Artificial Intelligence Report

# **A\* Algorithm**

Text

Description automatically generatedThe A\* algorithm works by calculating the f(n) for each node. First, it will look at all the adjacent nodes and choose the one with the lowest f(n) to explore further. It will then do the same thing for this node by calculating all the adjacent f(n) values and choosing the minimum. This process will be repeated until it has reached the target node.

As you can see in the code above, the algorithm will find the vertex with the minimum f(n). If this is the target, then the loop will break. It will then loop through all the adjacent vertices and calculate the f(n) for each node. Once this is done, it will add these to the pathtracking dictionary. Following this, the loop resets and the currentnode is then assigned to whichever node had the minimum f(n) value.

Chart

Description automatically generated

The above image is a screenshot of A\* bot navigating through the path it calculated on level 4.

# **LRTA\* Algorithm**

Text

Description automatically generatedThe LRTA\* algorithm works by calculating the cost of each adjacent vertex in real time as it moves. Given its current vertex, it will read the statecost of the adjacent vertices and move to whichever vertex had the lowest cost. If there are multiple vertices with the same cost, it will simply choose a random one to move to. This process is repeated until it eventually finds its way to the target. On its first attempt, it will likely take a while for it to reach the target. However, using the information it gathered from the previous attempt, it will try to find another path and this time it will learn from any previous trials by using the updated state costs for each vertex.

Diagram

Description automatically generated with medium confidence

Screenshot showing the path the bot took on the first attempt and all the updated state costs of each vertex.