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Exercise 1: The Pac-Man board will show an overlay of color for the states explored and the order in which they were explored (brighter red means earlier exploration). Is the exploration order what you would have expected? Does Pac-Man actually go to all the explored squares on his way to the goal?

- Run command "*python pacman.py -l mediumMaze -p SearchAgent -a fn=dfs*", we see that pacman discover the first path to the last path. The order of discovery is expected for DFS, which explores all possible paths to the maximum depth. However, the pacman doesn't go to all the explored squares on the way to the goal.

Exercise 2: Does BFS find a least cost solution?

No, BFS does not find the path with the least cost because BFS finds the shortest path in terms of number of transitions.

Exercise 3: Does UCS find a least cost solution? How many nodes are expanded?

Yes. Uniform cost search finds the shortest path with the lowest cost because it finds the shortest path between two nodes.

Comparison the node explored, the solution length, optimalization between 3 searches, Depth first search, Breadth first search, and Uniform cost search using table.

	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	16	10	No	15	8	Yes	15	8	Yes
medium	147	130	No	269	68	Yes	269	68	Yes
big	391	210	No	620	210	Yes	620	210	Yes

Table 1. Values record for DFS, BFS, UCS

	Uniform-Cost Search

Maze	#nodes explored	Solution length
medium	269	68
mediumDotted	186	1
mediumScaryMaze	108	68719479864

Table 2. UCS in different mazes.

Discussion/reflection of how the searches compare:

Breadth-first search and uniform cost search are much more efficient than depth-first search, based on the solution length (cost) of the agent. Therefore, we can conclude that uniform cost search or breadth first search with identical values step cost is optimal even if it returns the first path establish. In addition, they are iterative deepening, the step cost is identical or not reduced function of the depth of a button.