THE STRUCTURE OF AGENTS

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● Agent Program:

It implements the agent function mapping percepts to actions

○ Architecture:

Agent program will run on some sort of computing device with physical sensors called architecture.

Agent=architecture+program

THE STRUCTURE OF AGENTS

- Agent programs:
- > The agent programs take the current percept as input from the sensors and return an action to the actuators.

- > The agent program takes just the current percept as input because nothing more is available from the envirnoment.

- > If the agent's actions depend on the entire percept sequence, the agent will have to remember the percepts.

CONTINUE...

- Four kinds of agent programs:
  - Simple reflex agents
  - Model based reflex agents
  - Goal-based agents
  - Utility based agents

SIMPLE REFLEX AGENTS

> These are simplest kind of agents that select actions on the basis of current percept, ignoring the rest of the percept history.

> The agent program for a simple reflex agent in 2 state vacuum environment is as follows

function Reflex-Vacuum-Agent([location,status]) returns an action

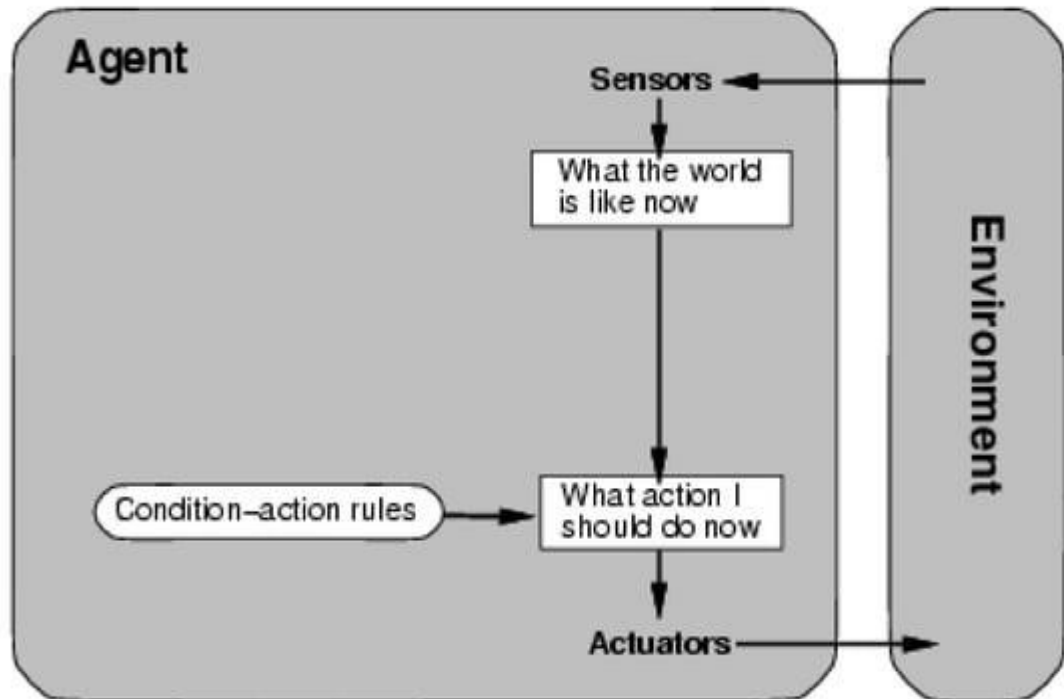if status = Dirty then return Suck

else if location = A then return Right
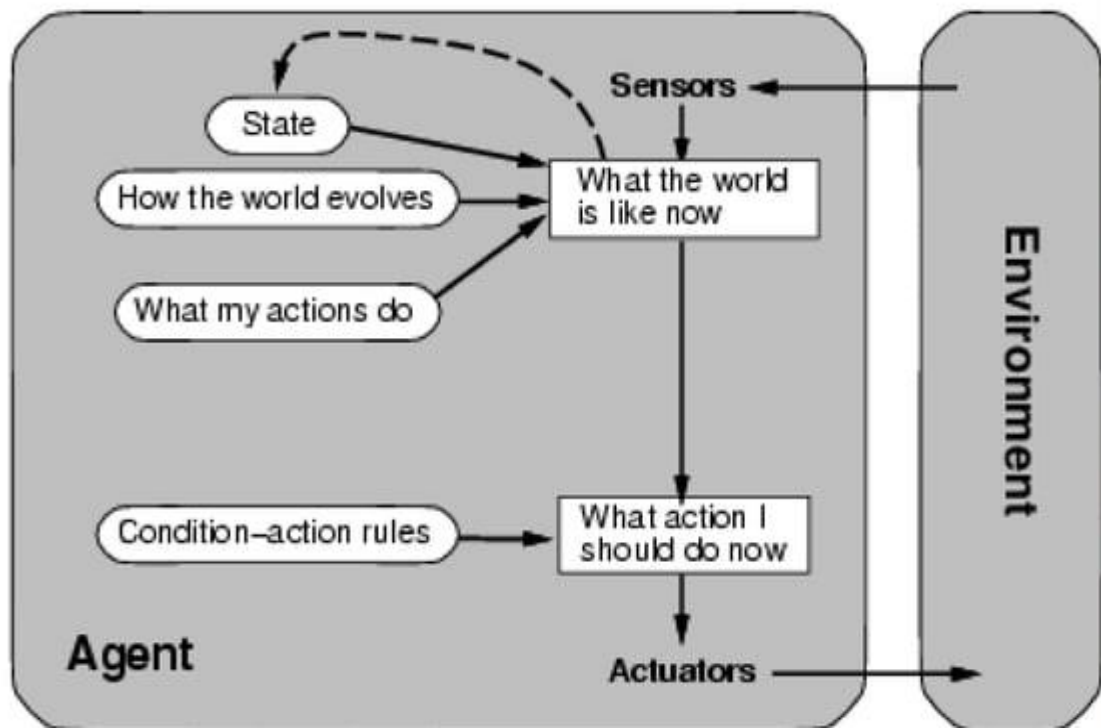
else if location = B then return Left

SIMPLE REFLEX AGENTS
FIG: SCHEMATIC DIAGRAM OF A SIMPLEX REFLEX AGENT

- Infinite loops are often unavoidable for simple reflex agents operating in partially observable environments.

- Escape from infinite loops is possible if the agent can randomize its actions.

MODEL BASED REFLEX AGENTS

MODEL BASED REFLEX AGENTS

- The most effective way to handle partial observability is for the agent to 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 thereby reflects at least some of the unobserved aspects of the current state
- Model based agent
- The knowledge about "how the world works" whether implemented in simple boolean circuits or in complete scientific theories is called model of the world.
- The agent that uses such a model is called a model-based agent

