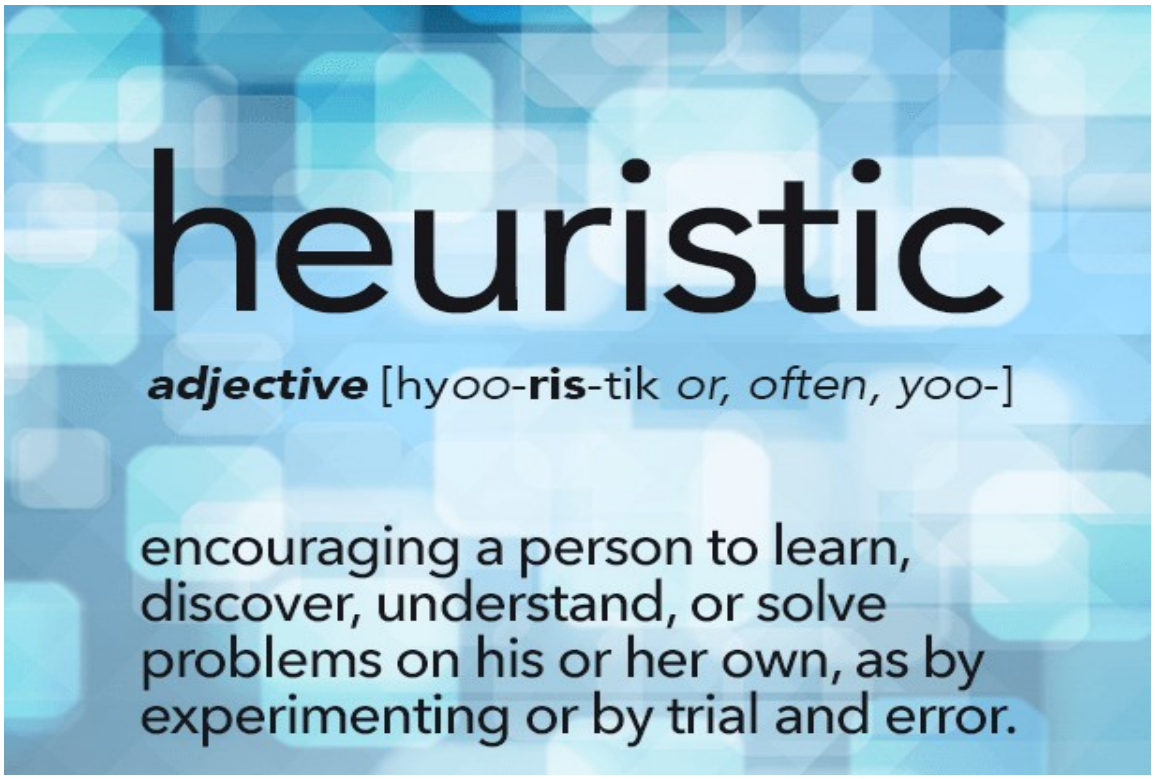
HEURISTIC REVIEW



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As part of ***Artificial Intelligence Nano Degree, Udacity***

