Ali Taylan Akyürek
64229

# Comp 341 Assignment 2 Report

Written Q1: What are the features you used in your evaluation function for your reflex agent? Why did you chose them? If you have too many, limit yourself to at most 5. Do you think using the reciprocals or negatives of some values is a good idea and why?

My evaluation function generally returns 1/ minDistance. That is logical because min food distance affects most and score should increase with min distance. I could also assign negative distance values and take max but my way is little easier I think. One of the other feature of my function is that: it gives -9999 when there is ghost on that state because that means thats end of game, thats logical. And it gives -9999. When action is stop because we don't want to stop. Another one is that if there is food on that state, function gives 9999 that means immediately go to food if there is food, thats also logical.

Written Q2: Try the following lines of code: python pacman.py -p MinimaxAgent -l trickyClassic -a depth=2 -f python pacman.py -p AlphaBetaAgent -l trickyClassic -a depth=2 -f Run both them until 20 seconds (or less if pacman ends up dieing) and see how far the pacman has got. You do not need to write additional time keeping code, a stopwatch should suffice. In your tests, were you able to see any speed difference between the MinimaxAgent and AlphaBetaAgent, between pacman actions? If so, why and if not why not? Is there any situation you came across that highlights this?

They bot were really slow, although AlphaBeta was faster. I think that's because of prunning. With prunning we do not need to explore some branches of the search tree. That leads a speed differance.

Written Q3: When you were running the tests in the previous question, did your pacman behave exactly in both cases? Why?

Yes. Its because prunning does not effects the path (and action to be taken). It just eliminate some part of tree when we make sure that (based on alpha and beta values) we will not search that part of tree. So, both algorithms will give same behaviour.

Written Q4: Now try the same with the ExpectimaxAgent; python pacman.py -p ExpectimaxAgent -l trickyClassic -a depth=2 -f Comment on how fast your code runs. Compare it with the MinimaxAgent and AlphaBetaAgent. Note that this comparison is trickier to do. If you are not able to conclusively see anything, write what you would have expected.

Expectiminimax works faster. Its reason is I think in Minimax, also all actions are considered. In Expectiminimax,multiplication of value of all considered moves and their probabilities adds up to sum when value is being calculated. That means both consider all actions but one of them choses min, one of them sums them (after multiplied with probabilities). Chosing min is more time consuming in terms of comlexity so I would expect Minimax to run slower, which it is.

Written Q5: We are sure that you were able to write a better evaluation function than the one we used for the programming questions 2-4. Did you change anything from your evaluation function for the ReflexAgent? If so, what were the changes? What, if anything, is different in this case? If you have written something entirely different, comment on your new evaluation function.

I wrote evaluation function for ReflexAgent and betterEvaluationFunction. I explained my evaluationFunction for ReflexAgent at the first question. At betterEvaluationFunction function that I implemented, I made a weighted sum and I considered capsules and score of current state when I calculate sum (also trivially ghost and food distances).

Written Q6: For both the programming questions 1 and 5, you probably needed to tune your feature weights. If so, comment on how you selected your weights, what did you prioritize and why.

I selected weight of food distance 10, weight of capsule distance 20, and weight of ghost distance 3. That seemed logical, because code already returns -infinity when there is ghosts in position so being close to ghosts are not that important. Capsules are more important becuase it eliminates a hughe overhead that is ghosts so its more important than food.