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Report: (Un)informed Search Lab

Which heuristics did you use for the A* algorithm?

Consistent: The number of boxes that are misplaced.

Non-consistent: The number of boxes that are misplaced times 10.

Test your program with a couple of different problems. Increase the size of the problem to test the limits of your program. Make a table comparing **how many nodes are searched** to find the answer for each problem. For this table, you should compare a number of different problems (at least 3) to avoid a statistical bias. Which of the three algorithms (UCS, A *with consistent and and A* with an inconsistent heuristic) searches the least nodes and which one take the most?

Test 1: 3 S: (A); (C,D); (F); G: (A); (F,D); (C);

Test 2: 3 S: (A, D, E); (C); (F); G: (A); (F,D); (C, E);

Test 3: 3 S: (B,E); (U,R,N); ();(); G: (R,U); (B,E); (N);();

Test #	UCS		A* Consistent		A* Not consistent	
1	7.73 sec	10	1.08 sec	10	0.17 sec	10
2	5.51 sec	13	0.61 sec	13	0.45 sec	23
3	Takes too long to execute.		10.82 sec	13	0.11 sec	24

- Why does this happen?
    - A* not consistent heuristic makes it fail to find the optimal solution, on the other hand the UCS and A* find the optimal but the USC takes longer to execute because it checks more nodes than the A*. Sometime UCS takes too much time to execute. The A* with a non consistent heuristic is faster than the others because it's not searching

for the best one, so when it finds one that seems optimal to it (according to the heuristic it has), it returns it.

Which algorithms are optimal? Why?

The A* with a consistent heuristic and the UCS, because they return the path with the lowest cost, the A* with a not consistent heuristic sometimes returns the optimal path by casuality but usually returns a non optimal path.

In your opinion, what are the benefits of simpler algorithms versus more complex ones?

We think the simpler algorithms are faster to develop and they can get to the goal but the path they'll return won't be the optimal and they will take too much time to process, on the other side the complex algorithms take longer to develop but they take less time to find the optimal solution.