

Project # 1

(Due: Sept 13, 2009)

Problem 1:

On a table are four cups arranged in a line. Each is either right side up (U) or upside down (D). A move consists of selecting one or two cups and turning them (from U to D or vice-versa). The goal is to get all the cups in the same orientation. (i.e., all in U or all in D.)

Problem 1a: Model the above task as a state-space search problem. Identify the number of essential states, the goal state(s), and the actions. Also describe the state-space graph. The graph may be too large to draw explicitly so it is enough to describe it implicitly and give two example moves. What is the minimum number of moves needed to solve the problem in the worst-case?

Problem 1b: In this version, the leftmost two cups are visible but the other two are not visible. The same actions can be performed as in Problem 1a. i.e., we are allowed to select any two cups (visible or not) and turn them. Since we may not know when the goal state is reached, assume that there is an external source such as a bell that rings when the solution state is reached. Determine the smallest number of moves required to solve the problem in the worst-case. Describe the optimal move sequence.

Problem 2

Problem 3.7 (d) of {Russell and Norvig}.