**CMPUT 366 HOMEWORK 1**

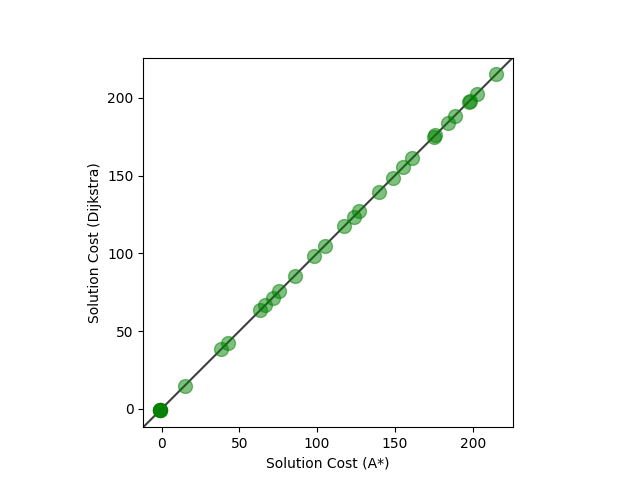
Explaining the Results:

Chart, scatter chart

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Chart, scatter chart

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According to the pictures, the solutions given by the Dijkstra’s Algorithm is identical to the A\* Algorithm, of which we can conclude that using either of the algorithms will give the same solution.

However, Dijkstra’s Algorithm will expand significantly more nodes compared to A\* Algorithm (By using the inputs given by this Assignment, we can see Dijkstra’s Algorithm expanded more nodes than A\* Algorithm by a factor of s on average). As a result, the running time for Dijkstra’s Algorithm will be significantly longer than A\* Algorithm, sometimes can be up to a factor of s.

Multiplicative Factor:

Chart

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It is clear from the graph that this new A\* Algorithm will expand significantly less nodes compared to the old A\* Algorithm, hence this new A\* Algorithm will run much faster than the old A\* Algorithm (and the old one is already much faster than Dijkstra’s Algorithm). However, the new A\* Algorithm produces slightly different answer compared to the old A\* Algorithm (and Dijkstra’s Algorithm).

When we inflate the heuristic function by , then there is a chance that there exist some nodes in the tree such that (). This means is likely non-admissible and thus unlikely to have an optimal solution.

The reason we find the goal node so quickly and expand significantly less nodes compared to the old A\* Algorithm is because the A\* Algorithm depends on , and when we inflate , will depends more on , which means the algorithm will move quicker to the goal (more “greedy”) – because as we move to the correct direction, will decrease, but since now is double as before, now will decrease two times as quickly, which means will decrease much faster.