

Mini Project 2

Analysis

Comp 472

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The lowest-cost solution

- Algorithms

- Heuristics

Algorithms

Uniform Cost Search vs. Greedy Best First Search vs. Algorithm A*

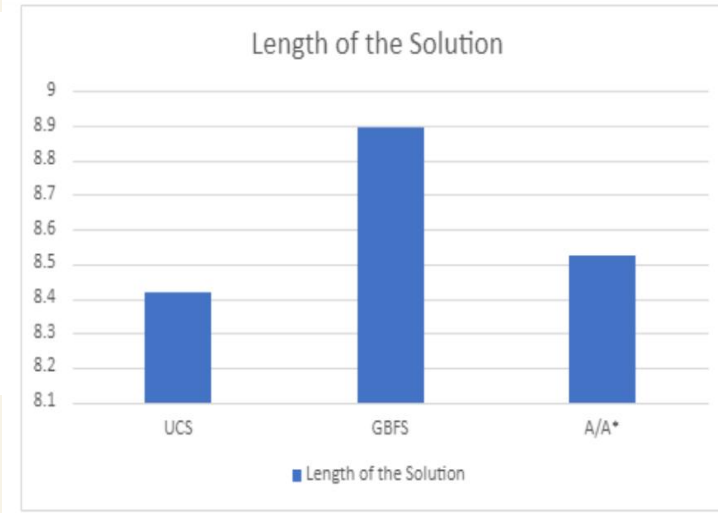
	Length of the Solution	Length of the SearchPath	Execution Time
UCS	8.42	506.34	2.630843463
GBFS	8.895	352.27	1.340298223
A/A*	8.525	410.22	1.818085889

The average the length of the solutions (UCS): 8.42

The average the length of the solutions (GBFS): 8.895

The average the length of the solutions (A*): 8.525

USC has the lowest-cost solution in our case.



Heuristics

Heuristic	Length of the Solution	Length of the SearchPath	Execution Time
h1	8.68	376.78	1.552879775
h2	8.68	376.78	1.530881109
h3	8.89	329.14	1.162544484
h4	8.59	442.28	2.070462856

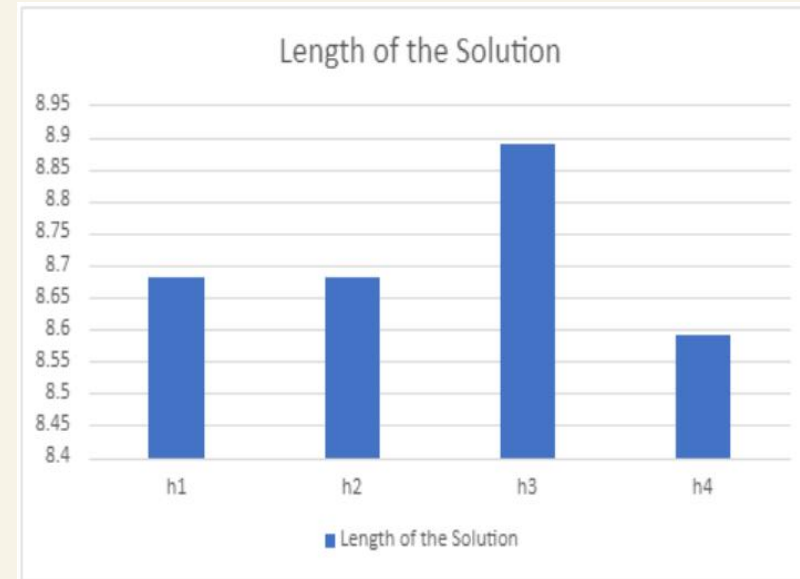
The average the length of the solutions (h1): 8.68

The average the length of the solutions (h2): 8.68

The average the length of the solutions (h3): 8.69

The average the length of the solutions (h4): 8.59

h4 is also the lowest-cost solution



admissibility of each heuristic

h_1 is allowed in this game. First, h_1 denotes the number of blocking vehicles, which must be moved. Therefore, the true optimal minimum cost is $n+1 > h_1$. This is also reflected in the data. The length of the solution returned by the A* algorithm (A^* algorithm) using h_1 is the same as the USC.

When there are vehicles of length ≥ 3 and on the same line as A, h_2 is unacceptable. As shown below, the predicted cost is 3, but the actual minimum cost is 2

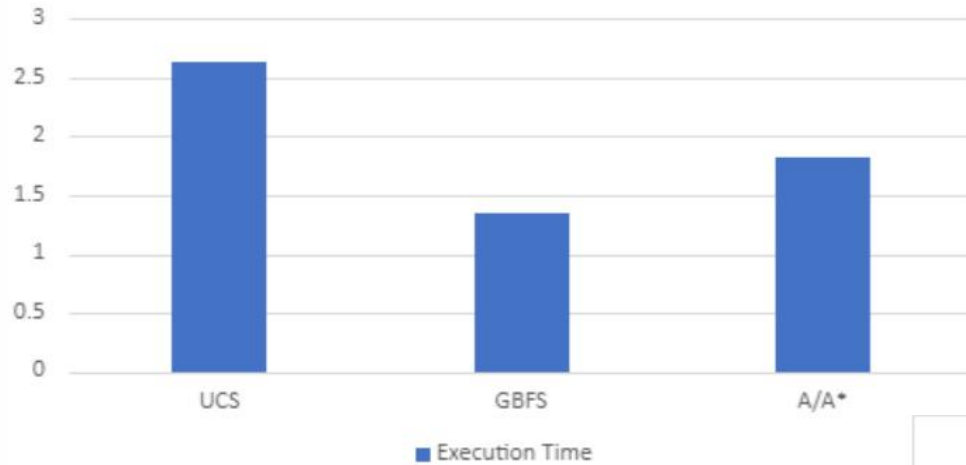
	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>
1	C	.	B	.	.	.
2	C	.	B	H	H	H
3	A	A	D	D	D	.
4
5	E	E	G	G	G	F
6	F

Is an informed search always faster?

