Project 1: CPSC 535 - 01 - Advanced Algorithm

Project Report - Electric Car Traveler

Summary:

In this project, an electric vehicle must travel between the source and destination cities through other cities. Since the automobile is electric, it must be recharged when its battery runs out of juice. There are electric vehicle recharging stations in every city. The automobile must move forward with as few stops as possible. Still, it must have enough battery to return to the city it is currently in if the charging station in the next city is faulty. At the source station, the automobile is first fully charged. According to the constraints listed below, we have created an algorithm to offer the best solution to the issue:

- The battery is fully charged at the source station.
- The source and the destination city should be present in the output.
- **Assumption:** The capacity of the electric car is between 250 and 350.
- The number of cities should be in the range of 3-20.
- The distance between the two cities should be in the range of 10 to half the total capacity of the car.
- The car should be able to return to the current city if the charging station at the next city is broken.

Input Variables:

1. Capacity (capacity) = Total capacity of the car.
2. The number of cities with their names (list_cities).
3. Distances between all the cities (list_dist)

Output Variables:

1. The list of cities where the car stopped to recharge its battery (output_list).

Pseudocode:

This program calculates and displays the number of cities an electric car needs to stop and recharge optimally before proceeding to the next town while traveling from City A to City B with certain constraints.

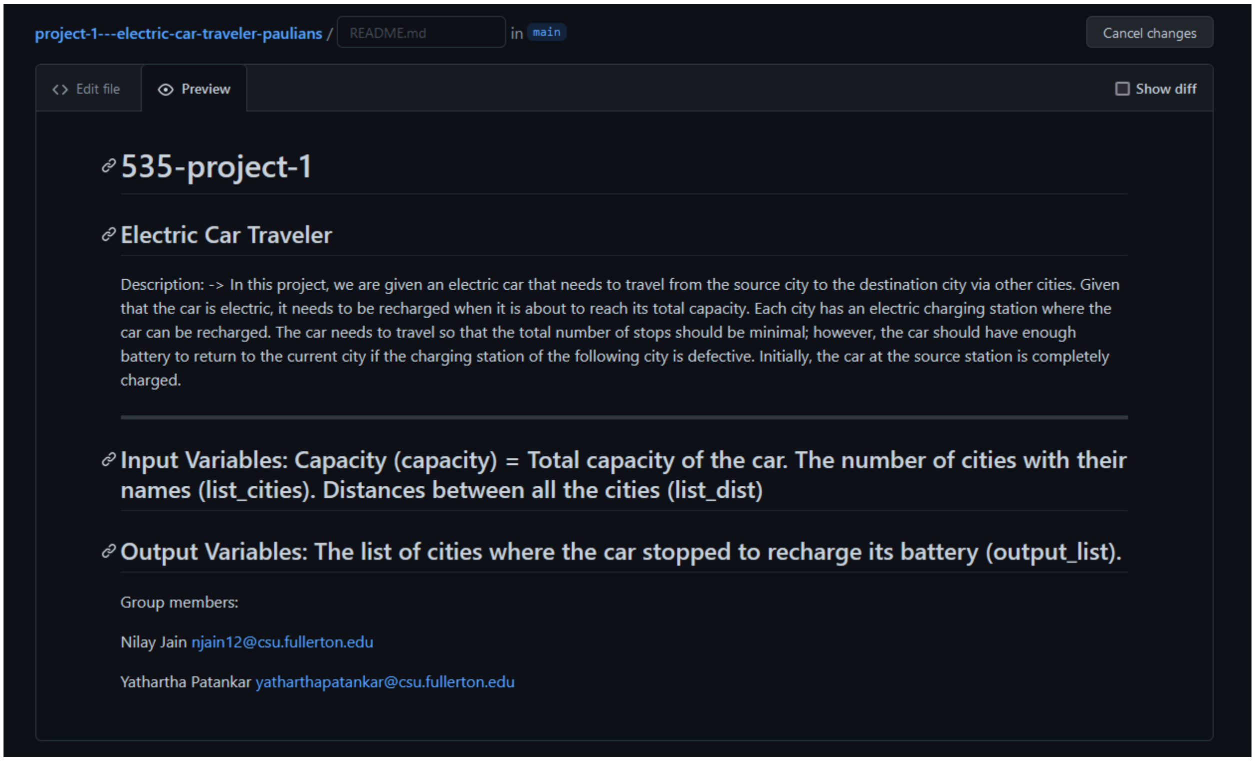
```
START
FUNCTION RechargeStationList(capacity, list_distance, list_cities)
{
    Initialize the output_list with the starting city
    For each distance in list_distance Do
    {
        Check IF the distance between the two cities is valid (Given constraint: distance <= capacity / 2)
        {
            Update the remaining capacity
        }
        ELSE
        {
            Recharge the car (reset to original capacity)
            Calculate the remaining capacity
            Append the charging city in the output list.
        }
    }

Append the output_list with the destination city.
RETURN output_list
}

Take required inputs from the user.
Check for the constraints.
CALL RechargeStationList(capacity, list_distance, list_cities)
END
```

