COMP 341/Intro. to Artificial Intelligence

Project 2: Multi-Agent Search

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Q1)

In my ReflexAgent, I focused on a few key strategies. I made sure Pacman goes towards the nearest food, which I did by rewarding shorter distances to food. I was also careful about ghosts: Pacman gets penalized if he’s too close to a non-scared ghost but gets points for being near scared ones, encouraging him to eat them. I also gave extra points for each scared ghost out there. Using the reciprocals for distance calculations was really helpful because it made the agent react more strongly to immediate threats and opportunities.

Q2)

When I compared the Minimax and Alpha-Beta agents, Alpha-Beta was much more faster than Minimax. Score was 718 for A-B and 159 for Minimax in 20 seconds. This makes sense because Alpha-Beta pruning cuts down unnecessary state explorations.

Q3)

Running both the Minimax and Alpha-Beta agents, I saw that Pacman’s overall game strategy didn’t really change. This is expected as both algorithms fundamentally aim for the best possible outcome. But the Alpha-Beta agent sometimes made different moves compared to Minimax. This is probably because of the different ways they process the game tree.

Q4)

Comparing the ExpectimaxAgent (score was approximately similar with Minimax) with the others, I found it a bit slower than Alpha-Beta but similar or sometimes faster than Minimax. Expectimax considers the probability of ghosts’ moves, which adds more complexity and slightly slows it down. Unlike Alpha-Beta, it doesn't prune branches, so it examines more possibilities.

Q5)

I developed an evaluation function that looks at the bigger picture rather than just immediate actions. This new function takes into account the overall influence of ghosts (both scared and not), how close the nearest food is, and how much food is left. This approach is more strategic and comprehensive compared to the initial reflex agent strategy, which was more about quick responses to immediate situations.

Q6)

Deciding on the feature weights for both the reflex agent and the improved evaluation function was a bit of a balancing act. I had to make sure Pacman stayed safe from ghosts while also efficiently collecting food and taking advantage of opportunities like eating scared ghosts. The weights were tuned based on their effectiveness in a variety of game situations, ensuring a good balance between survival and scoring high.