**Lab 2: Uninformed Search in Pac-Man**

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**python pacman.py -l tinyMaze -p SearchAgent -a fn=tinyMazeSearch**

A screenshot of a computer program

AI-generated content may be incorrect.

**Ex 1:** Implement the depth-first search algorithm in the **depthFirstSearch** function in search.py

A computer screen shot of a program code

AI-generated content may be incorrect.

**python pacman.py -l tinyMaze -p SearchAgent -a fn=dfs**

A screenshot of a video game

AI-generated content may be incorrect.

A computer screen with white text

AI-generated content may be incorrect.

**python pacman.py -l mediumMaze -p SearchAgent -a fn=dfs**

A maze with a black background

AI-generated content may be incorrect.

A screen shot of a computer

AI-generated content may be incorrect.

**python pacman.py -l bigMaze -p SearchAgent -z .5 -a fn=dfs**

A maze with a yellow light in the middle

AI-generated content may be incorrect.

A screen shot of a computer

AI-generated content may be incorrect.

**DFS (Depth-First Search)** explores as deeply as possible before backtracking, so the order may appear erratic and inefficient.

Ex 2: Implement the breadth-first search algorithm in the **breadthFirstSearch** function in **search.py**

A computer screen shot of a program code

AI-generated content may be incorrect.

**python pacman.py -l tinyMaze -p SearchAgent -a fn=bfsA screenshot of a video game

AI-generated content may be incorrect.**

A screen shot of a computer

AI-generated content may be incorrect.

**python pacman.py -l mediumMaze -p SearchAgent -a fn=bfs**

A maze with a black background

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

**python pacman.py -l bigMaze -p SearchAgent -z .5 -a fn=bfs**

**A maze with a person in the middle

AI-generated content may be incorrect.**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Yes, Breadth-First Search (BFS) finds the least-cost solution if all actions (movements) have the same cost.**

**Ex 3:** Implement the uniform-cost search algorithm in the **uniformCostSearch** function in search.py.

A screen shot of a computer program

AI-generated content may be incorrect.

**python pacman.py -l mediumMaze -p SearchAgent -a fn=ucs**

A maze with a blue line

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

**python pacman.py -l mediumDottedMaze -p StayEastSearchAgent**

A maze with a black background

AI-generated content may be incorrect.

A screenshot of a computer program

AI-generated content may be incorrect.

**python pacman.py -l mediumScaryMaze -p StayWestSearchAgent**

A game with a maze and a green character

AI-generated content may be incorrect.

A screen shot of a computer

AI-generated content may be incorrect.

**UCS (Uniform-Cost Search)** expands the lowest-cost nodes first, which can vary depending on terrain costs.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Depth-First Search** | | | **Breadth-First Search** | | | **Uniform-Cost Search** | | |
| **Maze** | **#nodes explored** | **Solution length** | **Is it optimal?** | **#nodes explored** | **Solution length** | **Is it optimal?** | **#nodes explored** | **Solution length** | **Is it optimal?** |
| **Tiny** | **15** | **10** | **No** | **15** | **8** | **Yes** | **16** | **8** | **Yes** |
| **Medium** | **146** | **130** | **No** | **269** | **68** | **Yes** | **275** | **68** | **Yes** |
| **Big** | **390** | **210** | **No** | **620** | **Yes** | **No** | **620** | **210** | **Yes** |

**With MediumScary Maze:**

* Nodes Explored: 108
* Solution length: 68719479864

**With MediumDottedMaze:**

* Nodes Explored: 186
* Solution length: 1