<u>Output Screenshots:</u>

<u>Readme.md:</u>



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535-project-1

Electric Car Traveler

Description: -> In this project, we are given an electric car that needs to travel from the source city to the destination city via other cities. Given that the car is electric, it needs to be recharged when it is about to reach its total capacity. Each city has an electric charging station where the car can be recharged. The car needs to travel so that the total number of stops should be minimal; however, the car should have enough battery to return to the current city if the charging station of the following city is defective. Initially, the car at the source station is completely charged.

Input Variables: Capacity (capacity) = Total capacity of the car. The number of cities with their names (list_cities). Distances between all the cities (list_dist)

Output Variables: The list of cities where the car stopped to recharge its battery (output_list).

Group members:

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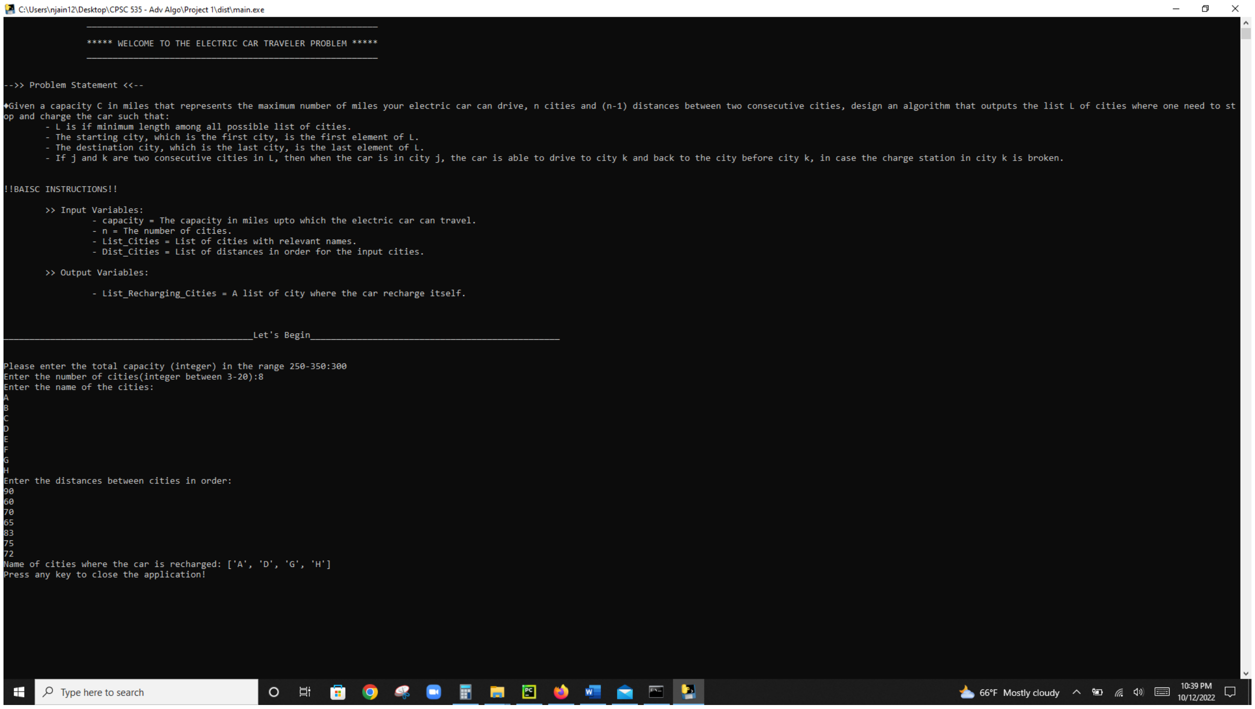
Yathartha Patankar yatharthapatankar@csu.fullerton.edu

