

Project 1 – Pacman Path/Location Search

CSC 412 –Intelligent Systems

California Baptist University

Instructor: Dr. Dan Grissom

Due: 02/13/2022

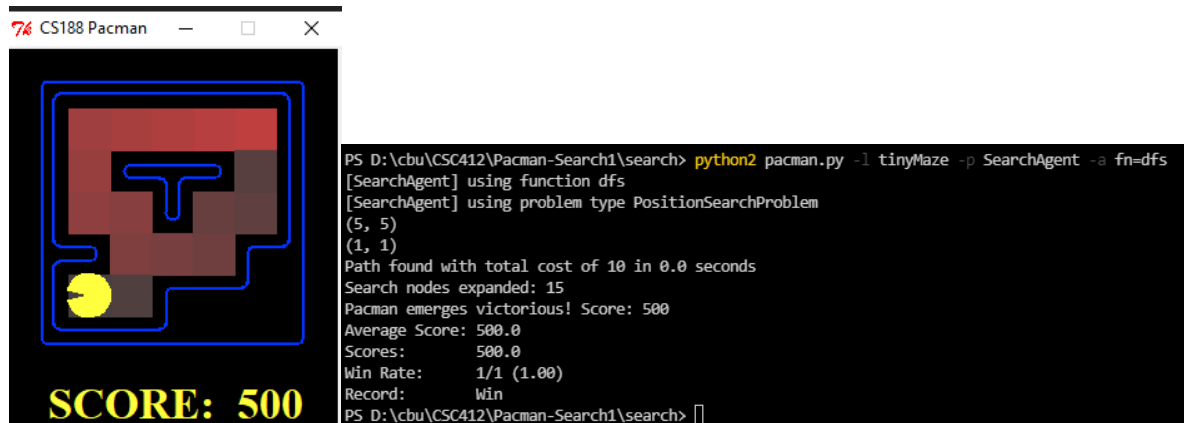
Johana Chazaro Cortes

Roberto Rodriguez

Individual Results

Question 1 – Tiny DFS

Screenshot

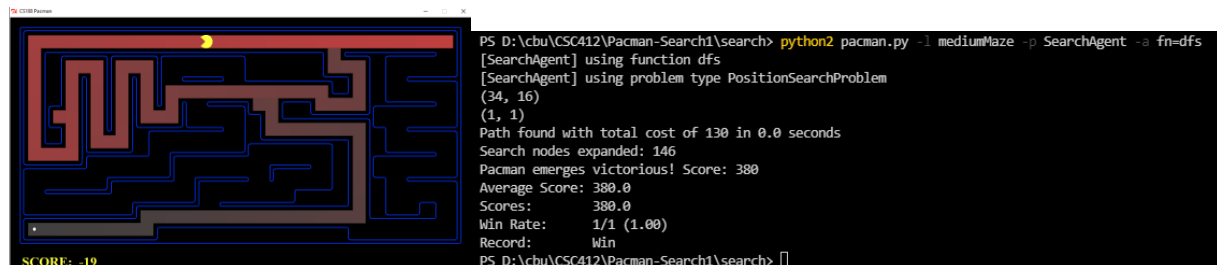


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
10	0.0	15	500

Question 1 – Medium DFS

Screenshot

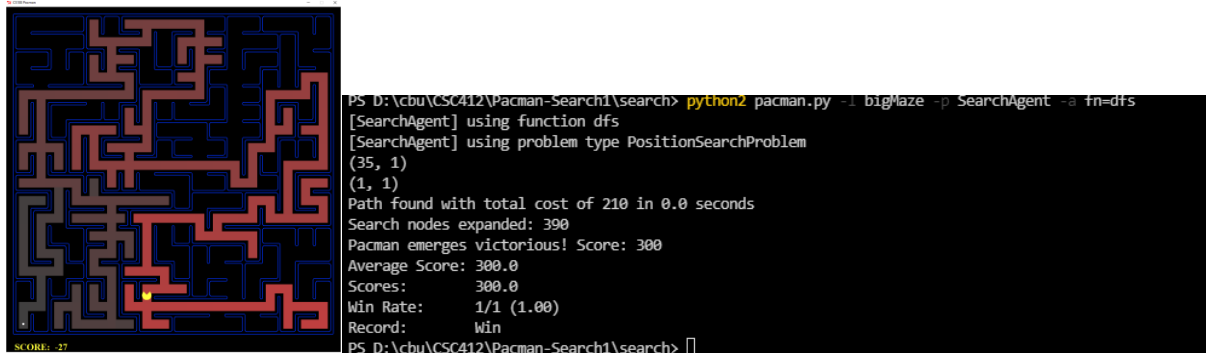


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
130	0.1	146	380.0

Question 1 – Big DFS

Screenshot



Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
210	0.0	390	300.0

Question 2 – Tiny BFS

Screenshot



Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
8	0.0	15	502.0

Question 2 – Medium BFS

Screenshot

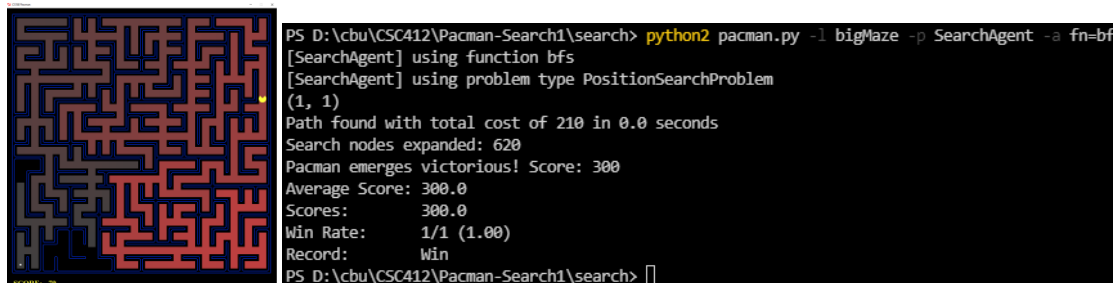


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
68	0.0	269	442.0

Question 2 – Big BFS

Screenshot

