Description of Approach

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Task A

In this task, the grid graph requires some modification before applied to Dijkstra algorithm. Here I try to convert the grid map into connected nodes. The steps are as below:

1. Find all edges exist in the map.
2. Transfer all these coordinates into a LinkedList-like node.
3. Use a Navigable Set to store the node in each traverse step.
4. Find all neighbors of the node's coordinate and select the nearest one.
5. Remove the "further" neighbor from the Navigable Set.
6. Record the total cost to its nearest neighbor node.
7. Repeat until the Navigable Set is empty. Here it means all reachable coordinates have been explored or the destination has been reached.
8. Trace back from the last node. If succeed, pass all path coordinates to the list in the findPath function. Otherwise, return an empty list.

Task B

This task is similar with task A only when creating edges with the given terrain cost. This would affect the program deciding shortest (smallest cost) path. The task A is one simple version of task B. The only difference is the edge weight could be more than one in this task.

Task C

In this task, the notion is running all different possible combination of origin coordinates and destination coordinates so that a minimum cost could be found out from their shortest path costs. Then pass the minimum one to the findPath function. Task A could be looked as Task C only contains one start coordinate and one destination coordinate.

Task D

In this task, the program needs to compare the costs of all possible sequences of the way points to find out the shortest one. The steps taken are as below:

1. Get a list of all way point coordinates for referencing use.
2. Generate all lists of all different sequences of the reference list (including its origin sequence).
3. Execute each of the generated list and restore the total cost of each and find out the minimum one.
4. Trace back for the complete path and if finishes with the start and the end and all way point coordinates, show the result.

Note: The task D may take a long time to process when the way points are more than three. Please wait for result.