

Licenciatura em Engenharia Informática MDISC 2023/2024

**Report Summary**

*Analysing the algorithm and results*

# Authors:

1191330 Luigy Lima

1170499 Daniel Silva

1191377 Tomás Pereira

1200356 Diogo Almeida

**Class:** 1DB **Group:** 22

**Date:** 08/06/2024

**Lecturer:** Alexandra Antunes Gavina

Dijkstra's algorithm(Method):

# methodToReplaceSize:

The method methodToReplaceSize counts non-null elements in a list of SignalPoint objects. It initializes a counter and iterates through the list, incrementing the counter for each non-null element. The loop continues until it encounters a null or goes out of the list bounds, which triggers an IndexOutOfBoundsException. When this exception occurs, the method returns the count of non-null elements. If the loop exits normally, it returns -1, although this scenario is unlikely due to the infinite loop structure.

Uma imagem com texto, captura de ecrã, software, ecrã

Descrição gerada automaticamente

# methodToReplaceIndexOf:

The methodToReplaceIndexOf function finds the index of a given SignalPoint object within a list of SignalPoint objects by comparing their names. It first determines the list size, iterates through the list, and returns the index of the matching object if found, otherwise, it returns -1.

Uma imagem com texto, captura de ecrã, software, Tipo de letra

Descrição gerada automaticamente

# importNamesFromCSV:

The importNamesFromCSV function reads a CSV file specified by filePath, converts each line into a SignalPoint object, and stores them in a list. It then returns this list of SignalPoint objects.

Uma imagem com texto, captura de ecrã, software, Software de multimédia

Descrição gerada automaticamente

# importRouteFromCSV:

The importRouteFromCSV function reads data from a CSV file and creates Route objects based on the information. It uses a list of SignalPoint objects to determine the route connections. Finally, it returns the list of created Route objects.

Uma imagem com texto, captura de ecrã, software

Descrição gerada automaticamente

# findShortestPathToNearestAP:

The findShortestPathToNearestAP function calculates the shortest path from a specified source signal point to the nearest assembly point (AP). It iterates through signal points, updating distances and predecessors until the shortest path to all points is determined. Then, it reconstructs the path to the nearest assembly point and returns it as a list of routes. If no path is found, it returns an empty list.

Uma imagem com texto, captura de ecrã

Descrição gerada automaticamente

Uma imagem com texto, captura de ecrã, Tipo de letra

Descrição gerada automaticamente

# findNearestAssemblyPointIndex:

The findNearestAssemblyPointIndex function finds the index of the nearest assembly point (AP) from a list of signal points based on their distances and whether they are marked as assembly points. It initializes variables to track the nearest AP index and minimum distance. Then, it iterates through the signal points, updating the nearest AP index and minimum distance if an assembly point with a shorter distance is found. Finally, it returns the index of the nearest assembly point.

Uma imagem com texto, captura de ecrã, Tipo de letra

Descrição gerada automaticamente

# constructRoute:

The constructRoute function creates a list of routes based on a list of signal points and existing routes between them. It iterates through adjacent signal points, searching for corresponding routes in the list of routes. If a matching route is found between the current and next signal points, it adds it to the list of new routes. Finally, it returns the list of new routes.

Uma imagem com texto, captura de ecrã, Tipo de letra

Descrição gerada automaticamente

# totalDistance:

The totalDistance function calculates the total distance of a list of routes. It iterates through each route in the list and adds its distance to a running total. Finally, it returns the total distance as an integer value.

Uma imagem com texto, captura de ecrã, Tipo de letra

Descrição gerada automaticamente

Input and Output Methods

# generateSubgraphCSV:

This method generates CSV content representing a subgraph.

It constructs CSV content by appending vertices, edges, and their costs to a StringBuilder object.

Uma imagem com texto, captura de ecrã, software

Descrição gerada automaticamente

# writeCSVToFile:

This method writes CSV content to a file.

It takes the CSV content and writes it to the specified file path.

Uma imagem com texto, captura de ecrã, Tipo de letra

Descrição gerada automaticamente

# displayPaths:

The displayPaths method finds and displays paths from each signal point to the nearest assembly point (AP). It imports signal point names and routes, determines assembly points, and initializes CSV content. For each signal point, it finds the shortest path to the nearest AP, prints the routes and total distance, and generates CSV content. Finally, it writes the CSV content to a file.

Uma imagem com texto, captura de ecrã, software

Descrição gerada automaticamente

Results (Display One Graph)

# Console Result:

# All the routes from a point to the nearest Assembly Point

* Route, this is route of points that leads to an Assembly point

The print below is part of the console and shows the route for the Point 0.

Uma imagem com texto, captura de ecrã, Tipo de letra, design

Descrição gerada automaticamente

# CSV File Infomation export:

# Uma imagem com texto, captura de ecrã, número, Tipo de letra Descrição gerada automaticamente