

ntu 2024spring AI hw1

R12922146 侯善融

Show your autograder results and describe each algorithm:

Q1. Depth First Search (1%)

```
ghostAgents.py  keyboardAgents.py  pacman.py  README.md  searchTest
~/De/nt/2024/AI/hw1  main !2 ?3  python autograder.py -q q1
Starting on 3-26 at 23:44:02

Question q1
=====
*** PASS: test_cases/q1/pacman_1.test
***   pacman layout:      mediumMaze
***   solution length: 130
***   nodes expanded:     146

### Question q1: 5/5 ###

Finished at 23:44:02

Provisional grades
=====
Question q1: 5/5
-----
Total: 5/5

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

dfs with a stack to record the path, if there is any valid successor, push into stack, otherwise, backtrack to next valid successor in the stack.

Q2. Breadth First Search (1%)

```
~/De/nt/2024/AI/hw1 main !2 ?3 python autograder.py -q q2
Starting on 3-26 at 23:44:39

Question q2
=====
*** PASS: test_cases/q2/pacman_1.test
***   pacman layout:      mediumMaze
***   solution length: 68
***   nodes expanded:     269

### Question q2: 5/5 ###

Finished at 23:44:39

Provisional grades
=====
Question q2: 5/5
-----
Total: 5/5

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

just a simple bfs strategy

Q3. Uniform Cost Search (1%)

```
~/De/nt/2024/AI/hw1 main !2 ?3 python autograder.py -q q3
Starting on 3-26 at 23:45:05

Question q3
=====
*** PASS: test_cases/q3/ucs_4_testSearch.test
***   pacman layout:      testSearch
***   solution length: 7
***   nodes expanded:     14
*** PASS: test_cases/q3/ucs_5_goalAtDequeue.test
***   solution:           ['1:A->B', '0:B->C', '0:C->G']
***   expanded_states:    ['A', 'B', 'C']

### Question q3: 10/10 ###

Finished at 23:45:05

Provisional grades
=====
Question q3: 10/10
-----
Total: 10/10

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

While p_queue is not empty, do the following:

1. Pop the state with the lowest cost from p_queue.
2. If the popped state is a goal state, terminate the search.
3. Otherwise, for each successor of the current state:
4. If the successor state hasn't been visited, update its cost and add it to p_queue.
5. Update the path information for the successor if a shorter path is found.
6. Backtrack from the goal state to the start state to find the optimal path.

Q4. A* Search (null Heuristic) (1%)

```

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/hw1 main !2 ?3 python autograder.py -q q4
Starting on 3-26 at 23:45:20

Question q4
=====
*** PASS: test_cases/q4/astar_0.test
***      solution:      ['Right', 'Down', 'Down']
***      expanded_states: ['A', 'B', 'D', 'C', 'G']

### Question q4: 15/15 ###

Finished at 23:45:20

Provisional grades
=====
Question q4: 15/15
-----
Total: 15/15

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/hw1 main !2 ?3

```

While fringe is not empty, do the following:

1. Pop a node from the fringe. This node contains information about the current location, the path taken to reach it, and the cumulative cost.
2. If the current location has not been visited:
3. Mark the current location as visited.
4. For each successor of the current location:
 1. If the successor has not been visited:
 2. cost to reach the successor = cost of reaching the current node + the cost of the action leading to the successor.
5. Calculate the priority of the successor by adding the cost to reach the successor and the heuristic estimate of the remaining cost from the successor to the goal. Push the successor onto the fringe with its calculated priority.

Q5. Breadth First Search (Finding all the Corners) (1%)

```
Question q2
=====
*** PASS: test_cases/q2/pacman_1.test
***   pacman layout:      mediumMaze
***   solution length: 68
***   nodes expanded:    269

### Question q2: 5/5 ###

Question q5
=====
*** PASS: test_cases/q5/corner_tiny_corner.test
***   pacman layout:      tinyCorner
***   solution length:    28

### Question q5: 5/5 ###

Finished at 23:45:33

Provisional grades
=====
Question q2: 5/5
Question q5: 5/5
-----
Total: 10/10

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

Base on last algo, but calculate the manhattanDistance to the corner and choose the minimal cost one

Q6. A* Search (Corners Problem: Heuristic) (1%)

```

Note: due to dependencies, the following tests will be run q4, q6
Starting on 3-26 at 23:46:02

Question q4
=====
*** PASS: test_cases/q4/astar_0.test
***   solution:      ['Right', 'Down', 'Down']
***   expanded_states: ['A', 'B', 'D', 'C', 'G']

### Question q4: 15/15 ###

Question q6
=====
*** PASS: heuristic value less than true cost at start state
path: ['North', 'East', 'East', 'East', 'East', 'North', 'North', 'West', 'West', 'West', 'West', 'West', 'West', 'South', 'South', 'South', 'West', 'West', 'North', 'East', 'East', 'North', 'North', 'North', 'North', 'North', 'East', 'East', 'East', 'North', 'North', 'North', 'North', 'North', 'West', 'West', 'West', 'West', 'South', 'South', 'East', 'East', 'East', 'East', 'South', 'South', 'South', 'South', 'South', 'South', 'East', 'East', 'East', 'East', 'East', 'East', 'South', 'South', 'East', 'East', 'East', 'East', 'East', 'North', 'North', 'East', 'East', 'South', 'South', 'South', 'South', 'South', 'North', 'North', 'North', 'North', 'North', 'North', 'North', 'North', 'West', 'West', 'North', 'North', 'East', 'East', 'North', 'North']
path length: 106
*** PASS: Heuristic resulted in expansion of 1136 nodes

### Question q6: 9/9 ###

Finished at 23:46:02

Provisional grades
=====
Question q4: 15/15
Question q6: 9/9
=====
Total: 24/24

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

```

Describe the difference between Uniform Cost Search and A* Contours (2%)

Uniform-cost expands equally in all "directions" A* expands mainly toward the goal, but does hedge its bets to ensure optimality

Describe the idea of Admissibility Heuristic (2%)

Admissible (optimistic) heuristics slow down bad plans but never outweigh true costs