DELHI METRO MAP

Project report

1. Problem Statement

In this project we will be showing the routes and the shortest distance routes and their minimum fare. As there is a need for a system which shows all the paths as well as most importantly the shortest path between source and destination. There are many people who travel through the metro every day therefore they require a system which shows every service given by the metro.

INTRODUCTION

2.1 Motivation

This topic for the project was chosen by us because it is much more interesting than the other topics which are mostly related to games and management. This project is slightly different. Secondly the aim of this project is to create something beneficial for the people, it will show you all the routes, the fare related to the routes and the shortest route and in today's life knowing all this information is more important than other things.

2.2 Objective and Scope Of The Project

The objective of the project is that this project gives an integrated service which provides all information about the metro rail in Delhi and its routes for the public .

The objectives of the project are as follows:

1. Users can view the metro station list
2. User can add as many metro stations as he/she wants
3. Users can add routes between different stations with adding particular distance between them
4. User can also view all existing routes between the stations
5. User can get to know the shortest distance route to save his/her time
6. Fare also gets calculated of the shortest route between your inputted source and destination metro stations.

SCOPE

1. Provide a route filtering method based on the travel cost difference between an alternative route and the shortest route.

2.Propose a route filtering method based on train operational plans.

3. Put forward a two-step framework to generate route choice sets on metro networks, based on both of the mentioned above.

METHODOLOGY

Dijkstra Algorithm

Dijkstra's algorithm allows us to find the shortest path between any two vertices of a graph.

When it comes to weighted graphs, it's not necessary that neighboring nodes always have the shortest path. However, the neighbor with the shortest edge can't be reached by any shorter path. The reason is that all other edges have larger weights, so going through them alone would increase the distance.

Dijkstra's algorithm uses this idea to come up with a greedy approach. In each step, we choose the node with the shortest path. We fix this cost and add this node's neighbors to the queue. Therefore, the queue must be able to order the nodes inside it based on the smallest cost. We can consider using a priority queue to achieve this.

We still have one problem. In unweighted graphs, when we reached a node from a different path, we were sure that the first time should have the shortest path. In weighted graphs, that's not always true. If we reach the node with a shorter path, we must update its distance and add it to the queue. This means that the same node could be added multiple times.

Therefore, we must always compare the cost of the extracted node with its actual stored cost. If the extracted distance is larger than the stored one, it means this node was added in an early

stage. Later, we must have found a shorter path and updated it. We have also added the node again to the queue, so this extraction can be ignored safely.

Since we're visiting each nodes' neighbors only once, we're visiting edges only once as well. Also, we can use a priority queue that has a time complexity of O(log n) for push and pop operations. Therefore, the total time complexity is **O(V + E(log V)).**

This project is implemented in C++ language

We have used maps, vectors, pairs, loops and switch cases for the implementation in the code.

3.2 Summary

Firstly it will show the existing metro station and then if you want you can add more metro stations. It will also show you some routes and you can add as many as you want, you can see all the existing routes between two metro stations by using To view all Routes. After filling your source and destination station you can also see the shortest distance route by using Dijkstra algorithm, which is the main part of our project as nowadays most of the people search for this to save their time as time is very precious. Then you also get to know the total fare that you have to pay by choosing the shortest route. At the end you can simply exit from our program.

3.3 Hardware & Software requirements

1. Software Requirements

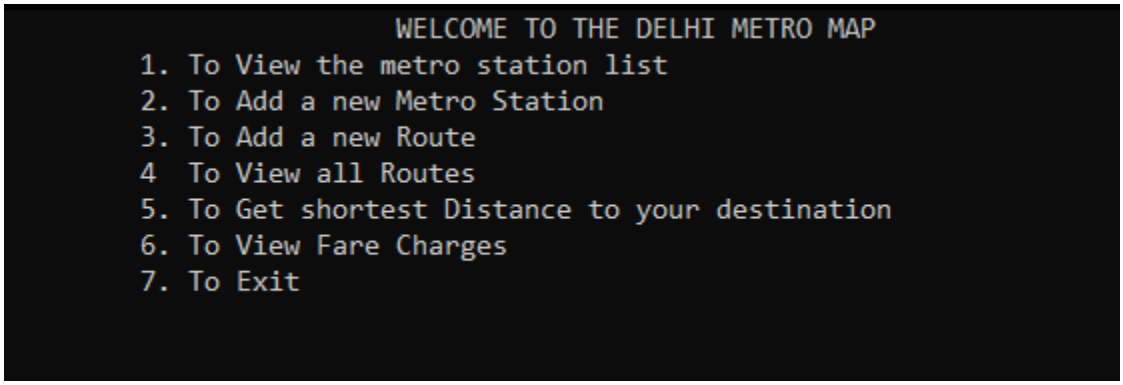
- C++/C
- MS Word 97 or later
- Web Browser: Microsoft Internet Explorer, Mozilla, Google Chrome or later
- Codeblocks, VS LAB, or any other online compiler

