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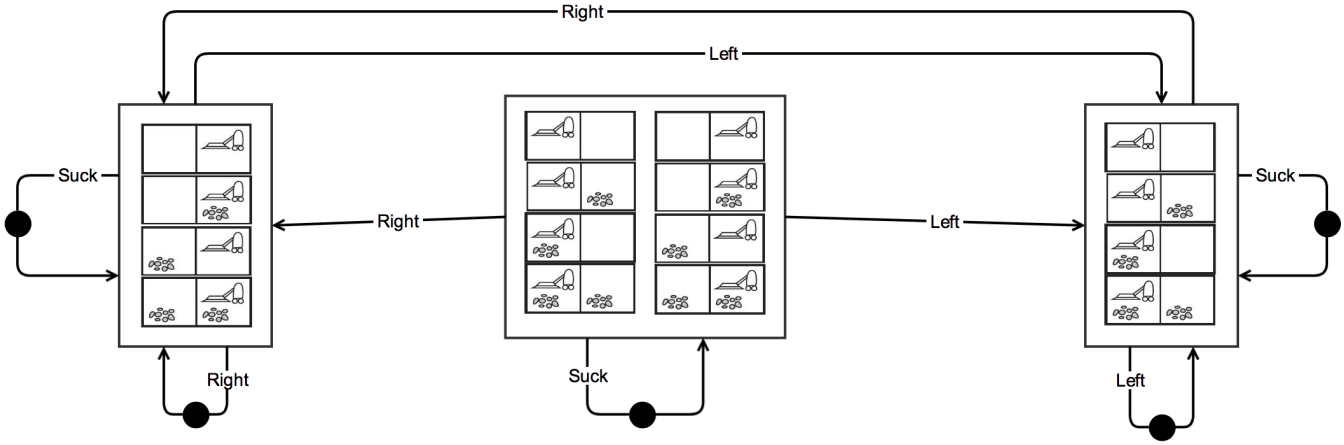
Response to Homework 2

1. Below is a belief-state space diagram to the erratic and sensorless vacuum with an unknown initial state problem. The problem will not for certain to achieve the goal because according to the diagram, whatever actions take, the problem will only looping amaong some belief states and will never get to a belief state that only contain goals. Thus, for this problam, the goal will not achieve for certain.

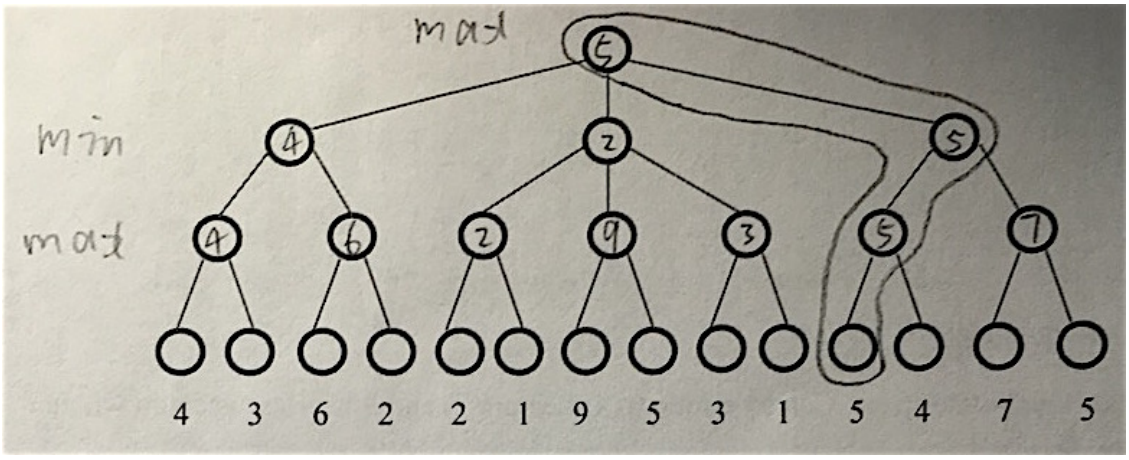


2. (a.) For state 1, $h^* = 3$ since a sequence of solving is $S- > R- > S$.
For state 2, $h^*(s) = 3$ since a sequence of solving is $S- > L- > S$.
For state 3, $h^*(s) = 1$ since a sequence of solving is S.
For state 4, $h^*(s) = 2$ since a sequence of solving is $L- > S$.
For state 5, $h^*(s) = 2$ since a sequence of solving is $R- > S$.
For state 6, $h^*(s) = 1$ since a sequence of solving is S.
For state 7, $h^*(s) = 0$ since it is already at the goal state.
For state 8, $h^*(s) = 0$ since it is already at the goal state.

(b.) For the initial state, $h(b) = 3$ according to (a.).

(c.) According to the graph on p.19 of lecture 7, if we treat a belif state as a node in the graph, then the actual shortest cost from the initial state node to any of the goal state node is 4 (A sequence of action could be $L- > S- > R- > S$ or $R- > S- > L- > S$). So for the initial state $h(b)$ under estimate the cost. And it is easy to see that this is true for all nodes. Thus, $h(b)$ is an admissible heuristid for this problem.

3. (a.) The minimax value are labled on the tree below. The solution is the path circled out in the tree.



(b.) The minimax value range are labled on the tree below. The nodes with cross are the roots of the branches being pruned.