Tutorial No. 2

Aim : To understand State Space based problem formulation of AI problem so that Problem Solving Agent can be applied

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1.2 Tutorial 2 : To understand State Space problem formulation

Aim : To understand State Space based problem formulation of AI problem so that Problem Solving Agent can be applied.

Theory : First we understand problem solving agent.

Algorithm shows in fig shows agent program for solving agent. Agent first formulates goals & problem, then determines or rather searches an action sequence, after which it return next action to be executed in a sequential manner.

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function SIMPLE-PROBLEM-SOLVING-AGENT (percept) returns as action
  static seq, an action sequence, initially empty
         state some description of 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 foll. 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 return list of all possible actions

Transition Model : also known as successor function which defines which state/s the system tend to move to when a particular action is executed by agent.

Goal Test : This act as a stopping condition when 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.

Thus a problem can formally specified by identifying initial state, actions, transition model, goal test & path cost. Process of finding a solution is called search.

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 min. no. of moves, Moves can be climbing or alighting staircase, turn left, right, walking through a corridor

2] 8 Puzzle problem.

3] The missionaries & cannibals problem. There are three missionaries & three cannibal who must cross river by a boat, under condition that missionaries present on bank cannot be outnumbered by cannibals.

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 vaccum cleaner world.

6] Water Jug Problem.