

作業三

404410039 李維哲

A*實作:

將 BFS 中的 Queue 改成 PriorityQueue

利用成本與估計成本做排序

即可實作出 A*

heuristic 在輸入參數時設定 測試時是使用已經寫好的 manhattanHeuristic

CornerProblem

把原本 PositionSearchProblem 的結束條件改成走完四個角落

遇到問題點:

在 copy corner_state 時若用單純的=做 assign

會導致 assign 的是指標而不是我們要的 state 內容

在內部做修改時會動到原本的值導致錯誤

所以需要使用 copy 裡的 deepcopy(使用方法是從網路找的)

CornerProblem + cornersHeuristic

cornersHeuristic 實作:

計算方式:

先找距離當下點最近.且未走過的角落

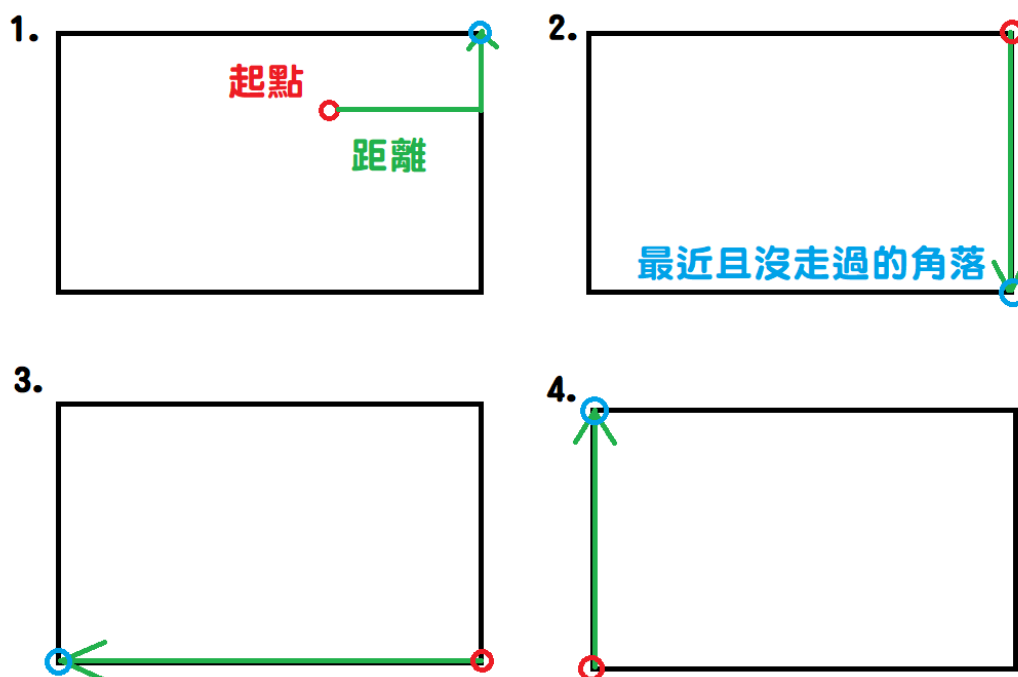
計算該點到該角落的距離

移動到該角落.並標記此角落已走過

將該角落作為起始點

重複上述動作，直到所有角落皆被走過，最後加總移動的距離

圖解:



結果:

```
Windows PowerShell
PS E:\LWJ\大學\人工智慧導論\hw3\search> python pacman.py -l bigMaze -z .5 -p SearchAgent -a fn=astar,heuristic=manhattanHeuristic
[SearchAgent] using function astar and heuristic manhattanHeuristic
[SearchAgent] using problem type PositionSearchProblem
Start: (35, 1)
Is the start a goal? False
Start's successors: [((35, 2), 'North', 1), ((34, 1), 'West', 1)]
Path found with total cost of 210 in 0.0 seconds
Search nodes expanded: 554
Pacman emerges victorious! Score: 300
Average Score: 300.0
Scores: 300
Win Rate: 1/1 (1.00)
Record: Win
PS E:\LWJ\大學\人工智慧導論\hw3\search> python pacman.py -l tinyCorners -p SearchAgent -a fn=bfs,prob=CornersProblem
[SearchAgent] using function bfs
[SearchAgent] using problem type CornersProblem
Start: ((4, 5), [0, 0, 0, 0])
Is the start a goal? False
Start's successors: [(((4, 6), [0, 0, 0, 0]), 'North', 1), (((5, 5), [0, 0, 0, 0]), 'East', 1), (((3, 5), [0, 0, 0, 0]), 'West', 1)]
Path found with total cost of 28 in 0.0 seconds
Search nodes expanded: 253
Pacman emerges victorious! Score: 512
Average Score: 512.0
Scores: 512
Win Rate: 1/1 (1.00)
Record: Win
PS E:\LWJ\大學\人工智慧導論\hw3\search>
PS E:\LWJ\大學\人工智慧導論\hw3\search> python pacman.py -l mediumCorners -p SearchAgent -a fn=bfs,prob=CornersProblem
[SearchAgent] using function bfs
[SearchAgent] using problem type CornersProblem
Start: ((5, 1), [0, 0, 0, 0])
Is the start a goal? False
Start's successors: [(((5, 2), [0, 0, 0, 0]), 'North', 1)]
Path found with total cost of 106 in 0.3 seconds
Search nodes expanded: 1967
Pacman emerges victorious! Score: 434
Average Score: 434.0
Scores: 434
Win Rate: 1/1 (1.00)
Record: Win
PS E:\LWJ\大學\人工智慧導論\hw3\search> python pacman.py -l mediumCorners -p AStarCornersAgent -z 0.5
Start: ((5, 1), [0, 0, 0, 0])
Is the start a goal? False
Start's successors: [(((5, 2), [0, 0, 0, 0]), 'North', 1)]
Path found with total cost of 106 in 0.1 seconds
Search nodes expanded: 698
Pacman emerges victorious! Score: 434
Average Score: 434.0
Scores: 434
Win Rate: 1/1 (1.00)
Record: Win
PS E:\LWJ\大學\人工智慧導論\hw3\search>
```

A*:

cost: 210

expand node: 554

score: 300

CornerProblem

cost: 106

expand node: 1967

score: 434

CornerProblem + cornersHeuristic

cost: 106

expand node: 698

score: 434

使用到的指令:

```
python pacman.py -l bigMaze -z .5 -p SearchAgent -a
```

```
fn=astar,heuristic=manhattanHeuristic
```

```
python pacman.py -l tinyCorners -p SearchAgent -a fn=bfs,prob=CornersProblem
```

```
python pacman.py -l mediumCorners -p SearchAgent -a fn=bfs,prob=CornersProblem
```

```
python pacman.py -l mediumCorners -p AStarCornersAgent -z 0.5
```