Project Report
On

Chalo Chalein

submitted towards the partial fulfilment of
the requirement for the award of the degree of

Bachelor of Technology
in
Information Technology

Submitted by
Priyansh Saini
2K20/IT/109

Under the Supervision
Of
Dr. Ritu Aggarwal

Department of Information Technology

Delhi Technological University
Bawana Road. Delhi -110042

1. Declaration

I hereby declare that the work, which is presented in the Project entitled 'Chalo Chalein' fulfillment of the requirement for the award of the Degree of Bachelor of Technology in Information Technology and submitted to the Department of Information Technology, Delhi Technological University, Delhi is an authentic record of my own, carried out under the supervision of Dr. Ritu Aggarwal.

The work presented in this report has not been submitted and not under consideration for the award for any other course/degree of this or any other Institute/University.

Priyansh Saini
2K20/IT/109
Information Technology

2. Supervisor Certificate

To the best of my knowledge, the report comprises original work and has not been submitted in part or full for any Course/Degree to this university or elsewhere as per the candidate's declaration.

Place: Delhi
Date:

Signature
Dr. Ritu Aggarwal

3. Certificate

I hereby certify that the work, which is presented in the Project-I entitled ‘ Chalo Chalein’ in fulfilment of the requirement for the award of the Degree of Bachelor of Technology in Information Technology and submitted to the Department of Information Technology, Delhi Technological University, Delhi is an authentic record of my own, carried out under the supervision of Dr. Ritu Aggarwal.
The work presented in this report has not been submitted and not under consideration for the award for any other course/degree of this or any other Institute/University.

4. ACKNOWLEDGEMENT

In performing our major project, I had to take the help and guidance of some respected people, who deserve our greatest gratitude. The completion of this assignment gives me much pleasure. I would like to show my gratitude towards Dr. Jasraj Meena, my mentor for the project, who gave me a good guideline for the report throughout through numerous consultations. I would also like to extend our deepest gratitude towards everyone who have directly and indirectly helped us to complete our project.

Many people, especially classmates, and team members themselves have made valuable comments and suggestions on this proposal which gave us an inspiration to improve my project. I thank all the people for their help directly and indirectly to complete our assignment.

Contents

5. Introduction

The aim of the project is to design an algorithm that can be used in the web site ‘Chalo Chalien’ for finding the shortest path through some waypoints. Chalo Chalein is an innovative & user-friendly interface that allows students to have the company of their trusted college mates as well as save the fast depleting natural resources. Carpooling or ridesharing is the latest cost-effective and environmentally friendly way to travel in urban areas. With increasing traffic problems and fewer people inclined towards using the public transportation network, carpooling is a safe, convenient, and eco-smart way to ease your travel woes. Share empty seats with verified riders traveling on the same route, decrease the number of cars on the road, and in turn bring down travel costs as rideshare is also about cost-share.

The program uses the Genetic Algorithm to solve for the shortest path available.

Suppose there are 9 drop-offs. These 9 drop-offs and universities make 10 locations to be visited by the rider. The possible ways in doing so is 10!(ten factorial) i.e. 3628800 ways. Out of these paths some of them could be smaller and some can be farther. To find the shortest routes distance between every point should be know and the minimum overall distance is calculated.

Figure 1: Google map API with assigned markers

Figure 2: Shortest path calculated.