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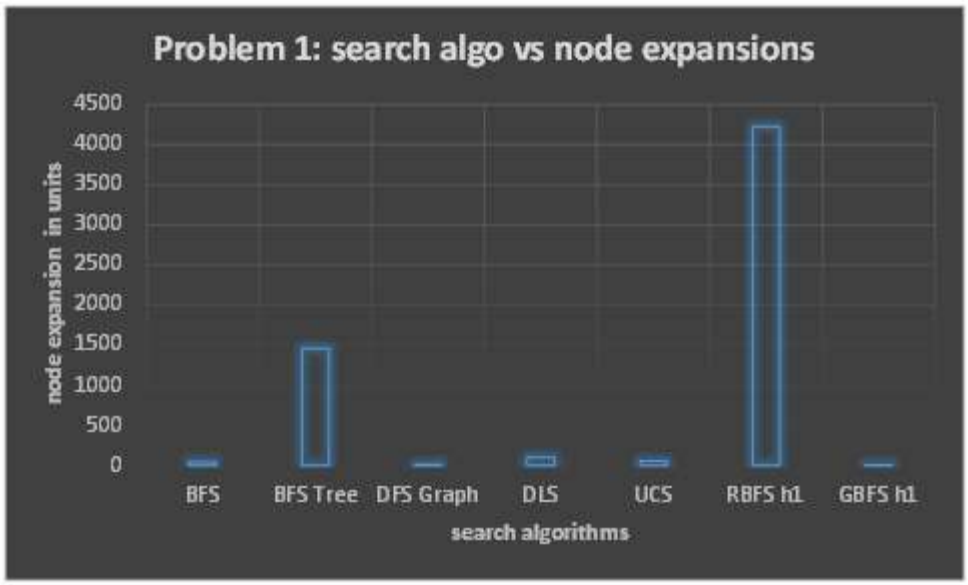
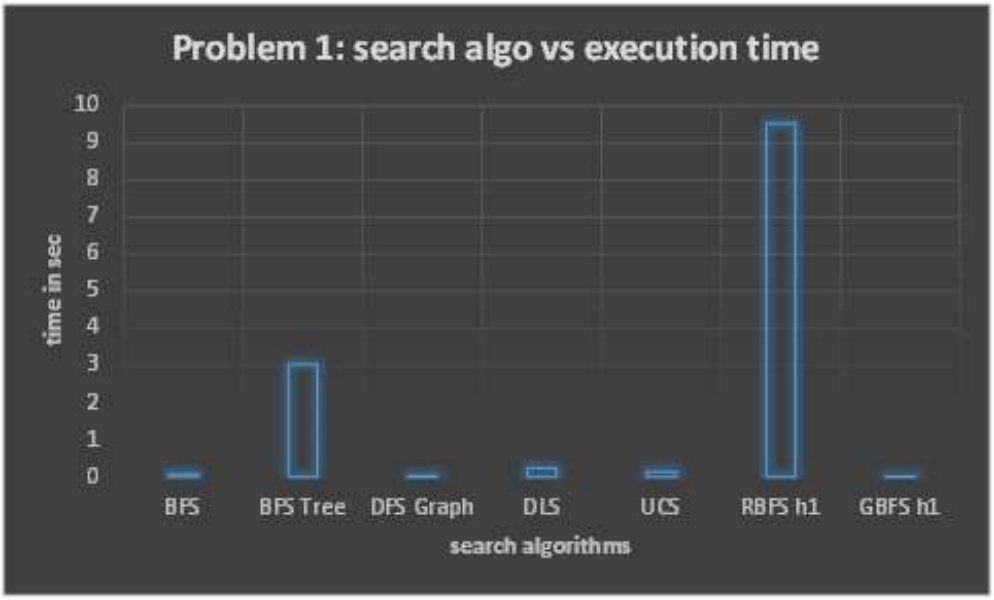
AIR CARGO PROBLEM 1 – UNINFORMED HEURISTICS

Below is the uninformed heuristic review of air cargo problem 1. The best path cost of 6 was identified by all flavors of Breath First Search [BFS] algorithms. The least node expansions of 7 nodes was observed by Greedy BFS algorithms. The least execution time of 0.013 seconds, was again observed with Greedy BFS algorithm. Since BFS is a complete algorithm, it finds the shortest path.