<u>Sample Input 1:</u>



C:\Users\njain12\Desktop\CPSC 535 - Adv Algo\Project 1\dist\main.exe

```
                ________________________________________________________

                ***** WELCOME TO THE ELECTRIC CAR TRAVELER PROBLEM *****
                ________________________________________________________


-->> Problem Statement <<--

♦Given a capacity C in miles that represents the maximum number of miles your electric car can drive, n cities and (n-1) distances between two consecutive cities, design an algorithm that outputs the list L of cities where one need to st
op and charge the car such that:
        - L is if minimum length among all possible list of cities.
        - The starting city, which is the first city, is the first element of L.
        - The destination city, which is the last city, is the last element of L.
        - If j and k are two consecutive cities in L, then when the car is in city j, the car is able to drive to city k and back to the city before city k, in case the charge station in city k is broken.


!!BAISC INSTRUCTIONS!!

        >> Input Variables:
                - capacity = The capacity in miles upto which the electric car can travel.
                - n = The number of cities.
                - List_Cities = List of cities with relevant names.
                - Dist_Cities = List of distances in order for the input cities.

        >> Output Variables:

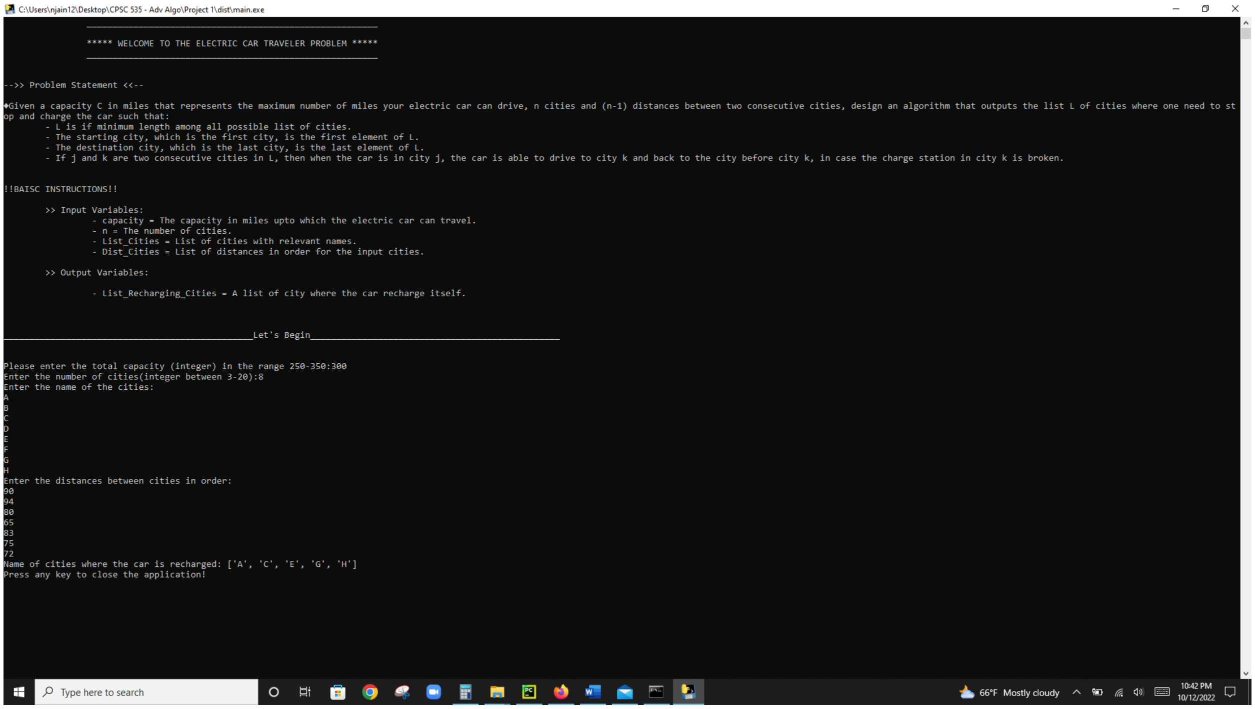
                - List_Recharging_Cities = A list of city where the car recharge itself.



________________________________________________Let's Begin________________________________________________


Please enter the total capacity (integer) in the range 250-350:300
Enter the number of cities(integer between 3-20):8
Enter the name of the cities:
A
B
C
D
E
F
G
H
Enter the distances between cities in order:
90
60
70
65
83
75
72
Name of cities where the car is recharged: ['A', 'D', 'G', 'H']
Press any key to close the application!
```

