Date

State-Space Problem formulation

TUTORIAL No.:- 02

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Class : BE- IT

Batch :- I2

Subject :- AI

Topic :-
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 & problems, then determines or rather searches an action sequence, after which it returns 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;
```

Fig: 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 the the problem is in

Actions

It defines all possible actions available to the agent, given it is in some state s currently

Transition Model

also known as successor function which defines which state/s the sys. 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 acts 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.

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Working:

Based on understanding of problem formulation students need to formulate following problems.

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 & cannibals problem.
4. N-Queen's Problem, Arrange N queens on a N×N chess board where no two queenss attack each other.
5. Two room vacuum cleaner world.
6. Water Jug problem.

Resources:

Refer to second chapter from AI: A modern Approach.