Group id: 1801cs08_1801cs11_1801cs53

Group Members:

1. Ammaar Ahmad - 1801cs08
2. Ayush Pandey- 1801cs11
3. Sumit Raj- 1801cs53

Subject: Artificial Intelligence Lab 1

Date: 25/08/2021

Compare the results of A* and BFS (Best First Search) Algorithm

1. Obviously, A* is better than the Best First Search Algorithm.
2. Best First Search algorithm does not always give optimal solution as it is greedy algorithm but A* algorithm always gives optimal solution.
3. Both Best First Search and A* algorithm guarantees to find the solution when the solution exists.
4. Time Complexity: In worst case, time complexity of both algorithms are $O(b^d)$ where b=branching factor, d= depth of the solution (here b=2.67) . In the solution, we found heuristic h2 finds answer in less time than heuristic h1
5. Space Complexity: : In worst case, space complexity of both algorithms are $O(b^d)$ where b=branching factor, d= depth of the solution (here b=2.67) . using a good heuristic helps to reduce memory requirements.

Let's take an example:

Start state	Goal State
T8 T3 T5	T1 T2 T3
T4 T1 T6	T8 B T4
T2 T7 B	T7 T6 T5

From the above example:

Time taken for BFS with h1= 1.551266 seconds
Total no. of states explored BFS, h1=18146
Time taken for BFS with h2= 2.979443 seconds

Optimal path cost for BFS with h1= 80
Optimal path cost for BFS with h2= 16
Total no. of states explored BFS, h2=181440

Time taken for A* with h1= 0.813 seconds
Total no. of states explored A*, h1= 87293
Time taken for A* with h2= 0.002263 seconds
Total no. of states explored A*, h2= 16
Optimal path cost for A* with h1= 14
Optimal path cost for A* with h2= 14