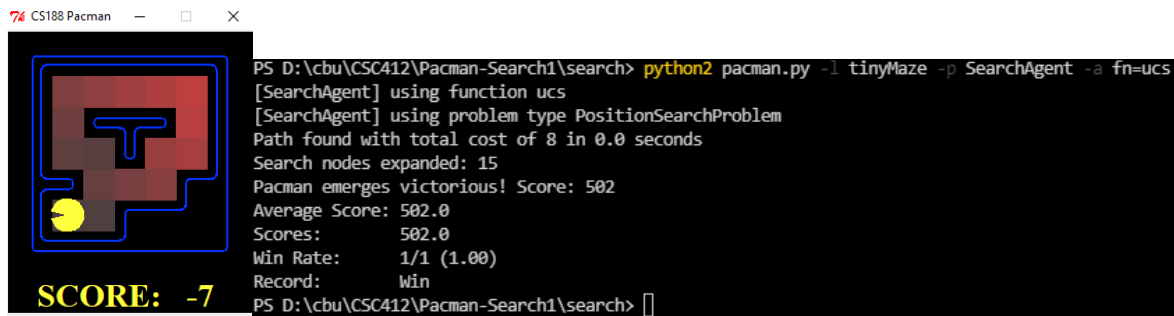


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
210	0.0	620	300.0

Question 3 – Tiny UCS

Screenshot

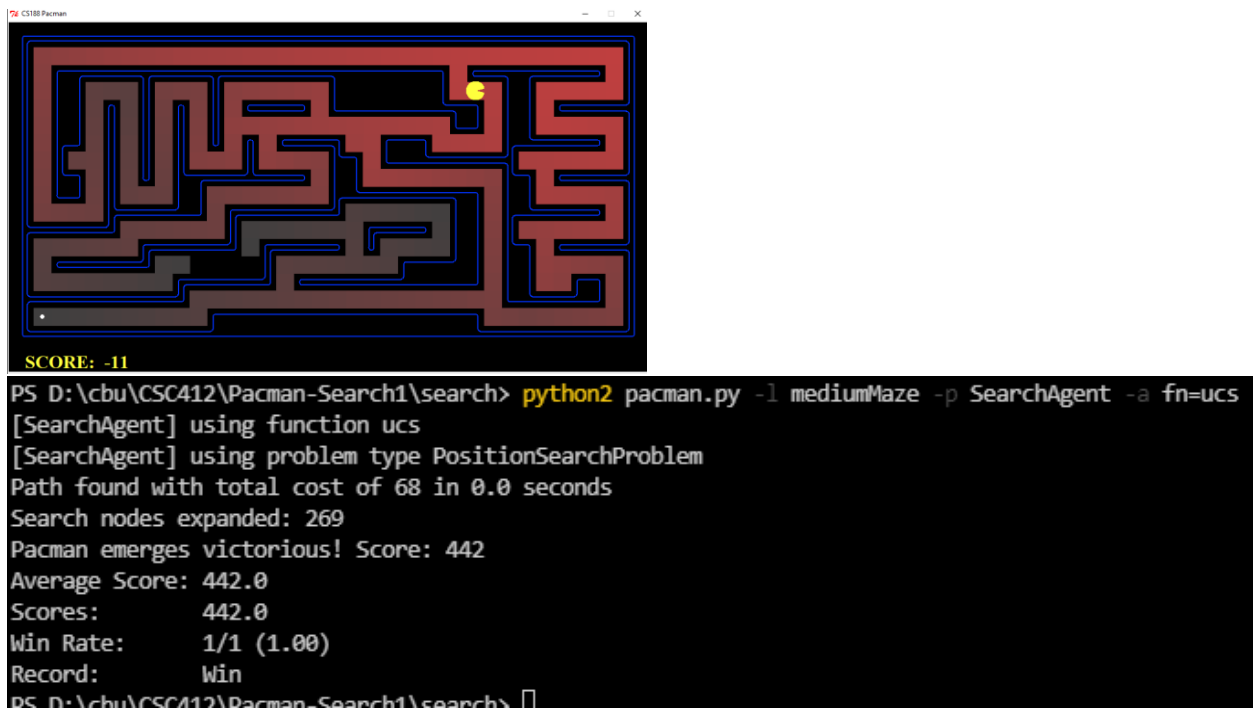


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
8	0.0	15	502.0

Question 3 – Medium UCS

Screenshot



Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
68	0.0	269	442.0

Question 3 – Big UCS

Screenshot



Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
210	0.2	620	300.0

Question 3 – Medium Dotted Stay East UCS

Screenshot

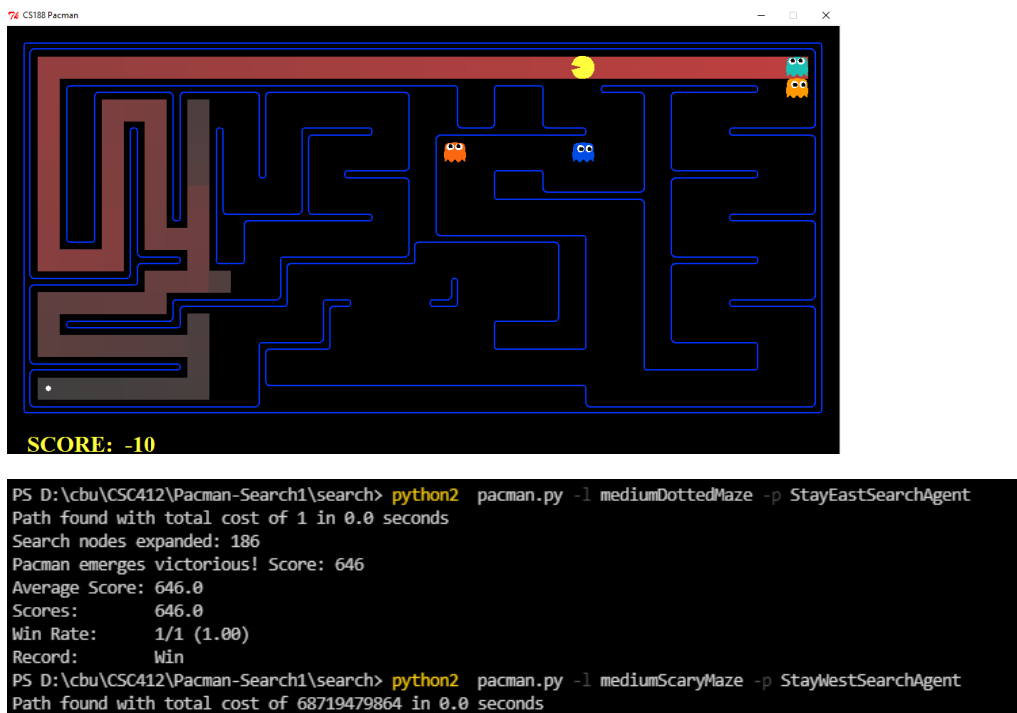


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
1	0.0	186	646

Question 3 – Scary Stay West UCS

Screenshot

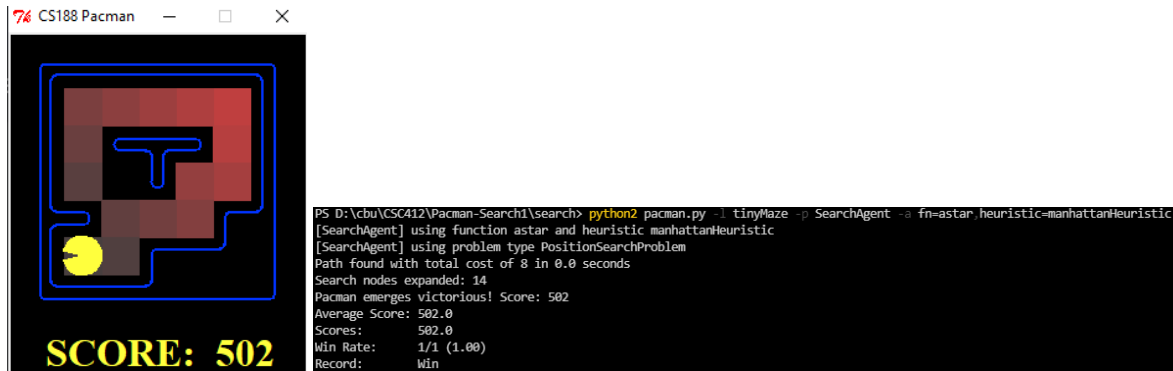


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
1	0.0	186	646

Question 4 – Big A*

Screenshot



Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
8	0.0	14	502.0

Question 4 – Big A*

Screenshot

