ntu 2024spring AI hw2

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Show your autograder results and describe each algorithm:

Q1. Reflex Agent (2%)

```
Question q1
===========

Pacman emerges victorious! Score: 1236
Pacman emerges victorious! Score: 1240
Pacman emerges victorious! Score: 1241
Pacman emerges victorious! Score: 1247
Pacman emerges victorious! Score: 1239
Pacman emerges victorious! Score: 1250
Pacman emerges victorious! Score: 1242
Pacman emerges victorious! Score: 1244
Pacman emerges victorious! Score: 1234
Pacman emerges victorious! Score: 1242
Average Score: 1241.5
Scores:        1236.0, 1240.0, 1241.0, 1247.0, 1239.0, 1250.0, 1242.0, 1244.0, 1234.0, 1242.0
Win Rate:      10/10 (1.00)
Record:        Win, Win, Win, Win, Win, Win, Win, Win, Win, Win
*** PASS: test_cases/q1/grade-agent.test (30.0 of 30.0 points)
***     1241.5 average score (2 of 2 points)
***         Grading scheme:
***          < 500:  0 points
***         >= 500:  1 points
***         >= 1000:  2 points
***     10 games not timed out (0 of 0 points)
***         Grading scheme:
***          < 10:  fail
***         >= 10:  0 points
***     10 wins (2 of 2 points)
***         Grading scheme:
***          < 1:  fail
***         >= 1:  0 points
***         >= 5:  1 points
***         >= 10:  2 points

### Question q1: 30/30 ###


Finished at 0:49:32

Provisional grades
==================
Question q1: 30/30
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Total: 30/30

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.

~/De/nt/2024/AI/hw2/A/AI2024-hw2  main !1 ?2
```
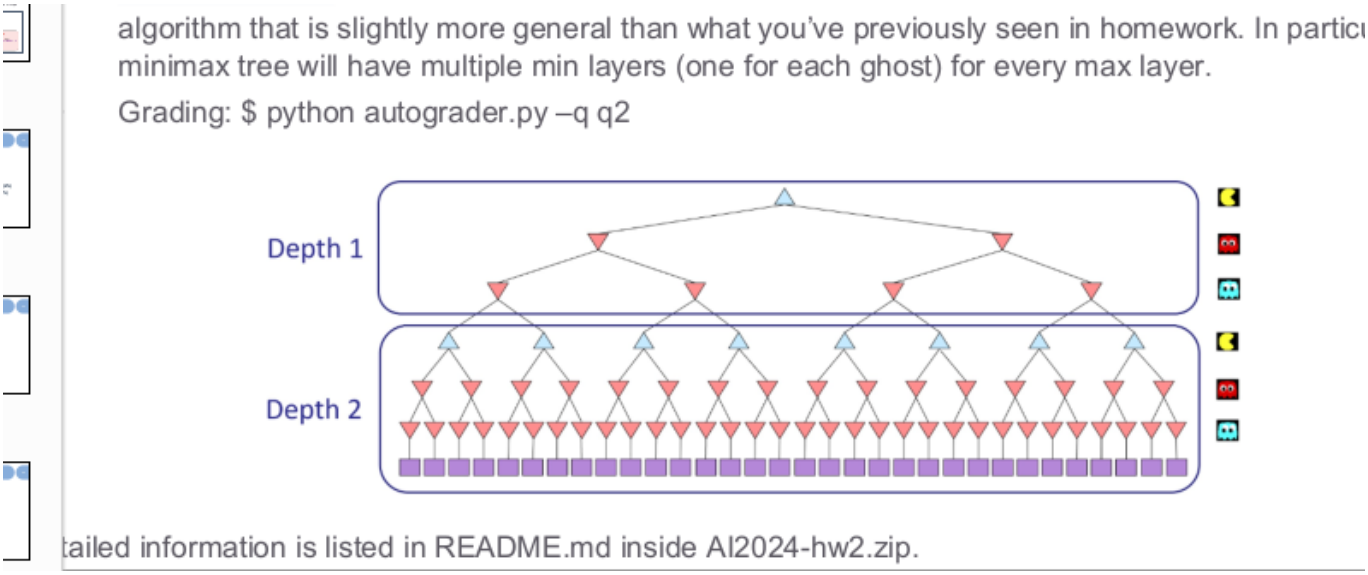

find the closest food also avoid from ghost if ghost is too close. return reciprocal the closest if the ghost isn't too close, in this way, pacman can simply find the food.