GOAL-BASED AGENTS
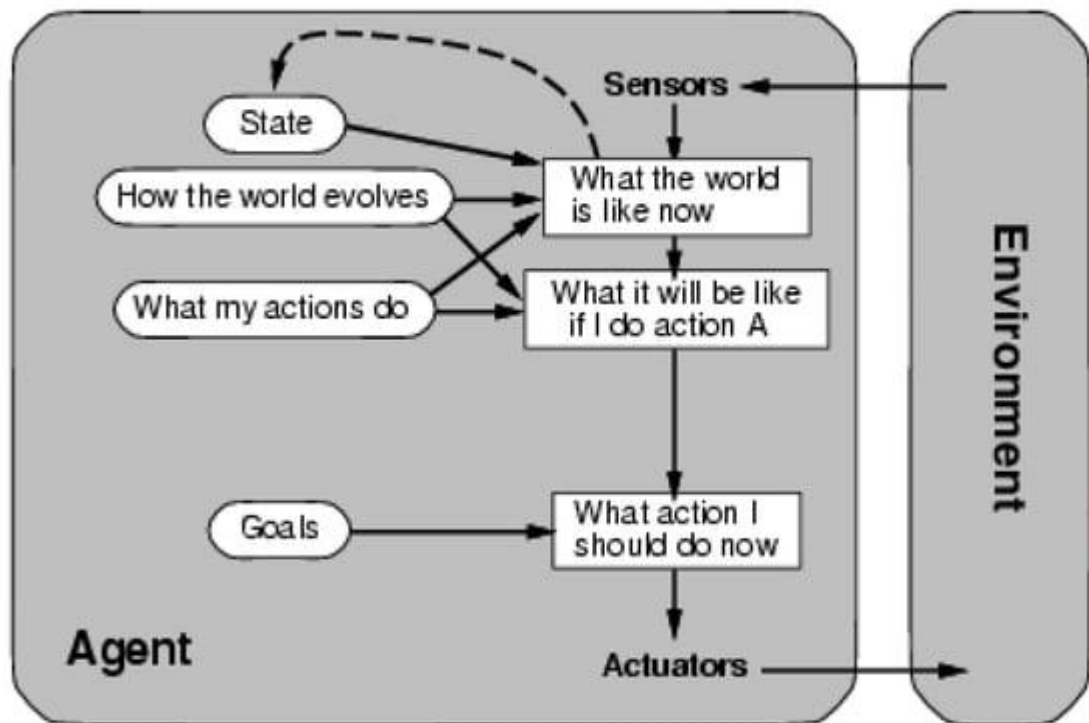
- Goal:
- The agent needs some sort of goal information that describes situations that are desirable.
- Example: being at the passenger's destination
- The agent program can combine this information about the results of possible actions inorder to choose actions that achieve the goals.
- Search and planning are the subfields of AI devoted to finding action sequence that achieve the agent's goals.
- Although the goal-based agent appears less efficient, it is more flexible because the knowledge that supports its decisions is represented explicitly and can be modified.

UTILITY BASED AGENTS
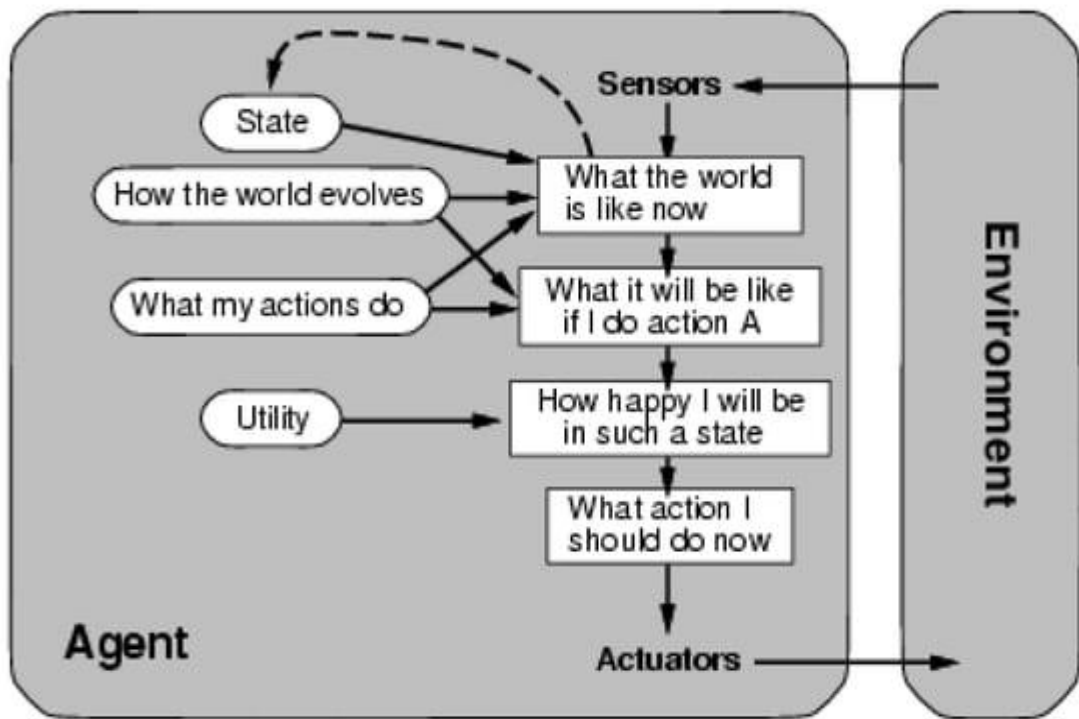
UTILITY BASED AGENTS

- Goals alone are not really enough to generate high-quality behavior in most environment.
- Utility-if one world state is preferred to another, then it has higher utility for the agent.
- Utility function
- It maps a state (or sequence of states) onto a real number, which describes the associated degree of happiness.
- A complete specification of the utility function allows rational decision in two kinds of cases where goals are inadequate.
- When there are conflicting goals, only some of which can be achieved, the utility function specifies appropriate tradeoff.
- When there are several goals that the agent can aim for utility provides a way in which the likelihood of success can be weighed up against the importance of the goals.

