

ALGORITHMS AND PROBLEM SOLVING PROJECT



ROAD TRANSPORT

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ACKNOWLEDGEMENT

We give our deepest appreciation to our esteemed guide, Dr. Vivek Kumar Singh and Dr. Shikha Jain for providing us with the possibility to complete this project with the right guidance and advice.

We would also like give gratitude for allowing us to use the facilities available and also help us to coordinate my project Furthermore.

We would also like to acknowledge with much appreciation the crucial role of faculty members on this occasion.

Last but not least, we would like to thank group members who help us to assemble the parts and gave a suggestion about the project.

ROAD TRANSPORT

In our aspiring project, we are aiming to make an interesting and gripping project “ROAD TRANSPORT”.

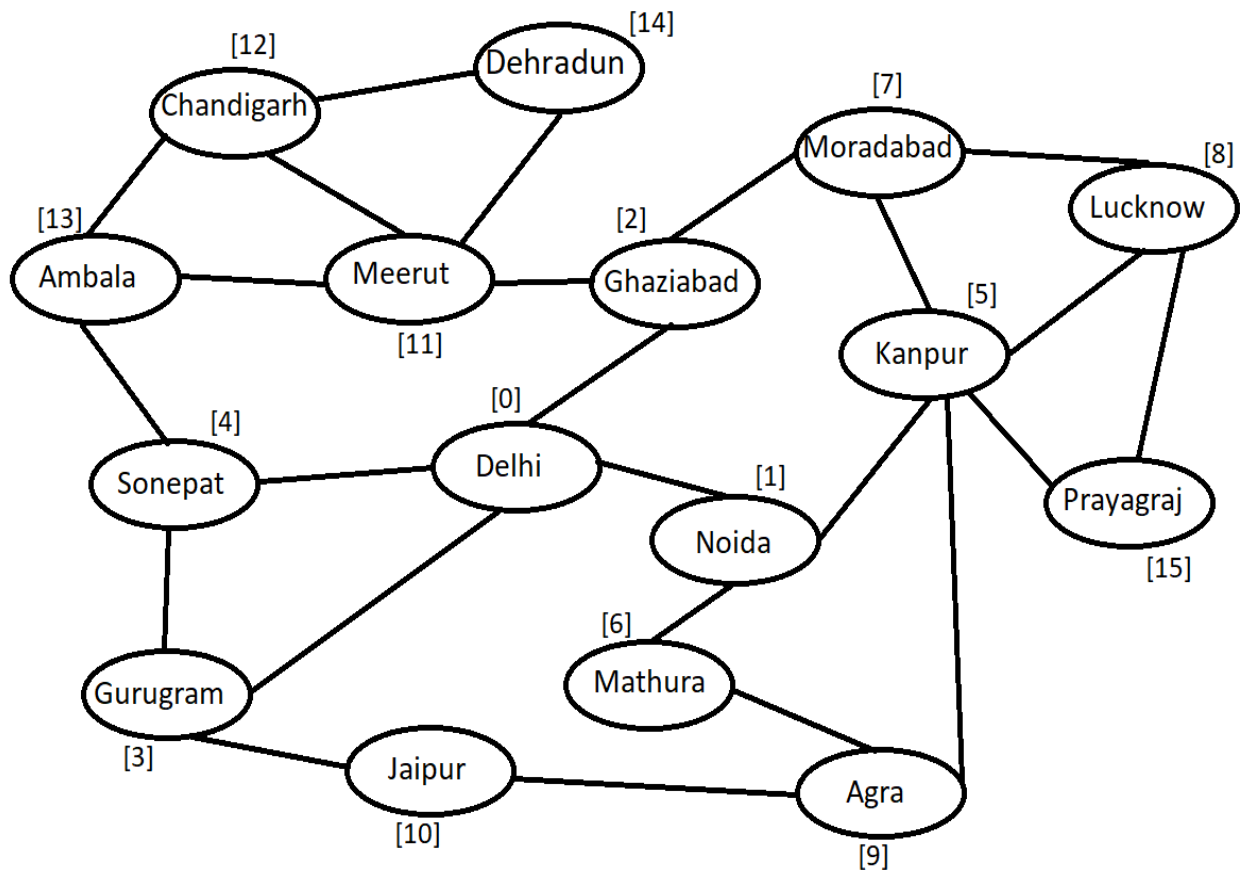
This project aims to find the best suitable bus route for the user.

There are multiple cities connected to each other. Some are directly connected; some are connected via intermediate cities. Buses are a mode of transport between the cities. We will be storing the fares of the buses and the starting time and reaching time. Between any pair of cities there may be multiple buses running and they have different fares and starting time.

Buses run between the cities at a specific time and it can travel to the destination either directly or via other cities. But the cost of travel between the cities will be different. Here the user would be given two choices:

- 1) whether he wants to reach the destination in minimum time or
- 2) whether he wants to reach the destination in minimum cost. The user can either select the buses which will take him to the destination within the shortest period of time or he can select the buses whose cost (bus fare) is minimum.

