

CS310 - Thinking Task Week 3

There are five lily pads in a row, numbered from 1 to 5. Lily pads 1 and 2 are occupied by two red frogs (one on each pad) and lily pads 4 and 5 are occupied by two blue frogs (again, one on each pad). Each lily pad can have at most 1 frog on it.

A frog can jump from the pad on to an empty lily pad, but it can only jump at most 2 spaces. For example, if a frog is on lily pad number 2, it can jump to pad number 1, pad number 3 or pad number 4 (so long as the pad being moved to is empty), but it cannot move to pad number 5 as this is 3 spaces away from pad 2.

The aim of the problem is to move the two red frogs to pads 4 and 5 and the two blue frogs to pads 1 and 2.

- (a) Formalise this as a search problem, using an appropriate representation of the state, a goal recogniser and a next-states function.
- (b) Draw the search tree for this problem to a depth of 2. Do not include nodes that loop back to any previously visited state on the path.
- (c) Annotate your tree to show what order the nodes would be visited in using depth-first search, limiting the depth of the search to 2.
- (d) Describe how best-first search differs from depth-first search.
- (e) Discuss how you could relax the problem to quickly estimate the distance between the current state and the goal state.
- (f) Draw the search tree to a depth of 2 again. Annotate the nodes to show the order in which the nodes would be visited using best-first search, using the estimate of distance you developed in Part (e).