Tutorial - 2

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Aim: To understand state space & based on problem ~~foundation~~ formulation of AI problems so that Problem solving Agent can be applied.

Theory: First we understand the problem agent. Algorithm shown in fig 3 shows agent program for problem solving agent. Agent first formulates goal and problem, 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
  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 3. Problem solving Agent Architecture

Defining the problem is referred to as problem ~~function~~ 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 which state/s, the system tend to move to when a particular action is executed by the agent. Successive app 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 and searching would stop.

Path ~~Test~~ cost : It is accumulated cost of performing certain sequence of actions. This can help in determining weather the action sequence under consideration is optimal.

Thus a problem can formally specified by identified initial state, actions, transition model, goal test and path cost. In term of problem solving agent solution is the path from initial state to a goal state, optional statement is the lowest path cost of all solutions. Process of finding a solution is called search.

WORKING: