COMP 341 – ASSIGNMENT 2

REPORT

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Q1) The features that I used in my evaluation function for the reflex agent are “amount of remaining capsules”, “distance to the closest capsule”, “amount of remaining food”, “distance to the closest food” and “distance to each ghost” together with “scared time of each ghost”. Reciprocals or negative values is a good idea since they help to represent the dangers (or disadvantages) for our agent (pacman). Their occurance leads to a better (more rational) evaluation function.

Q2) The speed of AlphaBetaAgent was higher than the speed of MinimaxAgent. This is becase AlphaBetaAgent prunes some of the nodes in the minimax tree while calculating the next action. Therefore, the time complexity of alpha-beta algorithm is less than the time complexity of minimax algorithm, which makes it more efficient.

Q3) Yes, pacman behaved exactly the same in both cases, except the speed difference. This is because both of the algorithms are optimal, which means they find the same optimal solution (ignoring the tie-breaking cases). The pruning in the AlphaBetaAgent does not effect the minimax value for the root (although intermediary node values may be wrong).

Q4) ExpectimaxAgent’s running speed is similar to the MinimaxAgent’s speed, and it is slower than the AlphaBetaAgent. This is because both Minimax and Expectimax algorithms expand all of the nodes in the minimax tree, while AlphaBeta prunes some of the nodes.

Q5) I adjusted and improved the weights of each feature by observing pacman’s actions in different cases. My initial evaluation function and the features I used were powerful enough so I did not need to change much.

Q6) I prioritized the features that bring high score, such as eating a capsule and eating a ghost while it is scared. And I highly penalized the features that would result in the death of pacman, such as being near to a ghost. I also did trial and error to improve the weights and I prioritized the number of food left and closeness to the nearest food, as these are needed to win the game.