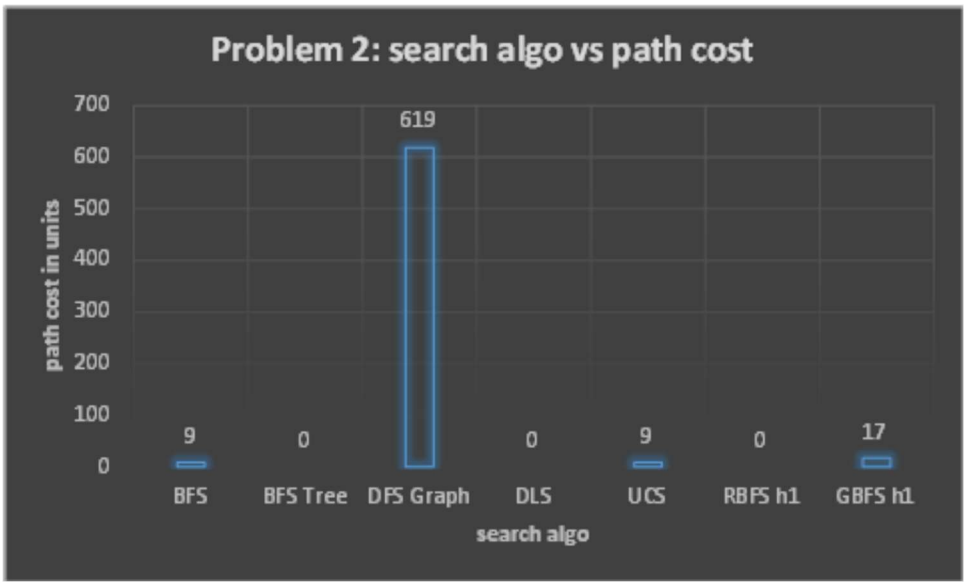


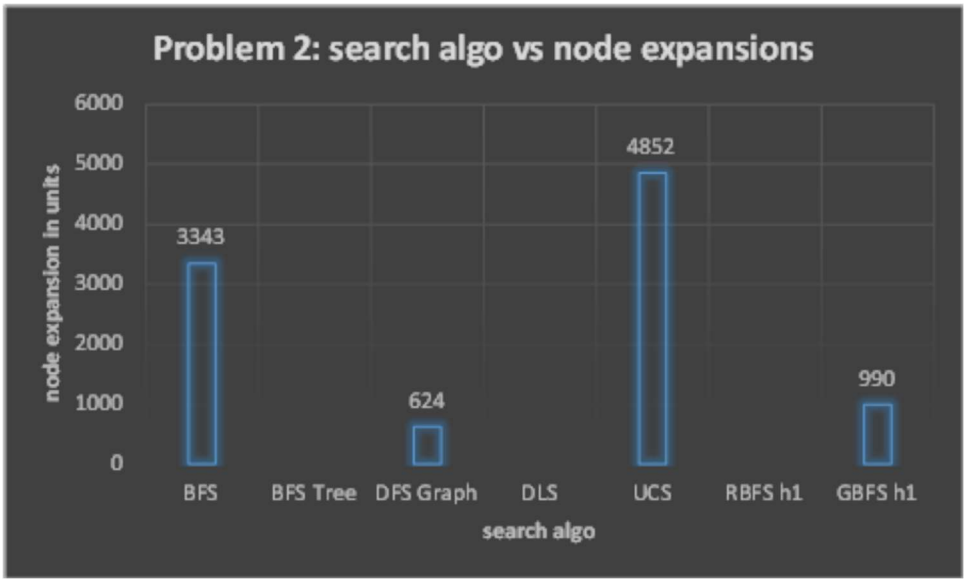


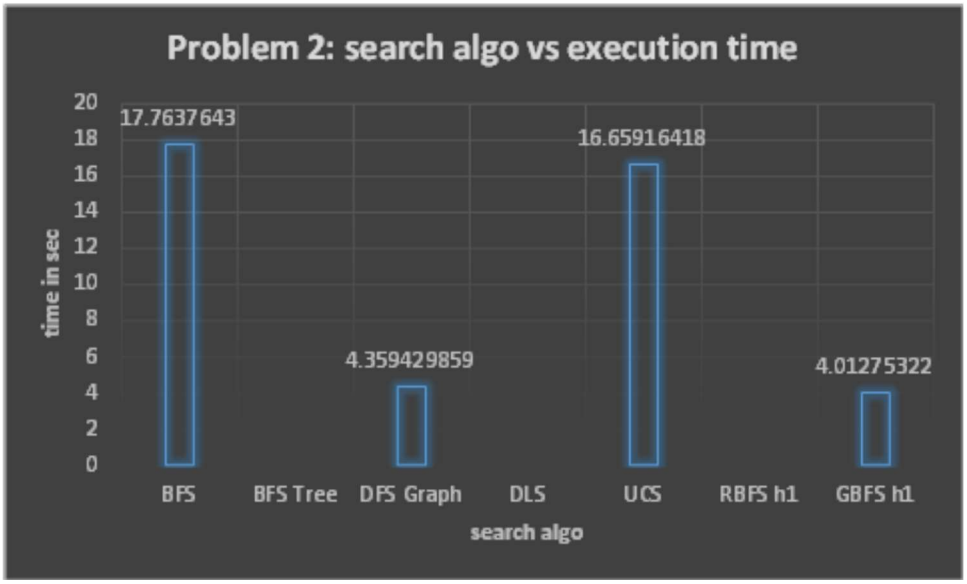
AIR CARGO PROBLEM 2 – UNINFORMED HEURISTICS

