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Computer Programming Laboratory

Midterm Exam

15/12/2023

COMPUTER PROGRAMMING III LABORATORY PROJECT REPORT

Navigation Project

1) Aim of the Project

The goal of this project is to enable users to navigate from any chosen location to another, providing them with the shortest route and guiding them along the way. Users specify their current location and destination, and the system assists in completing the journey, displaying the optimal path.

2) Program Structs and Relationships

2.1) The main purpose of Person Struct:

This struct encapsulates essential information about a person, facilitating user management functionalities.

2.2) The main purpose of Location Struct:

This struct is designed to represent specific points on the map, providing crucial information about various places within the navigation system. Each instance of this struct encapsulates details about a particular location, aiding in the identification and categorization of different points on the map.

2.3) The main purpose of Node Struct:

This struct is a fundamental element in the implementation of the A* algorithm, used for pathfinding within the navigation system. This struct encapsulates information about nodes in the map graph, aiding in the efficient calculation of the shortest path.

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3) Rules

1) Functions in map.c creates a 2D map with horizontal and vertical axes with given intervals.

2)Functions in map.c creates buildings in console at specified coordinates.

3)The function aStarSerach implements the A* search algorithm, which is a pathfinding algorithm used to find the shortest path from a starting point to a destination point on a grid.

4)While searching for the shortest path, the algorithm selects the node with the lowest total cost from the open list.

5) Subsequently, based on the A* search algorithm, the path is visualized by drawing it with green color using the `printColoredPath` function.