Assignment 1 Report

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Game state:

The current state of the game is that the spider can find the path to the ant in both a breadth first and a depth first manner. The spider uses this algorithm to find the path and perform the path until it has landed on the ant. In general it appeared that DFS was usually a few steps shorter than BFS for finding the path.

Heuristic 1:

Since the ant moves in the same direction we can predict where it will be based on its direction and current x and y position. A high-level heuristic function would be one that leads the spider to a position that the ant is going to move to in a few moves. Since the spider cannot move straight when traveling forward, the function would see if the spider could get ahead of the ant and then stay in its lane on the x or y axis. Once the spider found a path that would make this happen is it moves there and starts to move in one cell increments in either the backwards or sideways direction eventually running into the ant and achieving its goal.

The main problem with this heuristic is that the ant since the ant would only be moving once cell at a time once it finds the spiders lane, if the spider was far away it could take a lot of moves to reach the spider even though it is a fairly simple and direct path.

Heuristic 2:

The most obvious heuristic to determine the optimal path for the spider to find the ant would be to find the path that has the shortest distance to the ant. A good heuristic function would look at the distance from the ant to the spider as a measure of how many cells were between the ant and the spider. Through this heuristic function we would then take the path that leads to the ant that covers the least distance.

The problem with this heuristic function is that since the spider moves in greater direction going forward then backwards is that sometimes it would be easier for the spider to move forward then backwards or sideways. If the distance was 3 spaces backwards it would take 3 move to reach the spider but in some cases the spider could move 3 spaces over in just one move going forward. This means it would not always be the optimal path for the spider.

Heuristic 3:

The third heuristic would take the average of the first two heuristics functions and compare to get the most optimal path. It would do this by comparing the distances of each path as well as looking at the placement of the spider relative to the ant. If the distance was too great but the spider was inline with the ant it would not be the most optimal move since the spider would still need to make many one cell moves to eat the spider. However, in the case where the distance was low and the spider was in line with the ant it may reduce the number of moves to only a few since we care about where the spider is and how close it is relative to the ant. This combined result should give a good solution to the path the spider should take to eat the ant.