Below is the uninformed heuristic review of air cargo problem 2. The best path cost of 6 was identified by Breath First Search [BFS] and Uniform Cost Search [UCS] algorithms. The least node expansions of 624 nodes was observed by Depth First Search [DFS] algorithm. The least execution time of 4.3 seconds was again observed with DFS algorithm. The incompleteness of DFS graph search is very evident, and has a path cost of 619.

Note:- The value of 0 displayed with algorithms were not executed since the time exceeded 10 min on my hardware.

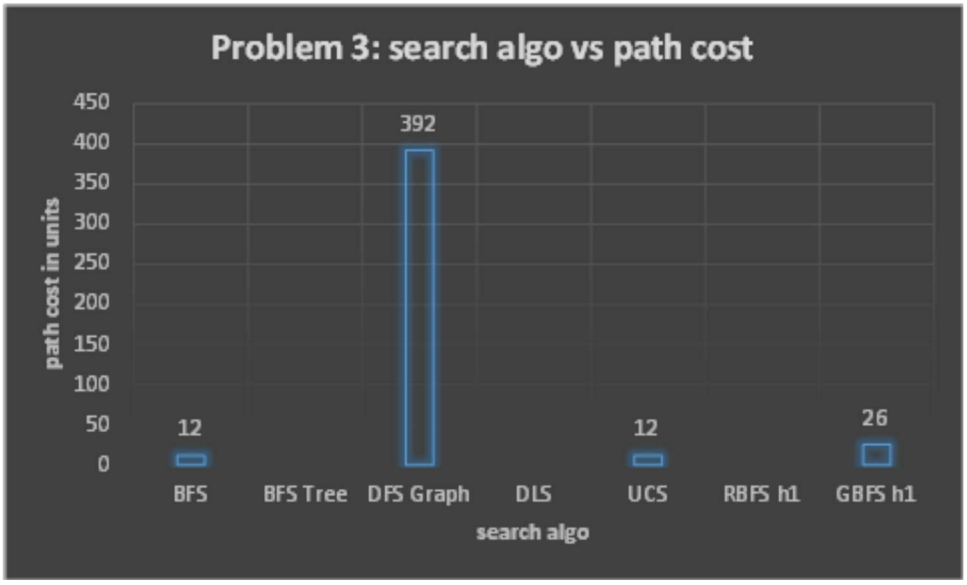

Problem 2: search algo vs path cost
path cost in units
700
600
500
400
300
200
100
0
9
0
619
0
9
0
17
BFS
BFS Tree
DFS Graph
DLS
UCS
RBFS h1
GBFS h1
search algo

