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DOP	DOA	Remark	Sign.

Tutorial 2 : To understand State Space problem formulation.

Aim : To understand State Space based problem formulat° of AI problems so that problem solving Agent can be applied.

Theory :

First we understand the problem solving agent. Agent first formulates goal and problem, then determines or rather searches an act° sequence, after which it returns the next act° to be executed in a sequential manner.

Defining the problem is refured to as problem formulat°. It involves defining following five things :

- Initial State - It is the starting state that the problem is in.
- Actions - It defines all possible act° available to the agent, given it is in some states currently. It is a function Action(s) that returns list of all possible actions.
- Transition Model - also known as successor funct° which define which state I s the system

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function SIMPLE-PROBLEM-SOLVING-AGENT(percept) returns an action
static : seq, an action sequence, initially empty
         state, some description of the current world
         goal, a goal, initially null
         problem, a problem formulation

state ← UPDATE-STATE(state, percept)
if seq is empty then do
    goal ← FORMULATE-GOAL(state)
    problem ← FORMULATE-PROBLEM(state, goal)
    seq ← SEARCH(problem)
    action ← FIRST(seq)
    seq ← REST(seq)
    return action
```

Problem Solving Agent Architecture.

tend to move to when a particular action is executed by the agent. Successive applicat° of transition model gives rise to what is known as State space.

- Goal Test - This act as a stopping condit° when the state passed to this funct° is goal state it will return true and searching would stop.
- Path cost - It is accumulated cost of performing certain sequence of act°. This can help in determining weather the action sequence under consideration is optimal.
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Thus a problem can formally specified by identifying initial state, action (operates), transition model (successor funct°), goal test and path cost. In turn of problem solving agent solution is the past from initial State to a goal state, optimal solut° is the lowest path cost of all solut°. Process of finding a solut° is called search.

Working :

Based on understanding of problem formulat° students need to formulat° following problem. They will clearly show state space up to depth level 3 or till goal node which ever is shallowest.

1. Navigate to KGCE Workshop from HOD IT Cabin with minimum no of moves, moves can be climbing or alighting staircases, turning left, right, walking through a corridor.
2. 8 puzzle problem.
3. The missionaries and cannibals problem. There are three missionaries are three cannibals who must cross a river using a boat which can carry at most two people, under the constraint that, for both banks, if there are missionaries present on the bank, they cannot be outnumbered by cannibals if they were, the cannibals they would eat the missionaries. The boat cannot cross the river by itself no people on board.
4. N Queen's problem, Arrange N queens on a N cross N chess board where no two queens attack each other.
5. Two room vacuum cleaner world.
6. Water Jug problem.