COMP341
Assignment 2

Report

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Written Q1:

In the given variables that we should use, I picked food, ghost distances to find where the closest food and closest ghost is. Thanks to the Manhattan distance function of util.py, I have implemented them easily. The reason I chose them was the main purpose of Pacman that collect all the foods while escaping ghosts. So that, lets think of food example, if it is closer and its distance variable is less enough, score must be incremented by the reciprocal of distance variable. Then, the other variable is distance of ghosts. While closer ghost distance is decreasing, that would be dangerous so that score should be decreased by the distance variable. At first, I did not used reciprocal for that issue but, there comes out a problem. Later, negative reciprocal of it added on score. Then, third feature is whether ghosts are scared or not, I have added this feature because Pacman should not escape while ghosts are scared. Then I applied this on as bool in the if statement of ghost distances issue. The last, fourth feature is if ghost is in front of Pacman just one step ahead, Pacman must escape. To do that score becomes minus infinity.

Written Q2:

In the environment Minimax Agent is used, Pacman got 654 points. When Alphabet Agent is used, it got 1311 points. In my tests, I clearly observed that, Alphabet Agent is much faster than Minimax Agent and has eaten more foods. The reason of being faster is that agent does not considering all the possibility. This decreasing process of possibility check is called pruning. Thanks to this feature in Alpha-Beta pruning, agent moved faster and got better score in a restricted time. At the beginning of the tests, I have clearly seen that Pacman actually stops and evaluate the possibilities for a while and I thought game is stopped. I can say that this example that I observed can highlights the difference of these agents.

Written Q3:

When I run both tests of Minimax Alpha-Beta agents, I observed that they behave exactly same. Only difference between them is the time till the end. Alpha-Beta pruning makes Minimax algorithm faster by eliminating possibilities, pruning.

Written Q4:

By the time the Minimax and Alpha-Beta agents died, the Expectimax agent had more points and at the end of the game Pacman completed the game. Also, it is clearly seen that, Expectimax agent is faster than others. Alpha-Beta and Minimax agents has gotten 913 points and died, but Expectimax has gotten 2180 points and won. Also, this only took 30% more time than the other agents.

Written Q5:

In the evaluation function I wrote for the Reflex agent, I had considered the distance of ghosts to foods and ghosts as the main factor. Afterwards, I got a better evaluation function by adding whether the ghosts were scared or not. However, this algorithm could not achieve sufficient score in the last question. Realizing that I had ignored the capsules, I added them to the evaluation function.

Written Q6:

In the first question, I added the effect of ghosts and foods to the score using the reciprocals of the distances. I tried the weights for food and ghost the same in magnitude but opposite and got a good result. Also, in the first one, if ghosts were scared, I ignored ghost's negative impact on the score. At first, when I did not adjust the weights equal, it could not eat the food while avoiding the ghosts, or in other cases, Pacman could die when his food was focused on eating. In the second evaluation, I started considering capsules and added its weight to half that of food and ghost. Because capsules are usually in tricky areas and increasing the score to the same extent as the others could cause the Pacman to die. I got this result by trial.