GRAPH OF THE CITIES

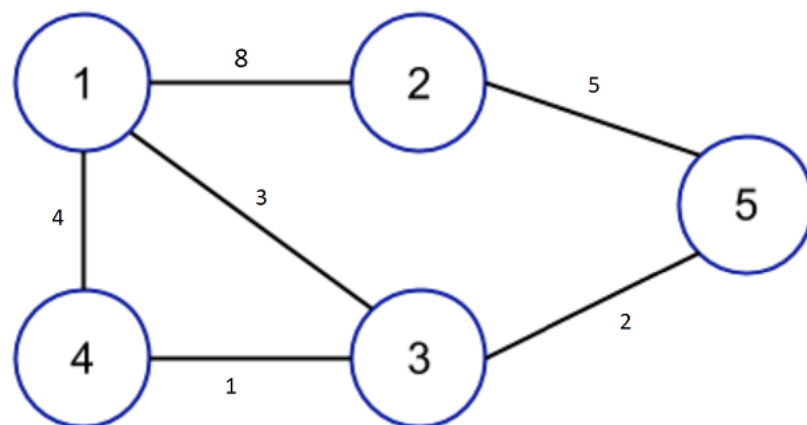


THEORY USED

The concept of Graphs, DFS & Backtracking have been used to implement the project. Here we will be considering an undirected graph because if a bus runs from A to B then there will be bus that runs from B to A. DFS and backtracking has been used to find all the paths that are possible from source to destination.

Here, for each path we will find what buses are running and then select those buses that have the minimum cost. Similarly, we will find the bus that reaches destination in minimum time. After considering all the paths we find the best possible route.

For Example:



If the user wants to go from city 1 to city 3

The possible paths are 1->3, 1->4->3, 1->2->5->3.

For path 1->2->5->3

We will first check what buses are running from 1 to 2 and select the best one, then similarly we check for the path from 2

to 5 and finally for the path from 5 to 3. Add the costs for each path and compare it with the other paths found from city 1 to city 3.

DETAILED DESCRIPTION

Firstly, a graph is created having cities as nodes and edge between them as a path. It is not necessary that all the cities are connected to each other directly or indirectly. To reach to destination city various paths may be available. Class node holds the details of the buses which travels from one city to another. Details such as Bus no, cost, start time and end time has been stored. Class travel holds the details of the various functions that have been used to implement the project. Function findAllpaths has been implemented using DFS, which stores the paths from the starting city to the destination city. Functions MinCostUtil and MinCostTime have been used to find out the minimum cost and minimum time required to reach the destination. There can be a case in which the user wants to leave the station at a time when no further buses travel then in that case user has to either wait or they can exit the bus station. There can also be a case in which there are two possible paths which have the same cost but the time of travel may be different, thus it depends upon the user requirement that which path should be taken in order to reach the destination. Function printMinCost and printMinTime have been used to print minimum cost and minimum time.

SCREEN SHOTS

1. User wants to travel from Jaipur to Prayagraj and wants to reach in minimum cost:

```
"C:\Users\91876\OneDrive\Desktop\APS Project\bin\Debug\APS Project.exe"
Enter the city from which u want to take the Bus:
jaipur
Enter the destination city:
prayagraj
Enter the time when you want to leave for your destination in 24 hour format:
5
You have two options to get to your destinations

1) Do u want take the path that takes you to the destination in minimum cost
2) Do u want take the path that takes you to the destination in minimum time
Which option would u like?
1
Following is the best path available that will take you to your destination in Minimum Cost:
->JAIPUR->AGRA->KANPUR->PRAYAGRAJ
Following buses u should take to reach to your destination

Take BusNumber-131 from JAIPUR which is scheduled at 10hrs and reach AGRA at 13hrs
Take BusNumber-126 from AGRA which is scheduled at 13hrs and reach KANPUR at 14hrs
Take BusNumber-161 from KANPUR which is scheduled at 17hrs and reach PRAYAGRAJ at 20hrs

You will reach PRAYAGRAJ at 20hrs
Your total Bus fare = 170

Do you want to again look for a bus route:1-continue,2-exit
-
```

2. User wants to travel from Jaipur to Prayagraj and wants to reach in minimum time:

```

"C:\Users\91876\OneDrive\Desktop\APS Project\bin\Debug\APS Project.exe"
-----Welcome-----
Enter the city from which u want to take the Bus:
jaipur
Enter the destination city:
prayagraj
Enter the time when you want to leave for your destination in 24 hour format:
6
You have two options to get to your destinations

1) Do u want take the path that takes you to the destination in minimum cost
2) Do u want take the path that takes you to the destination in minimum time
Which option would u like?

2
Following is the best path available that will take you to your destination in Minimum time:
->JAIPUR->GURUGRAM->DELHI->NOIDA->KANPUR->PRAYAGRAJ
Following buses you should take to reach to your destination

Take BusNumber-165 from JAIPUR which is scheduled at 6hrs and reach GURUGRAM at 8hrs

Take BusNumber-163 from GURUGRAM which is scheduled at 8hrs and reach DELHI at 9hrs

Take BusNumber-167 from DELHI which is scheduled at 9hrs and reach NOIDA at 10hrs

Take BusNumber-168 from NOIDA which is scheduled at 10hrs and reach KANPUR at 13hrs

Take BusNumber-161 from KANPUR which is scheduled at 13hrs and reach PRAYAGRAJ at 16hrs

You will reach PRAYAGRAJ at 16hrs
Your total Bus fare = 260

Do you want to again look for a bus route:1-continue,2-exit