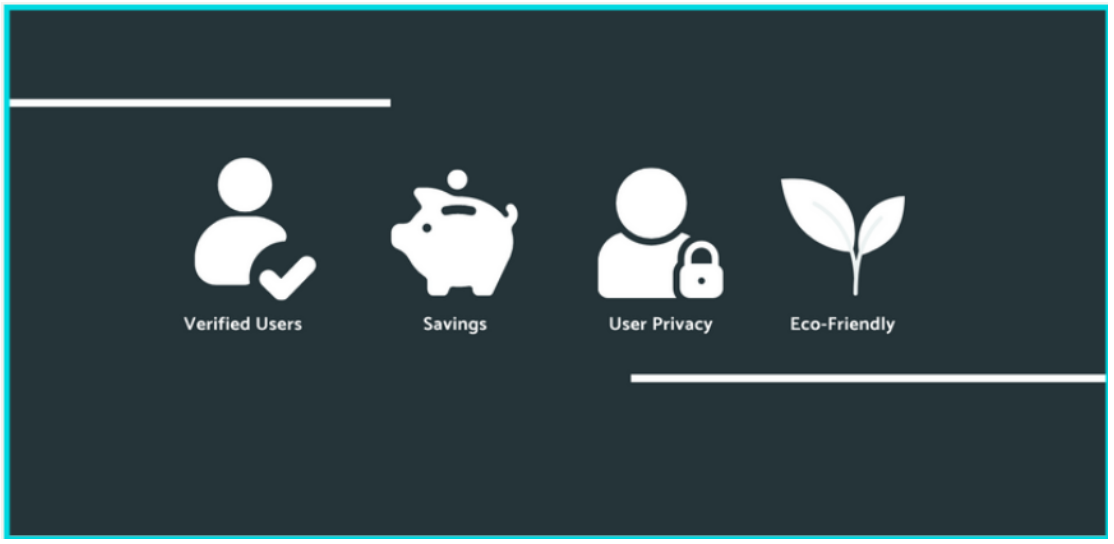
6. Challenges

- Tagging multiple user-markers on the map.
- User-friendly website.
- Verification of users.

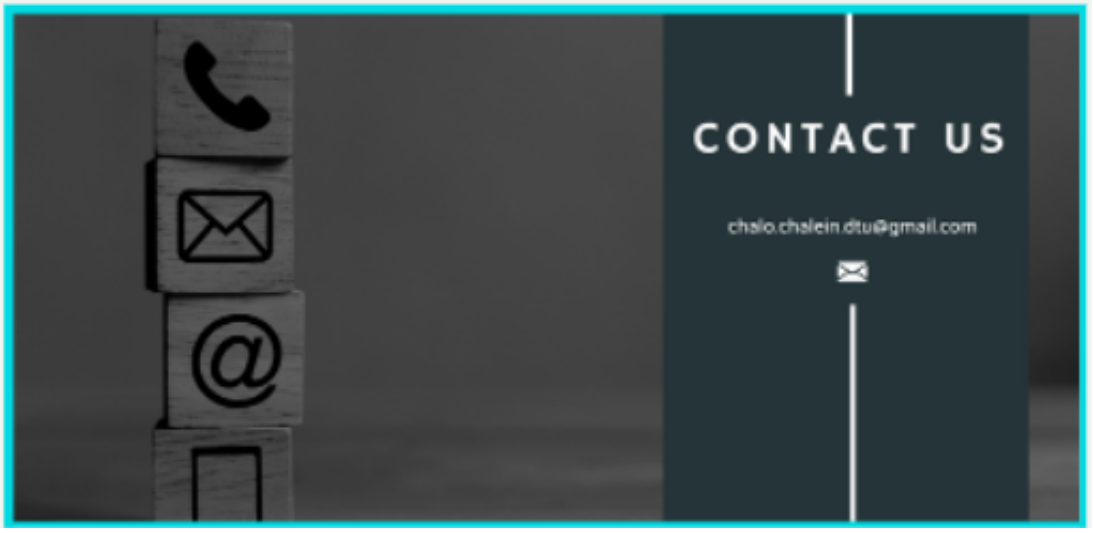
7. UI For website

Homepage:

