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Tutorial 2 :-
To understand State Space problem formulation.

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 fig. shows agent program for
problem solving agent.

Agent first formulates goal and problem, then determine
or rather searches an action sequence, after
which it returns the next action to be executed
in a sequential manner.

```
function SAMPLE-PROBLEM-SOLVING-AGENT returns an action.
Static : seg 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 seg is empty then do
   goal <- formulate-Goal (state)
   problem <- formulate -Problem (state, goal)
   seg <- search (problem)
action <- first (seg)
seg <- REST (seg)
return action.
```

Problem Solving Agent Architecture.

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's currently.

It is a function Action(s) that returns list of all possible actions.

Transition Model :-
Also known as successor function which define state's the system tend to move to when a particular action is executed by the agent.

Successive application of transition model gives 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 & searching would stop.

Path Cost :-

It is accumulated cost of performing certain sequence of actions.
This can help in determining weather the action sequence under consideration 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 or till goal node which ever is shallowest.

1. Navigate to KGCE Workshop from HOD It Cabin with minimum number of moves can be climbing or alighting staircase turning left, right, walking through a corridor.

2. 8 Puzzle problem

3. The missionaries and cannibles problem. There are three missionaries and three cannibals also 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 would eat the missionaries :
The boat cannot cross the river by itself
with 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.

Resources :-
   Refer to Chapter :-
   Artificial Intelligence : A Modern Approach.