

Artificial Intelligence/ hw2 Multi-Agent

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betterEvaluationFunction()

The evaluation score mainly depends on the following 4 parts, the score from game state, the score from food, the score from ghosts and the score from capsules.

- score: the score got from `currentGameState.getScore()`, which is depends on food ate, time consume, win or lose, etc.
- `_scoreFromFood`: I consider only the closest food distance only. Closer the distance, higher the score. I define the score as " $1/\text{manhattanDistance}(\text{Position of Pacman}, \text{food})$."
- `_scoreFromGhost`: I consider for all ghosts and also their status (scared or not). If the ghost is scared, then the score will add " $\text{pow}(\max(8 - \text{distance to ghost}, 0), 2)$." This way, even the ghost is scared, if it is too far away, Pacman will not trace the ghost. Also, when Pacman is closed to the ghost, the score will increase as second degree of polynomial. On the other hand, if the ghost is normal, the score will minus " $\text{pow}(\max(7 - \text{disGhost}, 0), 2)$." This way, if the ghost is closer, Pacman can avoid to move toward it.
- `_scoreFromCapsules`: To get higher performance, I found that Pacman should eat the capsules and try to eat the ghosts. Therefore, I define the score the " $p/\text{manhattanDistance}(\text{Position of Pacman}, \text{Capsule})$." As you can see, the closer the distance between Pacman and the capsule, the higher the score is. The parameter p is set to 50 after try and error.

I list some of my experiment below for your reference.

| | Avg. Score of Win Game | Win Ratio | Game Finished All Capsules (%) |
|--|------------------------|-----------|--------------------------------|
| Without <code>_scoreFromCapsules</code> | 1350 | 23/30 | 0.53 |
| <code>_scoreFromCapsules</code> $p=1$ | 1440 | 27/30 | 0.6 |
| <code>_scoreFromCapsules</code> $p=10$ | 1466 | 29/30 | 0.73 |
| <code>_scoreFromCapsules</code> $p=50$ | 1556 | 82/100 | 0.87 |
| <code>_scoreFromCapsules</code> $p=100$ | 1513 | 25/30 | 0.86 |