- Operating System: Windows XP / Windows7/ Windows Vista

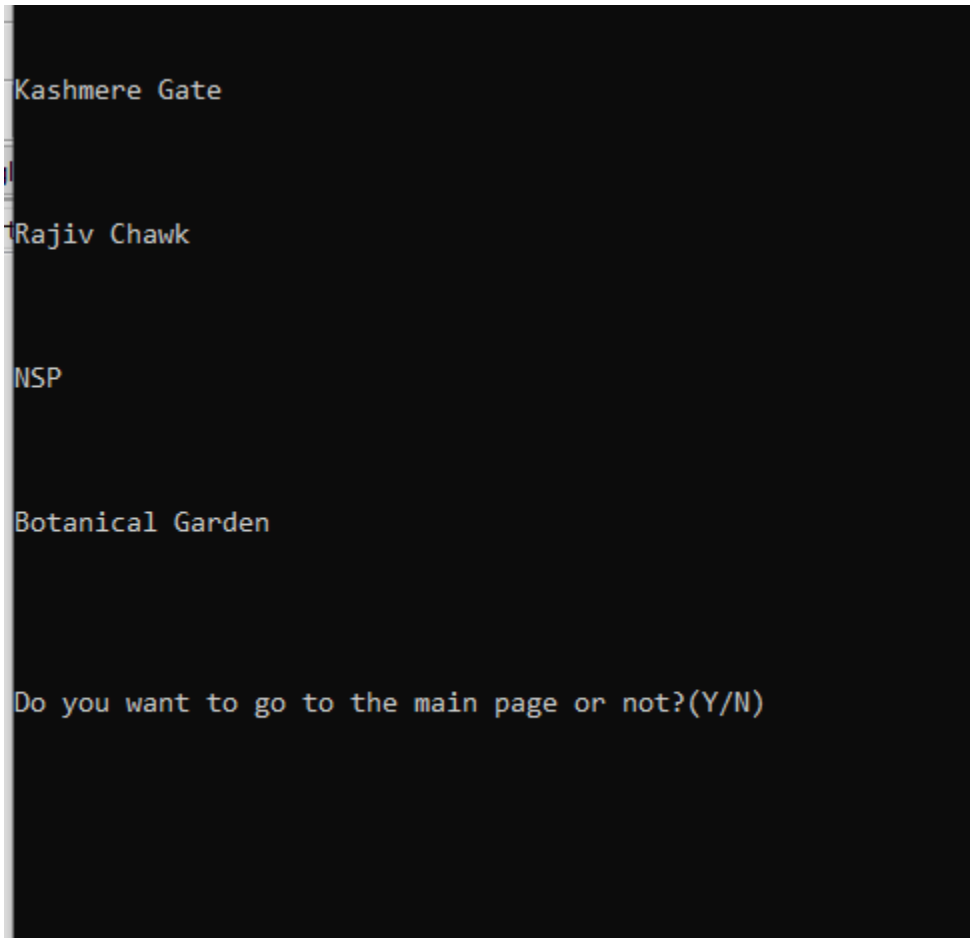
2. Hardware Requirements

- Processor: Minimum 1 Gz; Recommended 2 Gz or more
- Ethernet connection (LAN) or wireless adapter (Wi-Fi)
- Hard Drive : Minimum 32 GB; Recommended 64 or more
- Memory (RAM): Minimum 1 GB; Recommended 4GB or above
- Some card w/speakers

