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Tutorial No :- 2

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Aim:- To understand state space based problem formulation of AI problems so that problem solving agent can be applied.

Theory :- First we understand the problem solving agent : Algorithm shown in figure 3 shows agent program for problem solving agent. Agent first formulation goal and problem then determines or rather searches an action sequence after which it return the next action to be executed in a sequential manner

Function SIMPLE-PROBLEM-SOLVING-AGENT (Percept) returns an action.

static :- seq, an action sequence initially empty state, some description of the current world state 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

Defining the problem is referred to as problem formulation. IT involves defining following five things.

- Initial state It is the starting state that the problem is in
- Actions It defines all possible actions available to the agent, given it is in some state currently. It is a function Action that return list of all possible actions.

- Transition model also known as successor function which define which state is the system tend to move to when a particular action is executed by the agent. successive application of transition model give rise to what is known as state space.
- Goal test this act as a stopping condition when the state passed to this function is goal state it will return true and searching would stop.
- path cost It is accumulated cost of performing certain sequence of actions this can help in determining whether the action sequence under consider action is optimal.

Working :-

Based on understanding of problem formulation students need to formulate following problems. They will clearly show state space up to depth level 3 which ever is shallowest

1) Navigate to KGCE workshop from Hod IT cabin with minimum number of moves, moves can be climbing or alighting staircase, turning left, right, walking through a corridor.
2) 8 puzzle problem
3) The missionaries and cannibals problem. There are three missionaries and 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 these are missionaries present on the bank, they cannot be outnumbered by cannibals if they were the cannibals would eat the missionaries. The boat cannot cross the river by itself with no people on board.
4) n Queries problem, Arrange N Queens on N cross N chess board where no two queens attack each other.
5) Two room vaccum cleaner world
6) Water jug problem. //