```

3. User wants to travel from Chandigarh to Lucknow and wants to reach in minimum cost:

```

"C:\Users\91876\OneDrive\Desktop\APS Project\bin\Debug\APS Project.exe"
-----Welcome-----
Enter the city from which u want to take the Bus:
chandigarh
Enter the destination city:
lucknow
Enter the time when you want to leave for your destination in 24 hour format:
6
You have two options to get to your destinations

1) Do u want take the path that takes you to the destination in minimum cost
2) Do u want take the path that takes you to the destination in minimum time
Which option would u like?

1
Following is the best path available that will take you to your destination in Minimum Cost:
->CHANDIGARH->MEERUT->GHAZIABAD->MORADABAD->LUCKNOW
Following buses u should take to reach to your destination

Take BusNumber-144 from CHANDIGARH which is scheduled at 6hrs and reach MEERUT at 10hrs

Take BusNumber-162 from MEERUT which is scheduled at 10hrs and reach GHAZIABAD at 11hrs

Take BusNumber-118 from GHAZIABAD which is scheduled at 11hrs and reach MORADABAD at 14hrs

Take BusNumber-136 from MORADABAD which is scheduled at 16hrs and reach LUCKNOW at 20hrs

You will reach LUCKNOW at 20hrs
Your total Bus fare = 210

Do you want to again look for a bus route:1-continue,2-exit

```


4. User wants to travel from Chandigarh to Lucknow and wants to reach in minimum time:

```
"C:\Users\91876\OneDrive\Desktop\APS Project\bin\Debug\APS Project.exe"
2) Do u want take the path that takes you to the destination in minimum time
which option would u like?
2
Following is the best path available that will take you to your destination in Minimum time:
->CHANDIGARH->MEERUT->GHAZIABAD->NOIDA->KANPUR->LUCKNOW
Following buses you should take to reach to your destination

Take BusNumber-144 from CHANDIGARH which is scheduled at 6hrs and reach MEERUT at 10hrs

Take BusNumber-162 from MEERUT which is scheduled at 10hrs and reach GHAZIABAD at 11hrs

Take BusNumber-110 from GHAZIABAD which is scheduled at 12hrs and reach NOIDA at 13hrs

Take BusNumber-137 from NOIDA which is scheduled at 13hrs and reach KANPUR at 17hrs

Take BusNumber-122 from KANPUR which is scheduled at 17hrs and reach LUCKNOW at 19hrs

You will reach LUCKNOW at 19hrs
Your total Bus fare = 280

Do you want to again look for a bus route:1-continue,2-exit
```

5. User wants to travel from Noida to Moradabad in minimum time:

```
"C:\Users\91876\OneDrive\Desktop\APS Project\bin\Debug\APS Project.exe"
-----Welcome-----
Enter the city from which u want to take the Bus:
noida
Enter the destination city:
moradabad
Enter the time when you want to leave for your destination in 24 hour format:
10
You have two options to get to your destinations

1) Do u want take the path that takes you to the destination in minimum cost
2) Do u want take the path that takes you to the destination in minimum time
which option would u like?
2
Following is the best path available that will take you to your destination in Minimum time:
->NOIDA->GHAZIABAD->MORADABAD
Following buses you should take to reach to your destination

Take BusNumber-110 from NOIDA which is scheduled at 12hrs and reach GHAZIABAD at 13hrs

Take BusNumber-117 from GHAZIABAD which is scheduled at 14hrs and reach MORADABAD at 17hrs

You will reach MORADABAD at 17hrs
Your total Bus fare = 120

Do you want to again look for a bus route:1-continue,2-exit
-
```

6. User wants to travel from Sonapat to Lucknow but no buses available:

```
"C:\Users\91876\OneDrive\Desktop\APS Project\bin\Debug\APS Project.exe"
-----Welcome-----
Enter the city from which u want to take the Bus:
sonapat
Enter the destination city:
lucknow
Enter the time when you want to leave for your destination in 24 hour format:
12
You have two options to get to your destinations
1) Do u want take the path that takes you to the destination in minimum cost
2) Do u want take the path that takes you to the destination in minimum time
Which option would u like?
2
No combination of buses exist that can take to you to your destination
Do you want to again look for a bus route:1-continue,2-exit
-
```

THANKYOU!

GROUP MEMBERS-

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