Capture the Flag Report

We have created code for our agent who have simple memory, utilizes an A\* star approach, and does not utilize any weapons.

First, the move needs to establish if the agent is on the west or east side and if they are the north or south agent. The agent maintains a 2D array with an index position. For all agents, the starting position is (0,0). Depending on their start position, the north and west direction is always increasing in the 2D array, which is why there is a multiplier for each direction. With this array, the agent is then able to recall simple things from the map. This include where the locations of dead ends are.

To decide which direction is best, it first checks to see if there are any bad things, such as obstacles, dead ends, or enemies. It adds a huge negative weight to that direction. If the map size has been found, then it knows its current location and can calculate the goal location. It then can use the Manhattan distance to establish the heuristic for which direction to move to. If it doesn’t have the map size, then it moves towards the goal with a bias for the east and west directions. The agent also adds a negative weight to its previous direction, so it doesn’t get stuck in a simple cycle.

The agents also only believe in using hand-to-hand combat, avoiding the use of non-detectable anti-personnel mines as they have been banned in the Geneva Convention. Instead, the agents will attack the other team when either the other teammate has the flag or if they do not have the flag and the other team has managed to capture the flag.

Cycle detection for moderately complex cycles was implemented by keeping track of the previous moves in an arraylist. Whenever an agent happened to be on a space they were on previously it would test all the locations that the two occurrences had travelled. If the pattern of moves matched then a cycle was detected and an attempt to avoid the space was added to the 2d array map. In addition to the map update the agent moves in a different direction then the one it took at the first occurrence of the location.