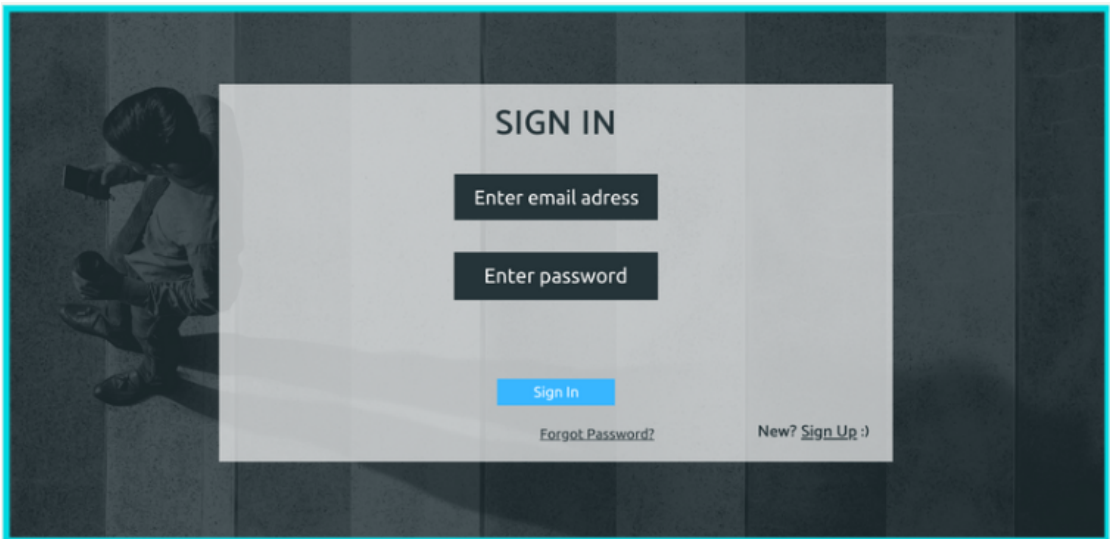
Features:



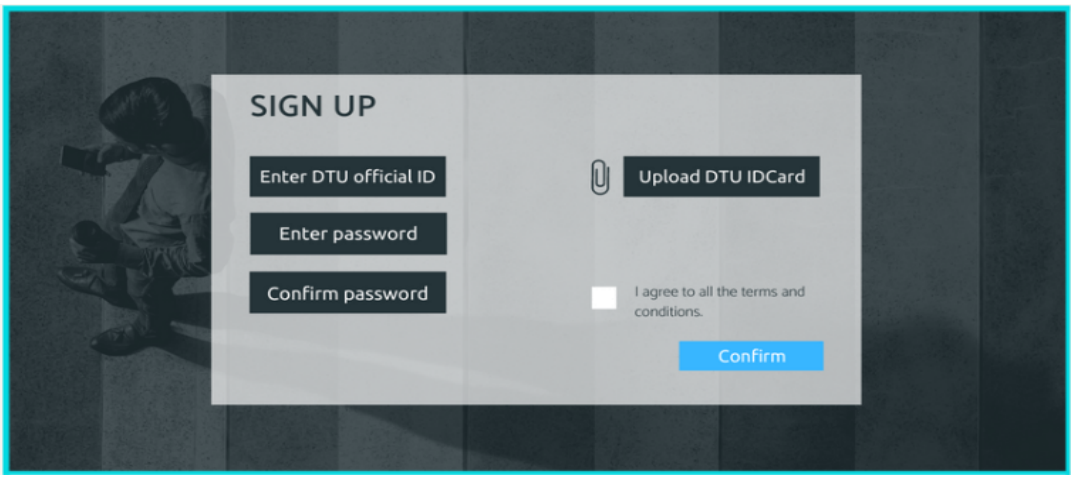
Contact us:



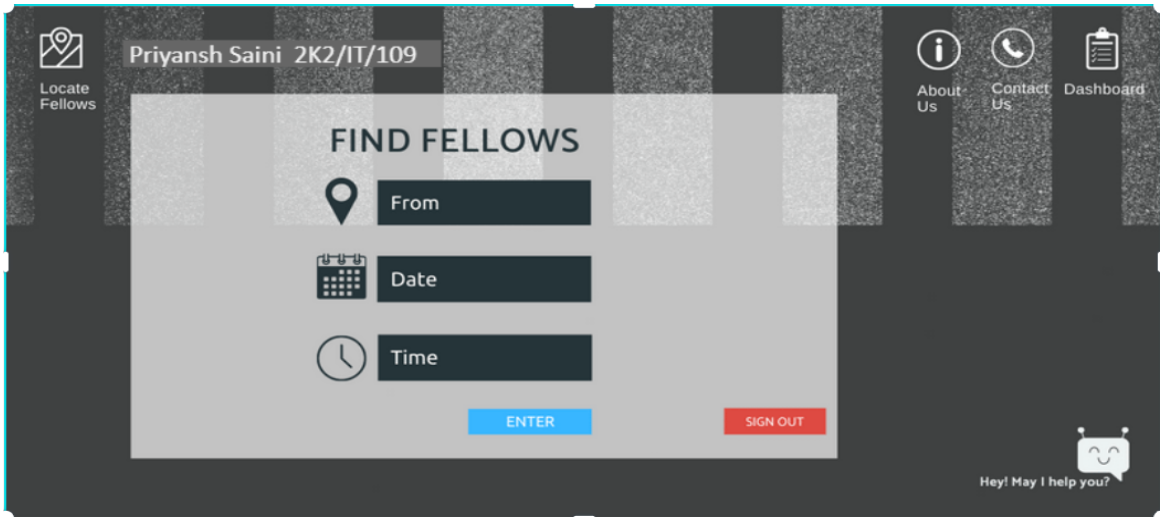
Sign-in:



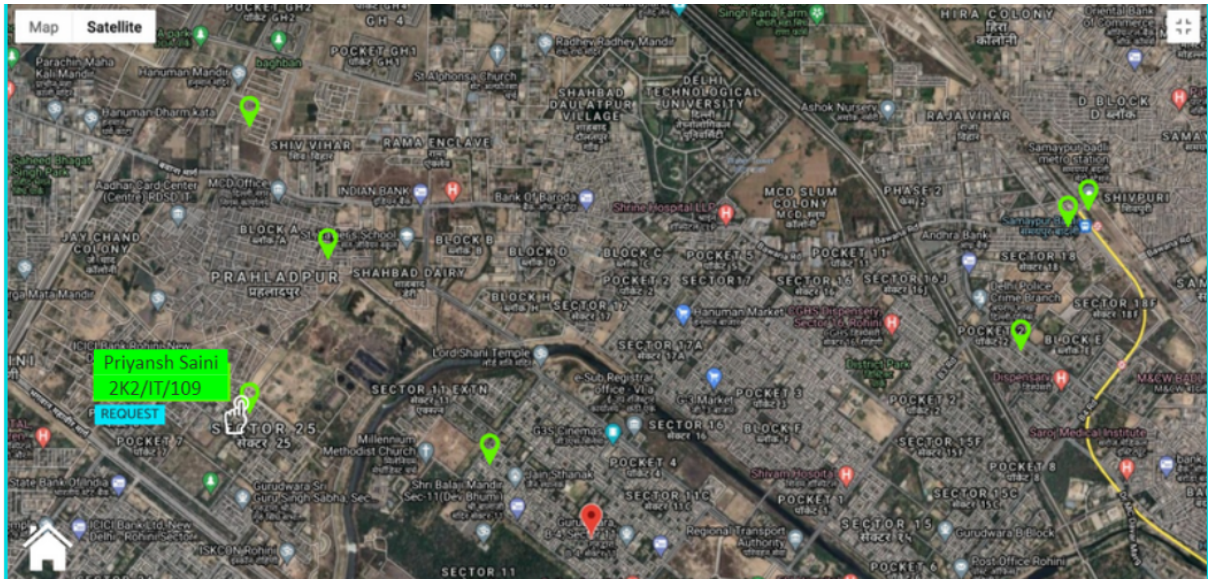
Sign-up:



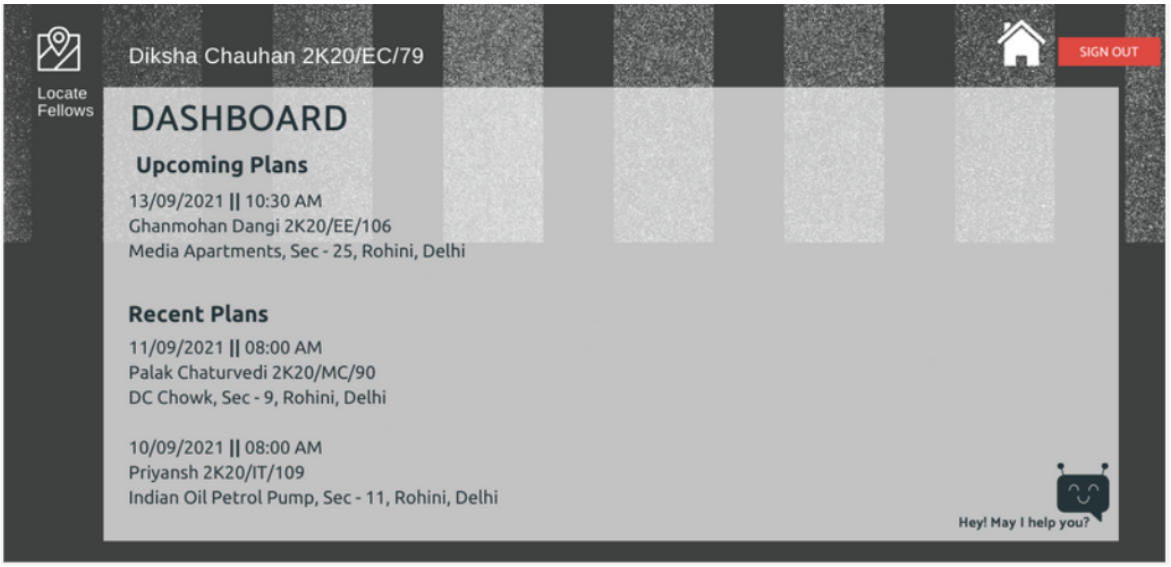
User Profile:



Find:



Dashboard:



8. Problem Statement

There are some users having their vehicle traveling to the university, willing to carpool. When a rider accepts a pool request, he gets the location of his pool. Suppose there are multiple pool members with one rider, the question arises in what order to pick them up to make his/her path shortest.

8.1 Travelling Salesman Problem

Problem Statement:

A traveler needs to visit all the cities from a list, where distances between all the cities are known and each city should be visited just once. What is the shortest possible route that he visits each city exactly once and returns to the origin city?

As we can see, there is very much resemblance to our problem with TSP. So, we can apply many of the solutions provided in the TSP to our problem.

Some of the possible solutions are:

- Brute Force
- Dynamic programming
- Greedy Approach
- Heuristic(Genetic algorithm)

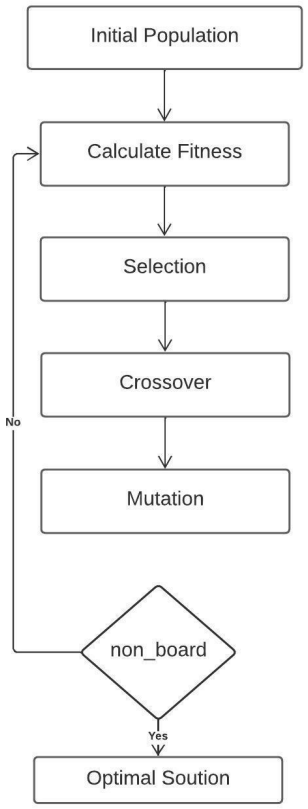
9 Using Genetic Algorithm

TSP belongs to the class of combinatorial optimization problems known as NP-complete. This means that TSP is classified as NP-hard because it has no “quick” solution and the complexity of calculating the best route will increase when you add more destinations to the problem.

- Solves complex problems(NP hard).
- Focus on optimization.
- Provides approximate solutions.

9.1 Genetic Algorithm

A genetic algorithm is a search heuristic that is inspired by Charles Darwin’s theory of natural evolution. This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation.