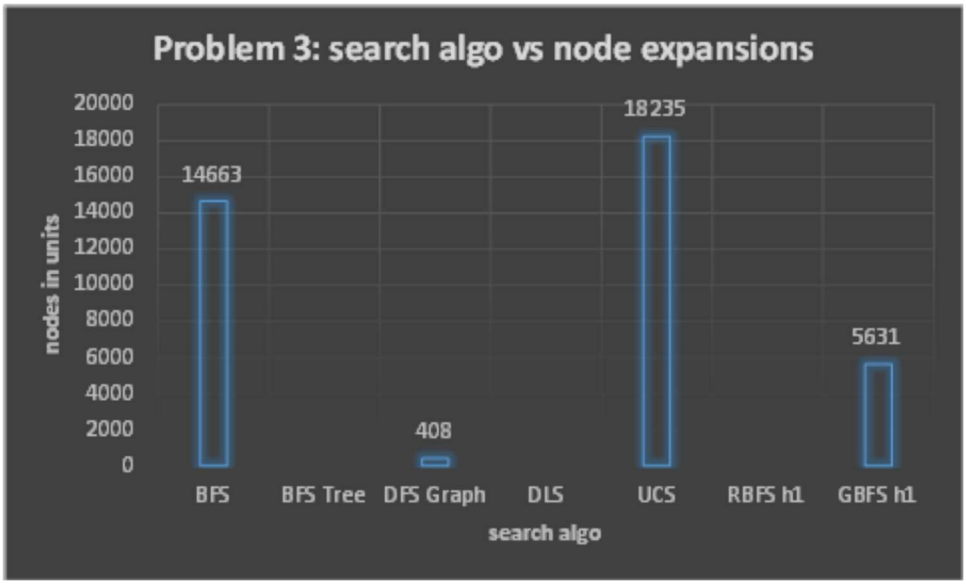

Problem 2: search algo vs node expansions
node expansion in units
6000
5000
4000
3000
2000
1000
0
3343
624
4852
990
BFS
BFS Tree
DFS Graph
DLS
UCS
RBFS h1
GBFS h1
search algo

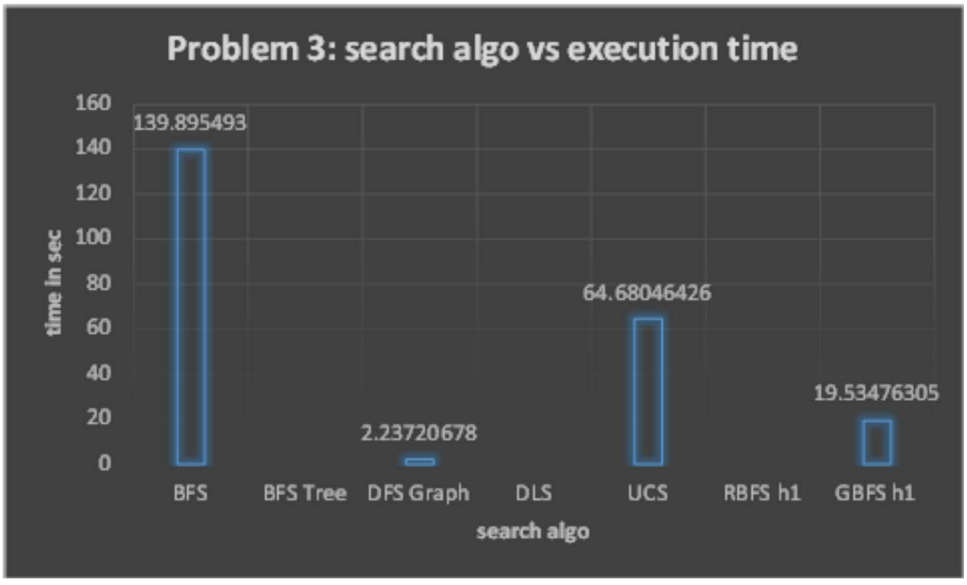


AIR CARGO PROBLEM 3 – UNINFORMED HEURISTICS

Below is the uninformed heuristic review of air cargo problem 3. The best path cost of 12 was identified by Breath First Search [BFS] and Uniform Cost Search [UCS] algorithms. The least node expansions of 408 nodes was observed by Depth First Search [DFS] algorithm. The least execution time of 2.2 seconds was again observed with DFS algorithm.

