

Group C Online Credit Task to be presented Feb. 13, 2023

Heuristic Search With Backtracking

Assume you apply backtracking with depth bound 5[[1]](#footnote-1) and uses the following operator selection function O to the 8 puzzle:

O selects the operator first/next which leads to a state s for which h'(s):= "The number of incorrect positions of s with respect to the goal state g (not counting ‘\*’)" has the lowest value. Ties are broken using N>E>S>W.   
    
For example for the search problem below; north, south and west are applicable in the initial state ini:

North leads to a state s1 with h(s1)=6 “1,3,4,6,7,8” are misplaced”

South leads to a state s2 with h(s2)=4 “1,4,6,8” are misplaced

West leads to a state s3 with h(s3)= 6 “1,4, 5,6, 7, 8” are misplaced

Consequently, backtracking applies operator south in the initial state first, north next, and finally west.

6 2 3 \* 2 3   
8 5 \* 6 5 7  
4 1 7 8 4 1   
 ini goal state g

a) Will backtracking with the described operator selection function, assuming ini is the initial state and g is the goal state find the goal state quickly?

b) Now assume the initial state is changed to ini’

8 2 3   
5 \* 7   
1 4 6

ini’

Assume backtracking is applied starting in position ini’; how does the search tree of the states backtracking searched look like after 10 operators have been applied?

1. Serch is limited to states that can be reached by applying at most 5 operators to the initial state. [↑](#footnote-ref-1)