AI Snake Algorithm

The artificial intelligence algorithm contains two parts – to make a simulation, and to have the snake determine which direction to move toward.

**Modeling and Simulation**

The first part of the algorithm is implemented only at the moment of egg generation. A 2D array is created for representing the game screen. The red square is the egg. The blue square is the snake head. The teal squares are the snake’s body. Set the snake head value to 1, the snake body and the borders to infinity, and the empty spaces to zeros. These values formulates a model about what will happen when the snake head travels to a specific position. Starting from the snake head location, increment the values in a breadth-first traversal pattern until it reaches the egg. Notice that the snake tail looks shrinking but it isn’t because the tail will no longer be there when the snake head travels to its location. The snake is not moving at this stage. This is just a simulation about what happens when the snake moves to a specific position. As we removed the snake tail the value of the entry in the 2D array is reset to zero, yet increment by 1 in the same phase. This may create a greater-than-one value gap between the adjacent entries. The gap is an identification that the snake may have to make a detour. The snake tail will still be there blocking the route if the head travels in a shortest path.

**Thinking about where to go…**

The second part of the algorithm is to have the snake decide which direction to move toward. Starting from the egg position back to the snake head, store the path that will lead the snake head to the destination based on the increasing numerical order in the simulation. If the gap between the adjacent values is greater than one, it means the snake has to make a detour, otherwise the tail will block the path. A delay variable is used to store the excessive adjacent gap values. Each detour path reduces the delay variable value by 2 because it takes at least two additional steps to reach the destination. The path-storing list keeps appending the direction variables until the path made it to the head and there is no delay process required. Finally, the snake will utilize the list to determine which direction to move toward.