**Optional Bonus : A\* Algorithm**

A\* search Algorithm is an extension of Dijkstra’s Algorithm which is used for finding the lowest cost path you may take between any two nodes. Now when it refers to cost it could refer to distance or even just computational efficiency. To get from one node to another one must traverse across an edge or sometimes refereed to as an arc. The key difference between A\* and Dijkstra’s Algorithm is that A\* uses heuristic values to help determine the cheapest path to take. These heuristic values are the standard Euclidean paths to the target, a straight line or in a proverbial sense, as the crow flies. So the algorithm can be described as such.

Let n be the next node on the path.

g(n) is the cost of the path from the starting point to the node n

h(n) be the heuristic path or function that estimates the cost or path from n to the goal

f(n) be the function that defines the path from n to the goal

So A\* selects the path that minimizes the equation:

f(n) = g(n) + h(n)

Note: When no heuristic path is defined, or rather when h(n) = 0 then we have Dijkstra’s Algorithm.

If you want to keep track of the nodes prior then you would need to revise the algorithm partially due to the base A\* does not keep that knowledge, but only the path of smallest cost. Have the goal node point to it’s predecessor and so forth.

So fundamentally each one of the edges has a distance attributed to them, this distance plus the distance from the start of the traversal is g(n), the heuristic is the straight line path from where you are to where you are going, and using this equation and minimizing – which means to plug values in and get the smallest set – will give you a cheapest path to the goal node.

**References:**

[https://rosettacode.org/wiki/A\*\_search\_algorithm](https://rosettacode.org/wiki/A*_search_algorithm)

[https://en.wikipedia.org/wiki/A\*\_search\_algorithm](https://en.wikipedia.org/wiki/A*_search_algorithm)

<https://www.youtube.com/watch?v=GazC3A4OQTE> – Dijkstra’s Algorithm

<https://www.youtube.com/watch?v=ySN5Wnu88nE> – A\* Search Algorithm