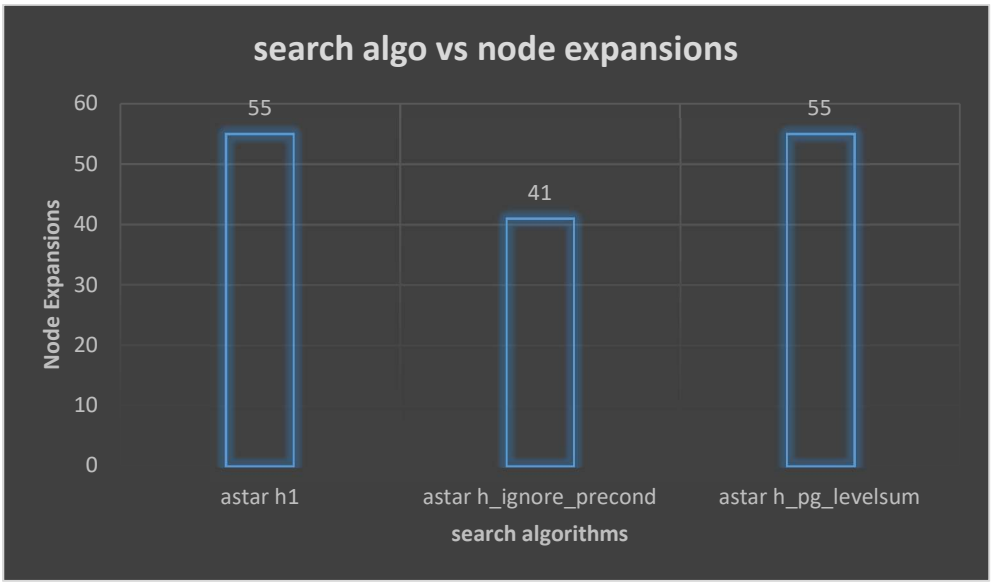


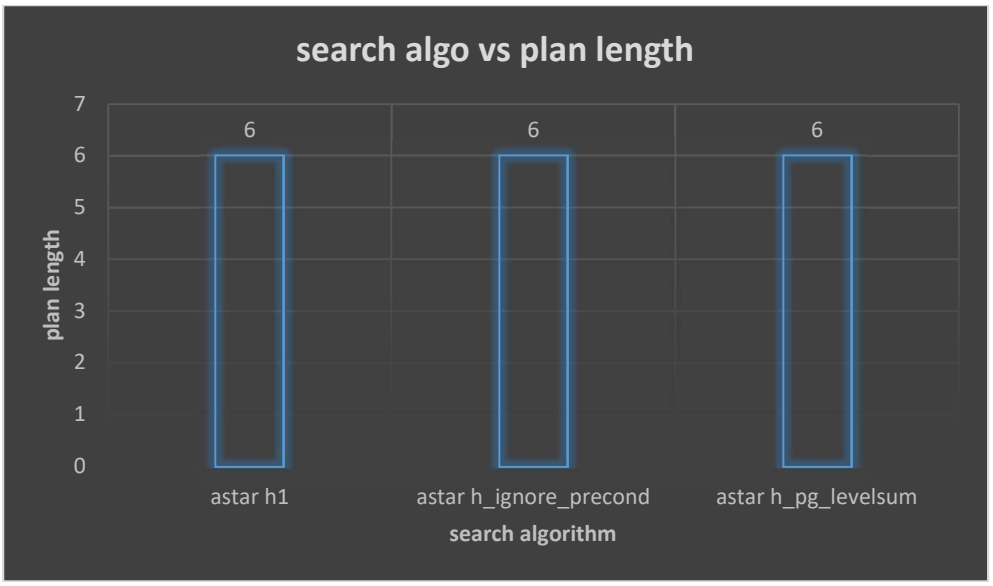

Problem 3: search algo vs node expansions
nodes in units
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
14663
408
18235
5631
BFS
BFS Tree
DFS Graph
DLS
UCS
RBFS h1
GBFS h1
search algo


Problem 3: search algo vs execution time
time in sec
160
140
120
100
80
60
40
20
0
139.895493
2.23720678
64.68046426
19.53476305
BFS
BFS Tree
DFS Graph
DLS
UCS
RBFS h1
GBFS h1
search algo

