CS 435 Artificial Intelligence: Homework 2
Game Playing

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Question 1-Depth First Search (DFS)
The Depth First Search (DFS) will keep searching the path to the destination by first exploring the neighbor nodes that have not been reached. It doesn't care about the cost. Therefore, DFS will not necessarily find the optimal solution.

tinyMaze:
[SearchAgent]: using function tinyMazeSearch
[SearchAgent]: using problem type PositionSearchProblem
Path found with total cost of 8 in 0.0 seconds
Search nodes expanded: 0
Pacman emerges victorious! Score: 502
Average Score: 502.0
Scores: 502.0
Win Rate: 1/1 (1.00)
Record: Win

mediumMaze:
[SearchAgent]: using function depthFirstSearch
[SearchAgent]: using problem type PositionSearchProblem
Path found with total cost of 130 in 0.0 seconds
Search nodes expanded: 144
Pacman emerges victorious! Score: 380
Average Score: 380.0
Scores: 380.0
Win Rate: 1/1 (1.00)
Record: Win

bigMaze:
[SearchAgent]: using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 210 in 0.0 seconds
Search nodes expanded: 390
Pacman emerges victorious! Score: 300
Average Score: 300.0
Scores: 300.0
Win Rate: 1/1 (1.00)
Record: Win

Question 2-Breadth First Search (BFS)
tinyMaze:
[SearchAgent] using function bfs
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 8 in 0.0 seconds
Search nodes expanded: 15
Pacman emerges victorious! Score: 502
Average Score: 502.0
Scores: 502.0
Win Rate: 1/1 (1.00)
Record: Win

mediumMaze:
[SearchAgent] using function bfs
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 68 in 0.0 seconds
Search nodes expanded: 269
Pacman emerges victorious! Score: 442
Average Score: 442.0
Scores: 442.0
Win Rate: 1/1 (1.00)
Record: Win

bigMaze:
[SearchAgent] using function bfs
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 210 in 0.1 seconds
Search nodes expanded: 620
Pacman emerges victorious! Score: 300
Average Score: 300.0
Scores: 300.0
Win Rate: 1/1 (1.00)
Record: Win

Grad Stucent-Iterative Eeepening Search:
tinyMaze:
[SearchAgent] using function ids
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 10 in 0.0 seconds
Search nodes expanded: 86
Pacman emerges victorious! Score: 500
Average Score: 500.0
Scores: 500.0
Win Rate: 1/1 (1.00)
Record: Win

mediumMaze:
[SearchAgent] using function ids
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 68 in 0.1 seconds
Search nodes expanded: 8138
Pacman emerges victorious! Score: 442
Average Score: 442.0
Scores: 442.0
Win Rate: 1/1 (1.00)
Record: Win

bigMaze:
[SearchAgent] using function ids
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 210 in 1.3 seconds
Search nodes expanded: 60211
Pacman emerges victorious! Score: 300
Average Score: 300.0
Scores: 300.0
Win Rate: 1/1 (1.00)
Record: Win

Question 3-Uniform Cost Search (UCS):
mediumMaze:
[SearchAgent] using function ucs
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 68 in 0.0 seconds
Search nodes expanded: 269
Pacman emerges victorious! Score: 442
Average Score: 442.0
Scores: 442.0
Win Rate: 1/1 (1.00)
Record: Win

mediumDottedMaze:
Path found with total cost of 1 in 0.0 seconds
Search nodes expanded: 186
Pacman emerges victorious! Score: 646
Average Score: 646.0
Scores: 646.0
Win Rate: 1/1 (1.00)
Record: Win

mediumScaryMaze:
Path found with total cost of 68719479864 in 0.0 seconds
Search nodes expanded: 108
Pacman emerges victorious! Score: 418
Average Score: 418.0
Scores: 418.0
Win Rate: 1/1 (1.00)
Record: Win

Grad Stucent-New Cost Fuction:

