Data Structures and Algorithms

HOMEWORK 7 REPORT

CLASSES AND THEIR DESCRIPTIONS

CSE222Map: Represents a map grid for the graph. It has properties such as size, start and end coordinates, and a 2D array representing the map grid. This class is primarily used to initialize the CSE222Graph object by providing the necessary information to construct the graph based on the map grid.

CSE222Graph: Represents a graph data structure. It has a constructor that takes a CSE222Map object and constructs the graph based on the provided map. The graph is represented using an adjacency list, where each node is mapped to a list of its neighboring nodes. The class provides methods to access various properties of the graph, such as size, start and end coordinates, and the adjacency list.

CSE222Dijkstra: Implements the Dijkstra's algorithm for finding the shortest path in a graph. It takes a CSE222Graph object as input and uses it to perform the algorithm. The class provides a method to retrieve the length of the shortest path from the start node to the end node using Dijkstra's algorithm. It also has a method to find the actual path by returning a list of node identifiers representing the shortest path.

CSE222BFS: Implements the Breadth-First Search (BFS) algorithm for finding the shortest path in a graph. It also takes a CSE222Graph object as input and uses it to perform the algorithm. The class provides methods to calculate the length of the shortest path and find the actual path using BFS. It employs a queue-based approach to explore the graph in a breadth-first manner, keeping track of visited nodes and previous nodes to reconstruct the shortest path.

EXPERIMENTAL STUDY

Map.txt / Algorithms	Dijkstra's Algorithm	Breadth-First Search Algorithm
1	0.2617 ms	0.2602 ms
2	0.3565 ms	0.2501 ms
3	0.2849 ms	0.2582 ms
4	0.2708 ms	0.2638 ms
5	0.2948 ms	0.2694 ms
6	0.2517 ms	0.2572 ms
7	0.2859 ms	0.2773 ms
8	0.2667 ms	0.2737 ms
9	0.2783 ms	0.2605 ms
10	0.4165 ms	0.2652 ms