AIR CARGO PROBLEM 1 – INFORMED HEURISTICS

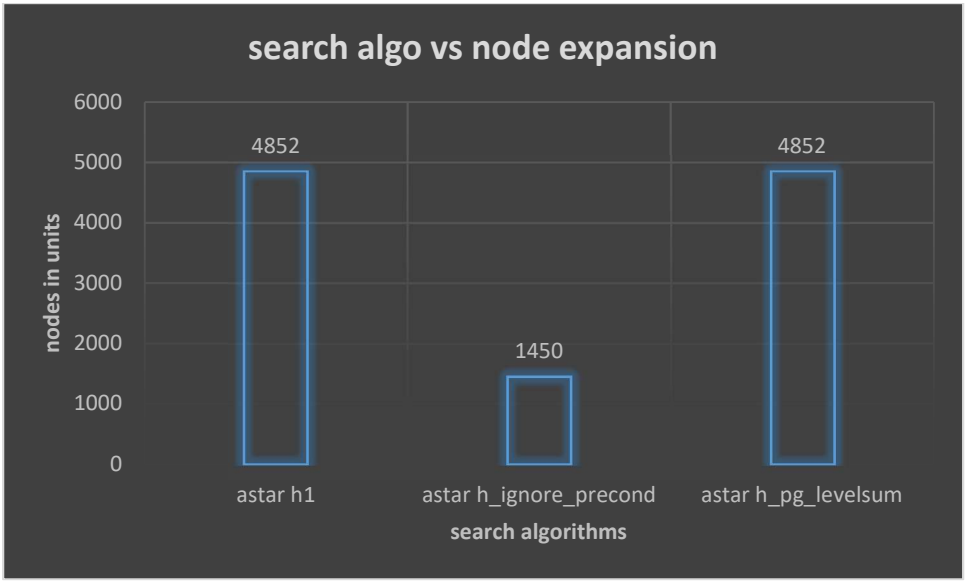
Below is the informed heuristic review of air cargo problem 1. The best path cost of 6 was identified by all flavors of astar searches. The least node expansions of 41 nodes was observed by astar h_ignore_preconditions algorithm. The least execution time of 0.03 seconds was again observed with both astar h1 and astar h_ignore_preconditions algorithm.



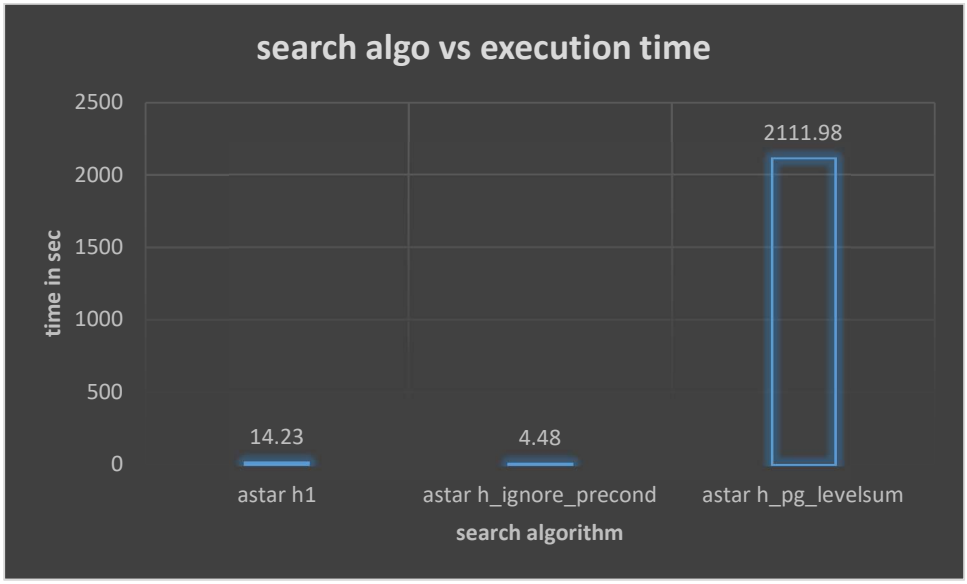


AIR CARGO PROBLEM 2 – INFORMED HEURISTICS

Below is the informed heuristic review of air cargo problem 2. The best path cost of 9 was identified by all flavors of astar searches. The least node expansions of 1450 nodes was observed with astar search with h_ignore_preconditions heuristic. The least execution time of 4.48 seconds was again observed with astar search with h_ignore_preconditions heuristic. h_ignore_preconditions is an admissible heuristic and hence we see better execution time and node expansion count.




search algo vs path cost
path length in units
10
9
8
7
6
5
4
3
2
1
0
9
9
9
astar h1
astar h_ignore_precond
astar h_pg_levelsum
search algo


search algo vs execution time
time in sec
2500
2000
1500
1000
500
0
14.23
4.48
2111.98
astar h1
astar h_ignore_precond
astar h_pg_levelsum
search algorithm

AIR CARGO PROBLEM 3 – INFORMED HEURISTICS

None of the algorithms finished under 10 mins on my hardware. Hence unable to collect much statistics.