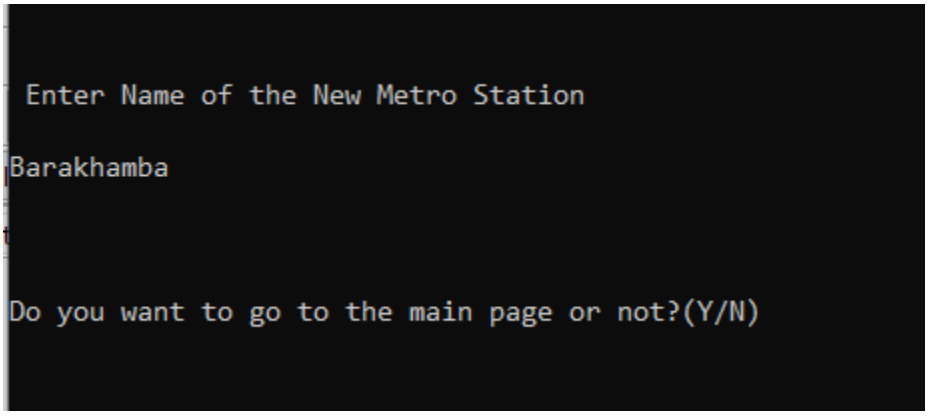
RESULTS



1.


Kashmere Gate
Rajiv Chawk
NSP
Botanical Garden
Do you want to go to the main page or not?(Y/N)

2.


Enter Name of the New Metro Station
Barakhamba
Do you want to go to the main page or not?(Y/N)

3.

```
                        WELCOME TO THE DELHI METRO MAP
        1. To View the metro station list
        2. To Add a new Metro Station
        3. To Add a new Route
        4  To View all Routes
        5. To Get shortest Distance to your destination
        6. To View Fare Charges
        7. To Exit

3
List of Source Metro Station
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Source Metro Station(1-6) :
3
List of Destination Metro Station
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Destination Metro Station(1-6) :
4
```

4.

```
        6. To View Fare Charges
        7. To Exit

4
List of Source Metro Station
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Source Metro Station(1-6) :
3
List of Destination Metro Station
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Destination Metro Station(1-6) :
4
->NSP->Rajiv Chawk->Kashmere Gate->Botanical Garden
->NSP->Kashmere Gate->Botanical Garden
->NSP->Botanical Garden



Do you want to go to the main page or not?(Y/N)
```

5.

```
List of Source Metro Station
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Source Metro Station(1-6) :
3
List of Destination Metro Station
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Destination Metro Station(1-6) :
4

Shortest Metro Distance between NSP and Botanical Garden is 3

Shortest Route is: NSP->Botanical Garden->



Do you want to go to the main page or not?(Y/N)
```

6.

```
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Source Metro Station(1-6) :
3
List of Destination Metro Station
1 Kashmere Gate
2 Rajiv Chawk
3 NSP
4 Botanical Garden
5 MOOLCHAND
6 Barakhamba
Select Destination Metro Station(1-6) :
4


Fare is 5 rupee per kilometer


Shortest Metro Distance between NSP and Botanical Garden is 3


Total Metro Fare: Rs 15


Do you want to go to the main page or not?(Y/N)
```

CONCLUSION

This project gives an integrated service which provides all information about the metro rail in Delhi and its routes for the public. Main aim of this project is to give the shortest distance route and hence be very useful to save time. The contribution that this project will be able to make is toward those people who are daily metro travelers.

REFERENCES

[1] Ahmadi, Mohsen, and Moein Qaisari Hasan Abadi. "A review of using object-orientation properties of C++ for designing expert system in strategic planning." *Computer Science Review* 37 (2020): 100282.

[2]https://www.geeksforgeeks.org/find-the-minimum-cost-to-reach-a-destination-where-every-station-is-connected-in-one-direction/

[3] Mahesh, Ashwin, Sridhar Pabbisetty, and M. V. Gowda. "Centre for public policy (CPP): Indian institute of management bangalore." University Of Pennsylvania Press, 2014.

[4] https://ijcrt.org/papers/IJCRT2106513.pdf

[5]https://www.geeksforgeeks.org/map-associative-containers-the-c-standard-template-library-stl/