A* Algorithm

A* algorithm is a graph based algorithm that finds the shortest distance between two nodes. It is an extension of Dijkstra’s algorithm as it tackles it its drawback by having an additional heuristic which gives it a sense of direction. This heuristic is a cost function assosciated with every node that is how far it is from the end goal.

Algorithm

All the nodes of the graph are initally assigned a weight of infinity except the starting node with a weight of zero and added to a priority queue sorted form shortest to longest path distance.The algorithm starts at the starting node. For every node in the queue, it finds the nodes it is connected to and calculates the distance to the node through the current node and combines it with the distance it has to the goal. If the combined distance throught the current node is lower than the combined distance already assigned to it, the node is updated. Once all the connected nodes distances have been computed, the current node is marked as visited so as to prevent the algorithm from getting stuck in loops. The algorithm then proceeds to the next node from the priority queue until the algorithm reaches the end node as the current node at which point it has the found the shortest tree path or it runs out of unvisited nodes in which case there is no possible path.

Performance

It can be observed that A* performs much better than Dijkstra’s and visits lower number of nodes than Dijstra’s on average.