Assignment 2 – Part 2

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1. I measured the distance to the closest ghost. If the distance is above a certain threshold, I assigned a constant value to it, so the Pacman will try to avoid it all the time. Other than that, I measured the distance to the closest food. For the evaluation function, first I used reciprocal for the food distance, plus distance to the closest ghost. But with this function Pacman did not move as smoothly as I wished, so I subtracted the total number of foods, which caused Pacman to move as I desired.

In general, I think reciprocals are better for use. If we were to use negative numbers, then moving and picking a food might not considered as a good move, if ghost were to move towards us even though it is far away. In such cases, we have to pick the food, so reciprocals are better for this job.

1. I may not be very precise, but approximately, MinimaxAgent got 116 points after 20 seconds, whereas AlphaBetaAgent got 150 points after 20 seconds. Where multiple agents are clustered in a nearby area, both algorithms were slower. But since AlphaBetaAgent prunes some of the branches, in overall it calculates a smaller number of values, that is why it is faster.
2. Yes, they behaved same. Even though AlphaBetaAgent prunes some of the branches, all of those branches actually contained bad moves. That is why, MinimaxAgent also did not choose them even though it calculated them. So overall, the path does not change, AlphaBetaAgent just manages to find the same path faster.
3. It also got 116 points. My guess is, even though ghosts do not play optimally, we still need to calculate all the branches. That is why, we got a similar result with MinimaxAgent. But I suppose that, at the start if all enemy agents were to do bad moves for a few turns, then maybe ExpectimaxAgent might be a little bit faster, since there would be minimal clustering.
4. In ReflexAgent, I did not need to consider the capsules, since the problem was relatively easier. But this time I had to consider them also. When I considered them, I also had to consider the “Scared Ghosts”. Additionally, I had to tweak with the weight values a lot to find a somehow optimal evaluation function.
5. I realized that eating ghosts were giving a lot of points compared to foods. That is why I prioritized eating the capsules, and eating “Scared Ghosts”, when there is any. Then I gave different weights for the ghosts at difference distances. The ones that are nearer were prioritized, whereas the ones at far away, were not taken into account that much.