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LECTURE(7)

Subject: AI definition, history, concept, and applications
Level: 1
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Knowledge Engineering

- The process of building intelligent knowledge based systems is called knowledge engineering

Problem fundamentals and characteristics

In problem solving, we try to move from a given initial state to a goal state which is the solution

On the way, we move through a number of intermediate states

The initial, final and all possible intermediate steps make up the state space for the given problem or the problem space

A problem space can be represented as a graph with nodes (states) and arcs (legal moves) between nodes

State space search characterises problem solving as the process of finding a solution path from the start to the goal

The task of a search algorithm is to find a solution path through a problem space (which intermediate state should be the next one?)

Problem Solving

State Space Search

A ***state space*** is the set of all possible states of the problem under solving.

Problem Solving Operations

To solve any problem in AI, must do the following operations:

1. Define space search **(state space)** that contains all possible

states.

2. Specify the **initial state** which the problem-solving process may start.
3. Specify (operators, possible moves, rules) that describe the actions available.
4. Specify the **goal state** that would be acceptable as solution to the problem.
5. Determine a suitable **inference technique** to reach the goal

AI Problems

1- Monkey and Banana Problem

There is a monkey at the door in the room. In the middle of the room there is a banana hanging in the ceiling. The monkey is hungry and wants to get the banana, but it cannot stretch high enough off the floor. At the window in the room there is a box the monkey may use.

Solution:

The monkey can perform the following actions to get the banana:-

1. Walk on the floor.
2. Climb the box.
3. Push the box a round (if the monkey is already at the box).
4. Grasp the banana if standing on the box directly under the banana.

The question is (*Can the monkey get the banana?*).

The **Initial state** can be determined by:-

1. Monkey is at door.
2. Monkey is on floor.
3. Box is at window.
4. Monkey does not have banana.

Initial state:- state (at door, on floor, at window, has not).

The **Goal state** can be determined by:-

1. Monkey is at box (middle).
2. Monkey is on box.
3. Box is under banana (middle).
4. Monkey has get banana.

Goal state:- state (middle, on box, middle, has).

state1 state2

move (state1, state2).

state1: is the state before the move.

move: is the move executed.

state2: is the state after the move.

The monkey and banana problem can be represented by the following state space:-