, the utility function may not be the same as the performance measure; furthermore, an agent may have no explicit utility function at all, whereas there is always a performance measure.

5. What is practical reasoning and how is it different from theoretical reasoning? Explain in no more than 4 sentences.

Answer

Practical reasoning is the reasoning towards action: what to do next. Theoretical reasoning is that one to understand how the world is, what is believed true.