Intelligent Agents Summary

Being Rational choice depends only on the percept sequence to date.

Information gathering – Doing actions in order to modify future percepts

Is an important part of rationality and is covered in depth in chapter 16.

Agents and Environments

Rationality

PEAS (Performance measure Environment, Actuators, Sensors)

Environment types

Agent types

An agent is anything that can be viewed as either perceiving its environment through sensors and acting upon that environment through actuators

Rational Agent – an agent should strive to be rational, and do the right thing based on what it can perceive and the actions it can perform .

Whats rational depends on four things

1. The performance measure 2. The agents prior knowledge of the environment 3. The actions the agent can perform 4. The agents percept sequence to date

Rational Agent: For each possible percept sequence, a rational agent should select an action that is expected to maximeize its performance measure, given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.

Rationality is distinct from omniscience ( all-knowing with infinite knowledge)

Rationality maximizes expected performance while perfection maximizes actual performance

An agent is autonomous if its behavior is determined by its own experience ( with ability to learn and adapt)

The right action is the one that will cause the agent to be most successful

Performance measure : an objective criterion for success of an agent’s behavior

It is better to design performance measures according to what you want in the environment to occur, rather than according to how you think the agent should behave.

Example ( amount of dirt cleaned vs a clean floor)

A better measure would reward the agent for having a clean floor.

Environment Types :

Task Environment – Observable | Deterministic | Episodic | Static | Discrete | Agents

Fully observable vs partially observable

Deterministic vs stochastic

Episodic vs sequenctial

Static vs Dynamic

Discrete vs Continuous

Single Agent vs MultiAgent

**Four Basic agent types in order of increasing generality:**

Simple reflex agents :

Select actions on the basis of the current percept

// ignoring the rest of th percept history

Condition – action – rule

The Agent will work only if the correct decision can be made on the basis of the current percept – that is only if the environment is fully observable.

Model-based reflex agents :

* The Agent should keep track of the part of the world it can’t see now
* The Agent should maintain some sort of internal state that depends on the percept history and reflects at least some of the unobserved aspects of the current state
* Updating the internal state information as time goes by requires two kinds of knowledge to be encoded in the agent program
  + Information about how the world evolves indepenedently of the agent
  + Information about how the agent’s own actions affects the world

Model of the world – model based agents

Goal-based agents :

* The Agent needs goal information that describes the situations of a desirable state
* The Agent program can combine this information with results of possible actions in order to choose actions that achieve the goal
* Usually requires search and planning

Its more flexible because the knowledge that supposts its decisions is represented explicitly and can be modified.

Reflex vs Goal Based, The goal based agent’s behavior can easily be changed, on the other hand the reflex agent’s rules (condition-action rules) must be changed for a new situation.

Utility-based agents:

Goals alone are not enough to be the best in most environments

A more general performance measure should allow a comparison of different world states according to how useful it would make the agent if it could be achieved.

A utility function maps a state onto a real nukmber which described the associated degree of usefulness

Learning Agents :

Machines that learn , allows the agent to operate in initially unknown environments and to become more competent than its initial knowledge alone might allow.

The learning element is responsible for making improvements

(It uses feedback from the critic on how the agent is doing and determines how the performance element should be changed to do better)

The performance element is responsible for selecting external actions