Sample Input 2: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Type here to search
66°F Mostly cloudy
10:42 PM
10/12/2022

```
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F
G
H
Enter the distances between cities in order:
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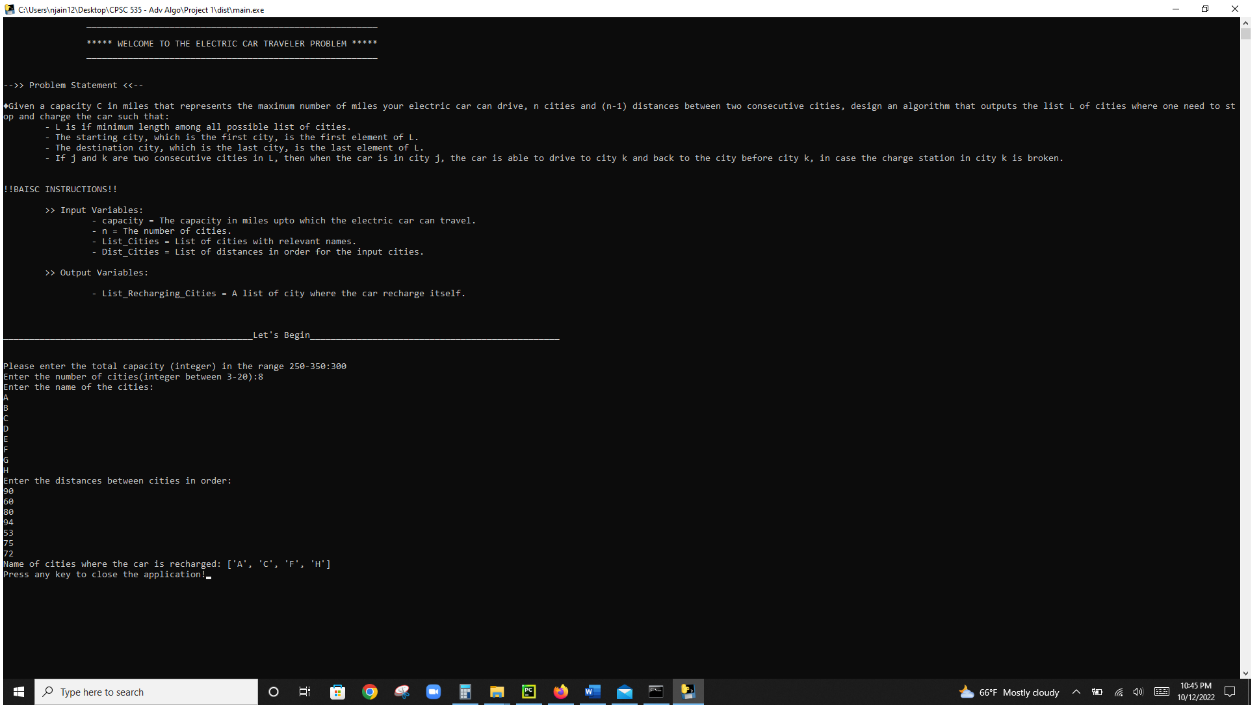
94
80
65
83
75
72
Name of cities where the car is recharged: ['A', 'C', 'E', 'G', 'H']
Press any key to close the application!
```

Sample Input 3:


C:\Users\njain12\Desktop\CPSC 535 - Adv Algo\Project 1\dist\main.exe
Type here to search
66°F Mostly cloudy
10:45 PM
10/12/2022

```
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