Southern University of Science and Technology

Artificial Intelligence Lab Report

Name：李东旭　Student Number：11612720

Major: Financial Engineering

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Introduction：

This lab construct a smarter ghost agent using Minimax algorithm.

Procedure：

1. Using random ghost agent

```
C:\Users\LDX\Anaconda3\envs\python2.7\python.exe C:/Users/LDX/Desktop/multiagent/pacman.py -p ExpectimaxAgent -l smallClassic -g RandomGhost -q
Pacman died! Score: -109
Pacman emerges victorious! Score: 915
Pacman emerges victorious! Score: 1229
Pacman died! Score: 160
Pacman emerges victorious! Score: 680
Pacman died! Score: 28
Pacman emerges victorious! Score: 1117
Pacman died! Score: -44
Pacman emerges victorious! Score: 709
Pacman emerges victorious! Score: 1023
Average Score: 570.8
Scores:        -109.0, 915.0, 1229.0, 160.0, 680.0, 28.0, 1117.0, -44.0, 709.0, 1023.0
Win Rate:      6/10 (0.60)
Record:        Loss, Win, Win, Loss, Win, Loss, Win, Loss, Win, Win

Process finished with exit code 0
```

2. Using miniMax ghost agent

```
C:\Users\LDX\Anaconda3\envs\python2.7\python.exe C:/Users/LDX/Desktop/multiagent/pacman.py -p ExpectimaxAgent -l smallClassic -g MinimaxGhost -q
Pacman died! Score: -814
Pacman died! Score: -442
Pacman died! Score: -762
Pacman emerges victorious! Score: 771
Pacman died! Score: 220
Pacman emerges victorious! Score: 285
Pacman died! Score: 240
Pacman died! Score: -74
Pacman died! Score: -422
Pacman emerges victorious! Score: 851
Average Score: -14.7
Scores:        -814.0, -442.0, -762.0, 771.0, 220.0, 285.0, 240.0, -74.0, -422.0, 851.0
Win Rate:      3/10 (0.30)
Record:        Loss, Loss, Loss, Win, Loss, Win, Loss, Loss, Loss, Win
```

Analysis(including answer of question)：

3. Describe the performance (in terms of the distribution) of Pacman in each case.

-p ExpectimaxAgent -l specialNew -g RandomGhost -q -n 5

```
C:\Users\LDX\Anaconda3\envs\python2.7\python.exe C:/Users/LDX/Desktop/multiagent/pacman.py -p ExpectimaxAgent -l specialNew -g RandomGhost -q -
Pacman died! Score: -515
Pacman died! Score: -543
Pacman emerges victorious! Score: 498
Pacman died! Score: -515
Pacman emerges victorious! Score: 498
Average Score: -115.4
Scores:        -515.0, -543.0, 498.0, -515.0, 498.0
Win Rate:      2/5 (0.40)
Record:        Loss, Loss, Win, Loss, Win

Process finished with exit code 0
```

-p MinimaxAgent -l specialNew -g RandomGhost -q -n 5

```
C:\Users\LDX\Anaconda3\envs\python2.7\python.exe C:/Users/LDX/Desktop/multiagent/pacman.py -p MinimaxAgent -l specialNew -g RandomGhost -q -n 5
Pacman emerges victorious! Score: 498
Pacman died! Score: -516
Pacman died! Score: -519
Pacman emerges victorious! Score: 484
Pacman died! Score: -506
Average Score: -111.8
Scores:        498.0, -516.0, -519.0, 484.0, -506.0
Win Rate:      2/5 (0.40)
Record:        Win, Loss, Loss, Win, Loss

Process finished with exit code 0
```

-p MinimaxAgent -l specialNew -g MinimaxGhost -q -n 5

```
C:\Users\LDX\Anaconda3\envs\python2.7\python.exe C:/Users/LDX/Desktop/multiagent/pacman.py -p MinimaxAgent -l specialNew -g MinimaxGhost -q -n 5
Pacman died! Score: -520
Pacman died! Score: -506
Pacman died! Score: -520
Pacman emerges victorious! Score: 492
Pacman died! Score: -520
Average Score: -314.8
Scores:        -520.0, -506.0, -520.0, 492.0, -520.0
Win Rate:      1/5 (0.20)
Record:        Loss, Loss, Loss, Win, Loss

Process finished with exit code 0
```

-p ExpectimaxAgent -l specialNew -g MinimaxGhost -q –

```
C:\Users\LDX\Anaconda3\envs\python2.7\python.exe C:/Users/LDX/Desktop/multiagent/pacman.py -p ExpectimaxAgent -l specialNew -g MinimaxGhost -q -
Pacman died! Score: -548
Pacman emerges victorious! Score: 498
Pacman died! Score: -506
Pacman died! Score: -506
Pacman died! Score: -520
Average Score: -316.4
Scores:        -548.0, 498.0, -506.0, -506.0, -520.0
Win Rate:      1/5 (0.20)
Record:        Loss, Win, Loss, Loss, Loss

Process finished with exit code 0
```

In the cases ghost is minimax agent that the Pacman agent implement the correct assumption of the ghosts behavior.

4. Describe why the ghosts seem as if they are cooperating when using minimax even though they are not sharing information with each other.

As for the two ghost using the same algorithm, they will have common refect in most cases, so they are cooperating even if they are not sharing information with each other.

Conclusion and Experience：

The miniMax ghost agent performe better than the Random ghost agent.