Question 4-A* search using manhattanHeuristic:
tinyMaze:
[SearchAgent] using function astar and heuristic manhattanHeuristic
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 8 in 0.0 seconds
Search nodes expanded: 14
Pacman emerges victorious! Score: 502
Average Score: 502.0
Scores: 502.0
Win Rate: 1/1 (1.00)
Record: Win

mediumMaze:
[SearchAgent] using function astar and heuristic manhattanHeuristic
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 68 in 0.0 seconds
Search nodes expanded: 222
Pacman emerges victorious! Score: 442
Average Score: 442.0
Scores: 442.0
Win Rate: 1/1 (1.00)
Record: Win

bigMaze:
[SearchAgent] using function astar and heuristic manhattanHeuristic
[SearchAgent] using problem type PositionSearchProblem
Path found with total cost of 210 in 0.2 seconds
Search nodes expanded: 549
Pacman emerges victorious! Score: 300
Average Score: 300.0
Scores: 300.0
Win Rate: 1/1 (1.00)
Record: Win

Question 5-Solves the corners problem with a BFS agent:
tinyCorners:
[SearchAgent] using function bfs
[SearchAgent] using problem type CornersProblem
Path found with total cost of 28 in 0.0 seconds
Search nodes expanded: 252
Pacman emerges victorious! Score: 512
Average Score: 512.0
Scores: 512.0
Win Rate: 1/1 (1.00)
Record: Win

mediumCorners:
[SearchAgent] using function bfs
[SearchAgent] using problem type CornersProblem
Path found with total cost of 106 in 0.2 seconds
Search nodes expanded: 1966
Pacman emerges victorious! Score: 434
Average Score: 434.0
Scores: 434.0
Win Rate: 1/1 (1.00)
Record: Win

Grad Student-Heuristic for corner proglem
Description

tinyCorners:
[SearchAgent] using function astar and heuristic cornersHeuristic
[SearchAgent] using problem type CornersProblem
Path found with total cost of 32 in 0.0 seconds
Search nodes expanded: 60
Pacman emerges victorious! Score: 508
Average Score: 508.0
Scores: 508.0
Win Rate: 1/1 (1.00)
Record: Win

mediumCorners:
[SearchAgent] using function astar and heuristic cornersHeuristic
[SearchAgent] using problem type CornersProblem
Path found with total cost of 106 in 0.1 seconds
Search nodes expanded: 312
Pacman emerges victorious! Score: 434
Average Score: 434.0
Scores: 434.0
Win Rate: 1/1 (1.00)
Record: Win

Question 7-Solves the eating all the dots problem with A* with a null heuristic:
testSearch:
[SearchAgent] using function astar and heuristic nullHeuristic
[SearchAgent] using problem type FoodSearchProblem
Path found with total cost of 7 in 0.0 seconds
Search nodes expanded: 14
Pacman emerges victorious! Score: 513
Average Score: 513.0
Scores: 513.0
Win Rate: 1/1 (1.00)
Record: Win

trickySearch
[SearchAgent] using function astar and heuristic nullHeuristic
[SearchAgent] using problem type FoodSearchProblem
Path found with total cost of 60 in 75.8 seconds
Search nodes expanded: 16688
Pacman emerges victorious! Score: 570
Average Score: 570.0
Scores: 570.0
Win Rate: 1/1 (1.00)
Record: Win

Grad Student-Solves the eating all the dots problem with A* with a foodHeuristic:
Description

testSearch:
Path found with total cost of 7 in 0.0 seconds
Search nodes expanded: 8
Pacman emerges victorious! Score: 513
Average Score: 513.0
Scores: 513.0
Win Rate: 1/1 (1.00)
Record: Win

trickySearch:
[SearchAgent] using function astar and heuristic foodHeuristic
[SearchAgent] using problem type FoodSearchProblem
Path found with total cost of 60 in 0.1 seconds
Search nodes expanded: 233
Pacman emerges victorious! Score: 570
Average Score: 570.0
Scores: 570.0
Win Rate: 1/1 (1.00)
Record: Win