Q2. Minimax (2%)

```
*** PASS: test_cases/q2/1-5-minmax.test
*** PASS: test_cases/q2/1-6-minmax.test
*** PASS: test_cases/q2/1-7-minmax.test
*** PASS: test_cases/q2/1-8-minmax.test
*** PASS: test_cases/q2/2-1a-vary-depth.test
*** PASS: test_cases/q2/2-1b-vary-depth.test
*** PASS: test_cases/q2/2-2a-vary-depth.test
*** PASS: test_cases/q2/2-2b-vary-depth.test
*** PASS: test_cases/q2/2-3a-vary-depth.test
*** PASS: test_cases/q2/2-3b-vary-depth.test
*** PASS: test_cases/q2/2-4a-vary-depth.test
*** PASS: test_cases/q2/2-4b-vary-depth.test
*** PASS: test_cases/q2/2-one-ghost-3level.test
*** PASS: test_cases/q2/3-one-ghost-4level.test
*** PASS: test_cases/q2/4-two-ghosts-3level.test
*** PASS: test_cases/q2/5-two-ghosts-4level.test
*** PASS: test_cases/q2/6-tied-root.test
*** PASS: test_cases/q2/7-1a-check-depth-one-ghost.test
*** PASS: test_cases/q2/7-1b-check-depth-one-ghost.test
*** PASS: test_cases/q2/7-1c-check-depth-one-ghost.test
*** PASS: test_cases/q2/7-2a-check-depth-two-ghosts.test
*** PASS: test_cases/q2/7-2b-check-depth-two-ghosts.test
*** PASS: test_cases/q2/7-2c-check-depth-two-ghosts.test
*** Running MinimaxAgent on smallClassic 1 time(s).
Pacman died! Score: 84
Average Score: 84.0
Scores:        84.0
Win Rate:      0/1 (0.00)
Record:        Loss
*** Finished running MinimaxAgent on smallClassic after 0 seconds.
*** Won 0 out of 1 games. Average score: 84.000000 ***
*** PASS: test_cases/q2/8-pacman-game.test

### Question q2: 30/30 ###


Finished at 0:50:25

Provisional grades
==================
Question q2: 30/30
------------------
Total: 30/30

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.

 ~/De/nt/2024/AI/hw2/A/AI2024-hw2  main !1 ?2
```

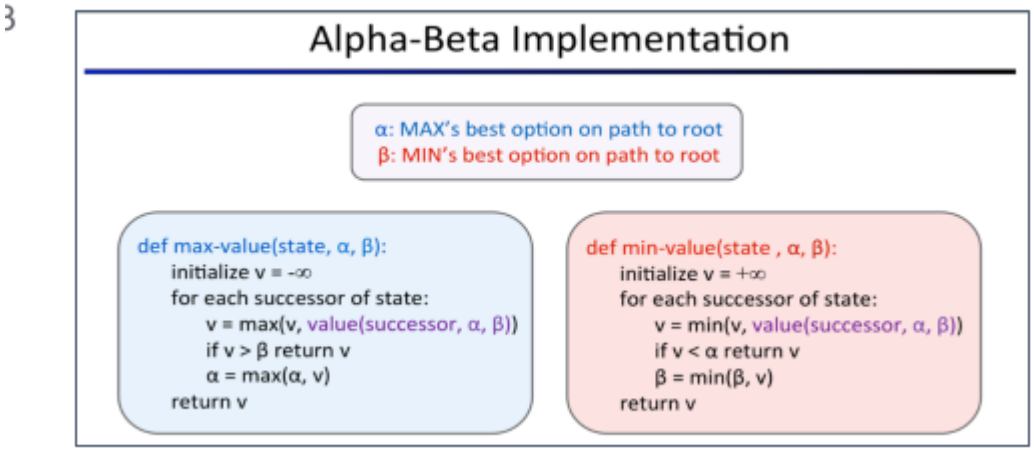
build the minmax as picture in AI2024-hw2.pdf