LEARNING AGENTS
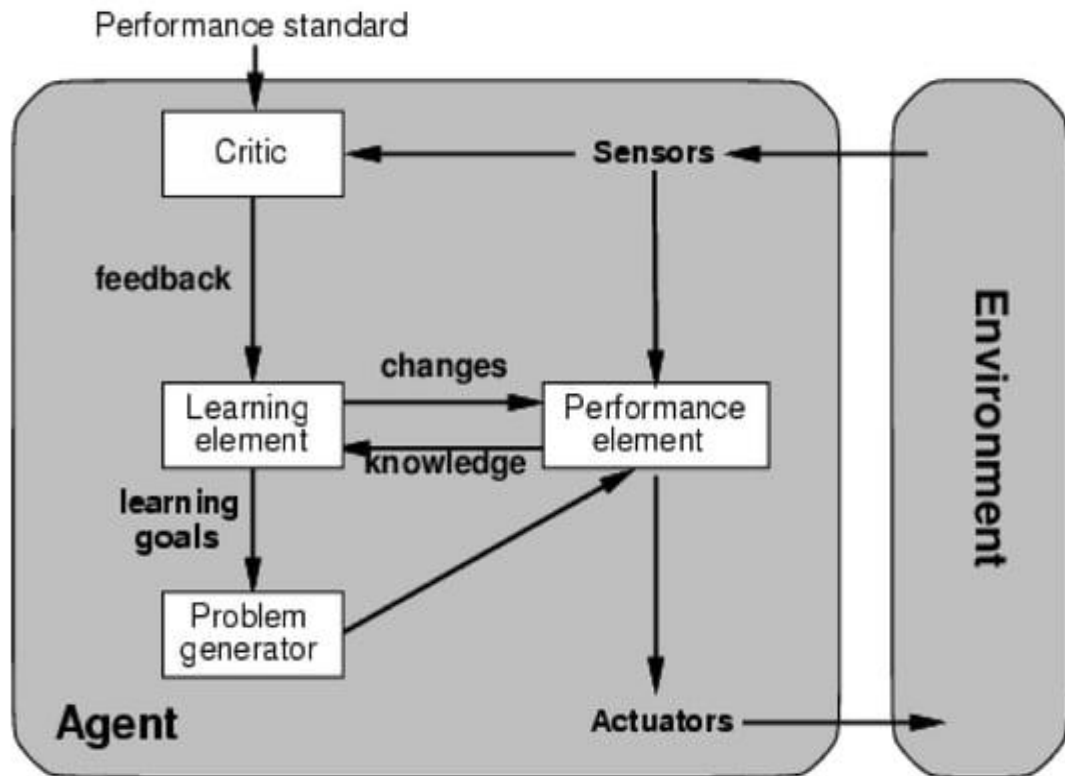
LEARNING AGENTS

- Method to build learning machines and then to teach them, which is used in many areas of AI for creating state-of-the-art systems.

- Advantage ->it allows agent to operate in initially unknown environment and to become more competent than its initial knowledge alone might allow.

- Conceptual components of learning agent

- Learning element- responsible for making improvements.

- Performance element-responsible for selecting external actions.

- Critic-the learning element uses feedback from the critic on how the agent is doing and determines how the performance element should be modified to do better in the future.

- Problem generator-responsible for suggesting actions that will lead to new and informative experiences.

- The performance standard distinguishes part of the incoming percept as a reward(or penalty) that provides direct feedback on the quality of the agent's behavior

- Example: hard-wired performance standards such as pain and hunger in animals can be understood in this way.