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Project 2 Answers

3.1 Reflex Agent

2. What was the feature you used for your evaluation function?
For our ReflexAgent evaluation function, we used the reciprocal of food distances as well as ghost distances as our features.

3.2 Minimax

2. When Pacman believes that his death is unavoidable, he will try to end the game as soon as possible because of the constant penalty for living. Give an explanation as to why the Pacman rushes to the closest ghost in this case?
Pacman assumes that the ghosts are acting optimally, so he sees that any of his plans will end in death. The death that gives Pacman the maximum points is the quickest death, so that is the maximum of the minimum plans found by the minimax tree.

3.4 Expectimax

2. You should find that your ExpectimaxAgent wins about half the time, while your AlphaBetaAgent always loses. Explain why the behavior here differs from the minimax case.
By default, the ghosts here actually act randomly. So assuming that they act optimally can actually lead to Pacman unnecessarily accepting his death and trying to get the highest score that kills him. This is often the case with minimax and the pruned Alpha-Beta. In the case of Expectimax, we are actually assuming that the ghosts act randomly. This makes Pacman a bit more optimistic so to speak, since he’ll actually try to live even when an optimal ghost would kill him no matter what.

3.5 Evaluation Function

2. What features did you use for your new evaluation function?
For this one we used a more extensive set of features. We started with the current game score, and subtracted the amount of food and capsules from it (times 10 for a good weight). Then we subtract the Manhattan distance of the closest food. And finally, if we are within a Manhattan distance of 2 from a ghost, then we just return negative infinity. It turns out avoiding ghosts at all costs like this seems to lead to good results.

4 Self Analysis

1. What was the hardest part of the assignment for you?
Figuring out how to write the minimax (and other) trees in a fairly simplistic way took some figuring out. We originally tried to write in a much more complex way, but we figured out a good recursive way to write it (which was fairly easily adapted to each type of tree).

2. What was the easiest part of the assignment for you?
Coming up with evaluation functions took a little bit of experimentation, but we didn’t have too much trouble with it.

3. What problem(s) helped further your understanding of the course material?
I think this definitely helped us realize how similar these different types of trees are. We have a much better understanding of what the exact differences between them are.

4. Did you feel any problems were tedious and not helpful to your understanding of the Material?
We think every part of this assignment was pretty helpful to our understanding. Nothing was incredibly tedious, except maybe coming up with a good recursive implementation for the trees.

5. What other feedback do you have about this homework?
We liked that each part built upon the previous parts in some way. We implemented an evaluation function and minimax tree, then basically modified them for the next parts.