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Execution Time

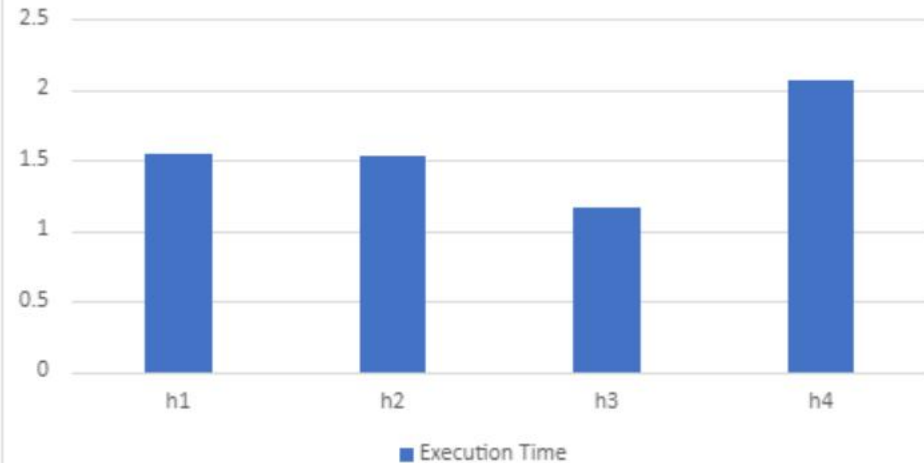


The GBFS and A* search is faster than UCS.

Therefore, informed search is always faster.

And the h1 and h2 are faster than h3 and h4.

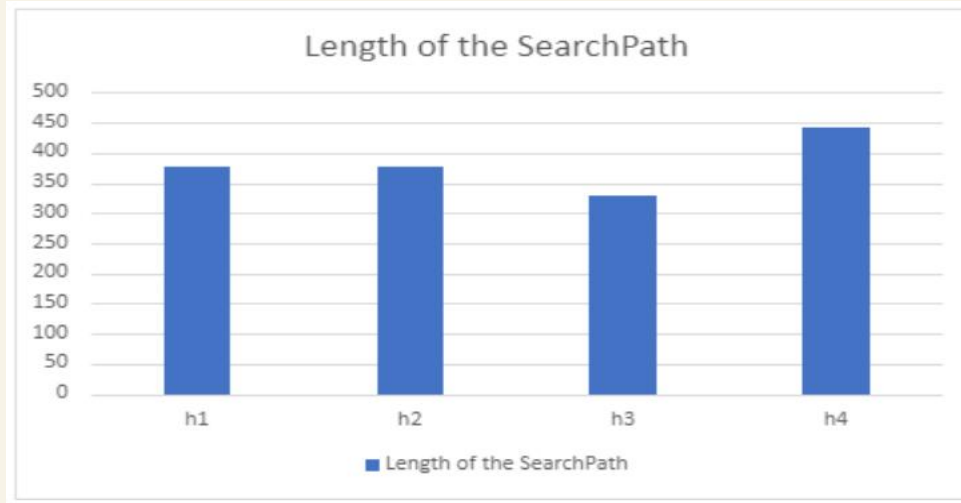
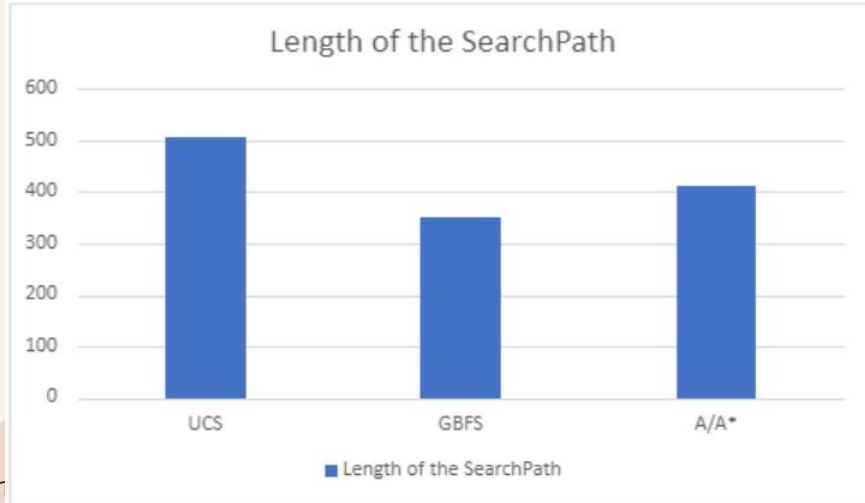
Execution Time



Interesting facts

USC has the lowest-cost solution in our case, but it has the highest length of the search path.

h1 and h2 have the same value which are 8.68 in length of the solution, and they also have the same value of the length of the solution.





Thanks!

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