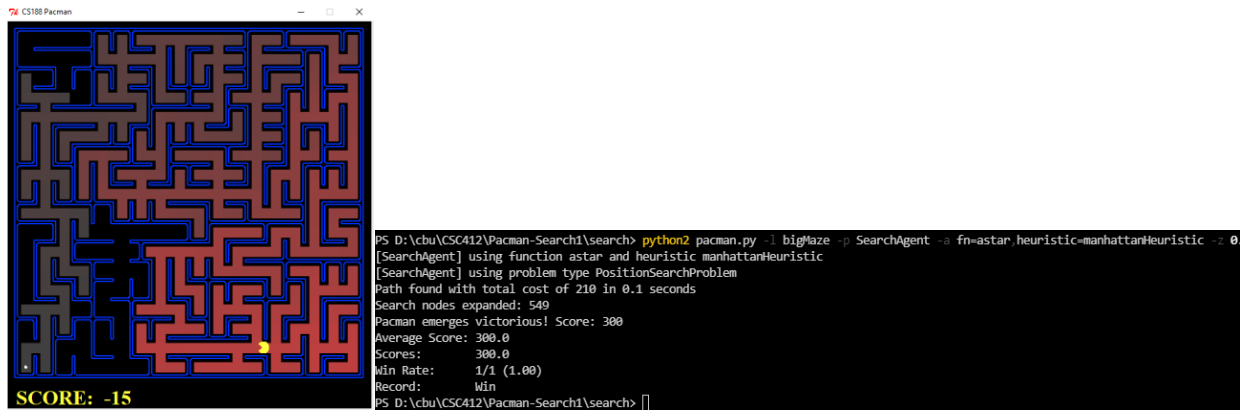


Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
68	0.0	221	442

Question 4 – Big A*

Screenshot



Numbers

Cost	Execution Time (sec)	# Nodes Expanded	Pacman Score
210	0.1	549	300.0

Summary

Summary Chart

The following chart summarizes the individual results provided in the previous section:

Alg.	Maze	Cost (Solution Quality)	Execution Time (s)	# Nodes (Time Complexity)
DFS	Tiny	10	0.0	15
	Med	130	0.1	146
	Big	210	0.0	390
BFS	Tiny	8	0.0	15
	Med	68	0.0	269
	Big	210	0.0	620
UCS	Tiny	8	0.0	15
	Med	68	0.0	269
	Big	210	0.2	620
A*	Tiny	8	0.0	14
	Med	68	0.0	221
	Big	210	0.1	549

Summary Explanation

There were some interesting observations when comparing the four search algorithms across each maze size and application. Firstly, DFS demonstrated a slight slowdown as the size of the maze was increased. This could mostly be due to how depth first search is designed to look for the goal state. For instance, as DFS searches, it goes through the deepest nodes in the search tree before returning to the next node and following it to its deepest path. We also observe the ratio of nodes searched is smaller than the other search algorithms. This observation is expected because UCS and BFS are expected to follow the same base style of algorithm that searches the entire tree of opportunities and therefore searches through all the nodes before identifying the most optimal. Thus, it is reasonably expected for the number of nodes explored for all maze sizes to be the same for BFS and UCS. Another expected observation that can be seen is the equal reported costs of BFS, UCS, and A*. This is because these algorithms are guaranteed to be optimal and complete, meaning that after searching through the tree, the resulting path is required to be the most cost efficient (specifically concerning UCS/A* since cost is not considered in BFS) and most optimal (all three).