Q3. Alpha-Beta Pruning (2%)

```
*** PASS: test_cases/q3/1-5-minmax.test
*** PASS: test_cases/q3/1-6-minmax.test
*** PASS: test_cases/q3/1-7-minmax.test
*** PASS: test_cases/q3/1-8-minmax.test
*** PASS: test_cases/q3/2-1a-vary-depth.test
*** PASS: test_cases/q3/2-1b-vary-depth.test
*** PASS: test_cases/q3/2-2a-vary-depth.test
*** PASS: test_cases/q3/2-2b-vary-depth.test
*** PASS: test_cases/q3/2-3a-vary-depth.test
*** PASS: test_cases/q3/2-3b-vary-depth.test
*** PASS: test_cases/q3/2-4a-vary-depth.test
*** PASS: test_cases/q3/2-4b-vary-depth.test
*** PASS: test_cases/q3/2-one-ghost-3level.test
*** PASS: test_cases/q3/3-one-ghost-4level.test
*** PASS: test_cases/q3/4-two-ghosts-3level.test
*** PASS: test_cases/q3/5-two-ghosts-4level.test
*** PASS: test_cases/q3/6-tied-root.test
*** PASS: test_cases/q3/7-1a-check-depth-one-ghost.test
*** PASS: test_cases/q3/7-1b-check-depth-one-ghost.test
*** PASS: test_cases/q3/7-1c-check-depth-one-ghost.test
*** PASS: test_cases/q3/7-2a-check-depth-two-ghosts.test
*** PASS: test_cases/q3/7-2b-check-depth-two-ghosts.test
*** PASS: test_cases/q3/7-2c-check-depth-two-ghosts.test
*** Running AlphaBetaAgent on smallClassic 1 time(s).
Pacman died! Score: 84
Average Score: 84.0
Scores:        84.0
Win Rate:      0/1 (0.00)
Record:        Loss
*** Finished running AlphaBetaAgent on smallClassic after 0 seconds.
*** Won 0 out of 1 games. Average score: 84.000000 ***
*** PASS: test_cases/q3/8-pacman-game.test

### Question q3: 30/30 ###


Finished at 0:50:32

Provisional grades
==================
Question q3: 30/30
------------------
Total: 30/30

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.

 ~/De/nt/2024/AI/hw2/A/AI2024-hw2  main !1 ?2
```

build the minmax as picture in AI2024-hw2.pdf add the alpha-beta Pruning as



Describe the idea of your design about evaluation function in Q1

Just simply move toward the food with shortest manhattanDistance. if the ghost is next to the pacman, return -1 to avoid pacman kill itself.

Demonstrate the speed up after the implementation of pruning.

simply modify autograder.py (Note: No any other modify)

```
            display=getDisplay(True, options))
    else:
        import time
        start_time = time.time()
        evaluate(options.generateSolutions, options.testRoot, moduleDict,
                 gsOutput=options.gsOutput,
                 edxOutput=options.edxOutput, muteOutput=options.muteOutput, printTestCase=options.printTestCase,
                 questionToGrade=options.gradeQuestion, display=getDisplay(options.gradeQuestion != None, options))
        print("--- %s seconds ---" % (time.time() - start_time))
```

result: speed up = 1.185210647

Minmax:

```
==================
Question q2: 30/30
==================
Total: 30/30

Your grades are NOT yet registered.  To registe
to follow your instructor's guidelines to recei

--- 0.40775299072265625 seconds ---
~/De/nt/2024/AI/hw2/A/AI2024-hw2
```

alpha-beta:

```
Provisional grades
==================
Question q3: 30/30
==================
Total: 30/30

Your grades are NOT yet registered.  To register your grad
to follow your instructor's guidelines to receive credit o

--- 0.34403419494628906 seconds ---
~/De/nt/2024/AI/hw2/A/AI2024-hw2 main !1 ?1
```