

1. Depth-first search randomly picks a path, until it reaches an exit or dead-end. If it reaches a dead-end, it backs up and picks another path at a fork. Depth-first search will give a path, but in a non-efficient way. Breath-first search searches randomly again, but will return the shortest path of the paths taken. This is better than DFS, but still slow. A* however, predicts the direction that the AI should go. A* looks at the cost of each adjacent cell, and computes which cell it should take. In this way, it is both faster, and more efficient than the algorithms above.

2. This picture shows the tiles with their corresponding H cost. Where H is the direct cost to reach the exit. It ignores objects, and is the cost to travel directly (as if there was no obstruction). You can see that the cost in the bottom left is low, even though there is a giant wall of lava blocking the path to the exit.



Off to the left, we see the cost of G, which is the cost of total movement as if the object was at that tile. For each movement, G increases by 1. We can see that in the dead end, the cost is high, due to the movement required to reach that position.

Finally, we have cost of F. which is the combined cost of G and H at each tile. We can see that along the top and right, the combined cost stays constant. And near the middle, the cost increases.



Diagonals

Once we implement diagonals as a cost of 3, we can see how the AI reacts. If we block off the entire section, we can see that the AI has no option but to move diagonally at a cost of 3.



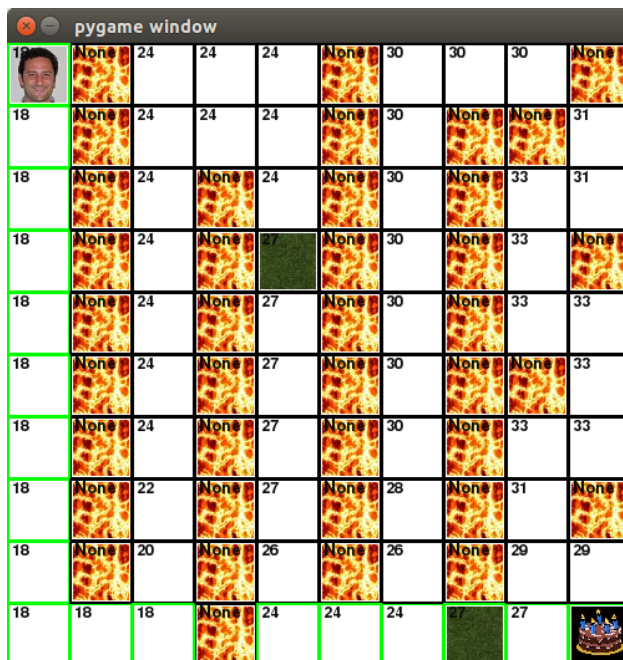
On the left, we can see a situation where the map is not blocked off. Since the cost of going down, then back up is more than a cost of 3, Paul takes the diagonal route.

Jump

We can see how Paul reacts if given the ability to jump. (costs 8). Since the long zig-zag is definitely more than 8 movement points, we can see that he jumps right over the wall, to take the cake.



18	18	18	18	18	18	18	18	18	18
None	None	None	None	None	None	None	None	None	18
24	None	24	24	24	24	24	22	20	18
24	None	24	None	None	None	None	None	None	None
24	None	24	24	24	24	24	24	24	24
24	None	None	None	None	None	None	None	None	24
24	24	24	24	24	24	24	24	24	24
24	None	None	None	None	None	None	None	None	None
24	24	24	24	24	24	24	24	24	24
24	24	24	24	24	24	24	24	24	24



18	None	24	24	24	None	30	30	30	None
18	None	24	24	24	None	30	None	None	31
18	None	24	None	24	None	30	None	33	31
18	None	24	None	27	None	30	None	33	33
18	None	24	None	27	None	30	None	None	33
18	None	24	None	27	None	30	None	33	33
18	None	22	None	27	None	28	None	31	None
18	None	20	None	26	None	26	None	29	29
18	18	18	None	24	24	24	27	27	27
18	18	18	None	24	24	24	27	27	27

Swamp

Here, Paul is traversing a map with swamp tiles. The swamp tiles here cost 3 movement points. We can see that he jumps over the bottom block, in order to avoid moving up and over the swamp. He also traverses through the swamp along the bottom to avoid going up and through a diagonal and series of zig-zags

In the end, Paul is able to have his cake and eat it too!