Pseudo Code:

START

Generate the initial population

```
Compute fitness

REPEAT

    Selection

    Crossover

    Mutation

    Compute fitness

UNTIL population has converged

STOP
```

Time compledxity:

O(O(Fitness) * (O(mutation) + O(crossover)))

If the number of generations and population size is constant, as long as your mutation function, crossover function, and fitness function takes a known amount of time, the big o is O(1) - it takes a constant amount of time.

Initial Population

The process begins with a set of individuals which is called a Population. Each individual is a solution to the problem you want to solve.

Fitness Function

The fitness function determines how fit an individual is (the ability of an individual to compete with other individuals). It gives a fitness score to each individual. The probability that an individual will be selected for reproduction is based on its fitness score.

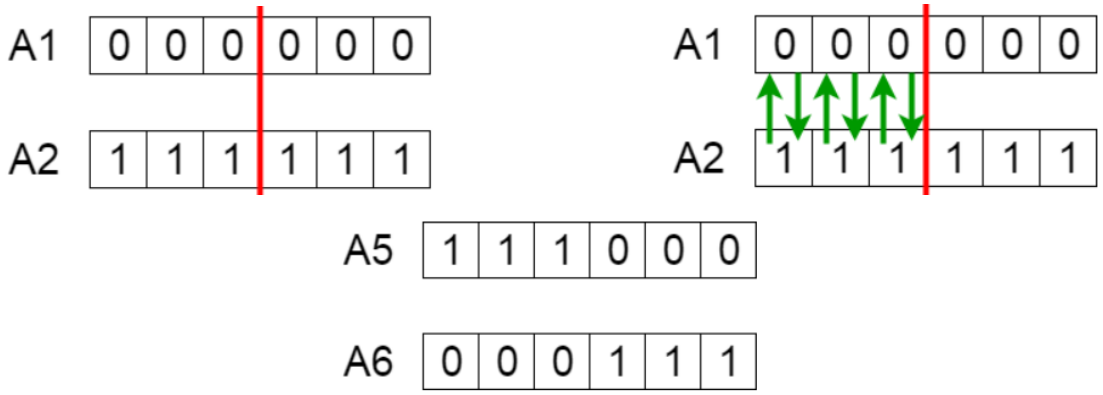
Selection

The idea of selection phase is to select the fittest individuals and let them pass their genes to the next generation.

Two pairs of individuals (parents) are selected based on their fitness scores. Individuals with high fitness have more chance to be selected for reproduction.

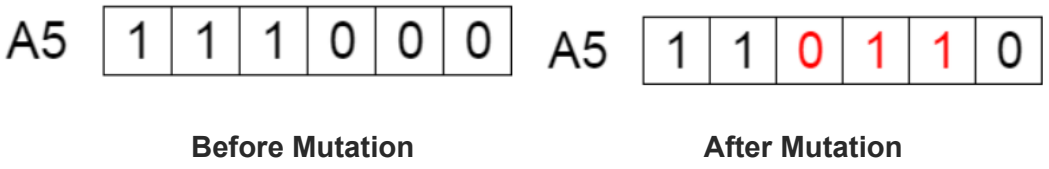
Crossover

Crossover is the most significant phase in a genetic algorithm. For each pair of parents to be mated, a crossover point is chosen at random from within the genes.



Mutation

In certain new offspring formed, some of their genes can be subjected to a mutation with a low random probability. This implies that some of the bits in the bit string can be flipped.



10. Use of Graph data structure

The provided set of vertices should be {1, 2, 3, 4, n .n}. Let's consider 1 as the first and last place to release. For all other vertex i (except 1), we find the low cost method by 1 as the starting point, i as the end point and all vertices appear exactly once. The cost of this method should be the cost (i), the cost of the corresponding cycle will be the cost (i) + dist (i, 1) while the dist (i, 1) is a distance from i to 1. Finally, we return the minimum of all values [cost (i) + dist (i, 1)]. This seems easy so far. Now the question is how can you get the cost (s)?

To calculate the cost (i), we need to have some recurring relationships depending on the minor problems. Let us define the term C (S, i) as the cost of the minimum cost per visit per vertex in set S and exactly, starting at 1 and ending in i.

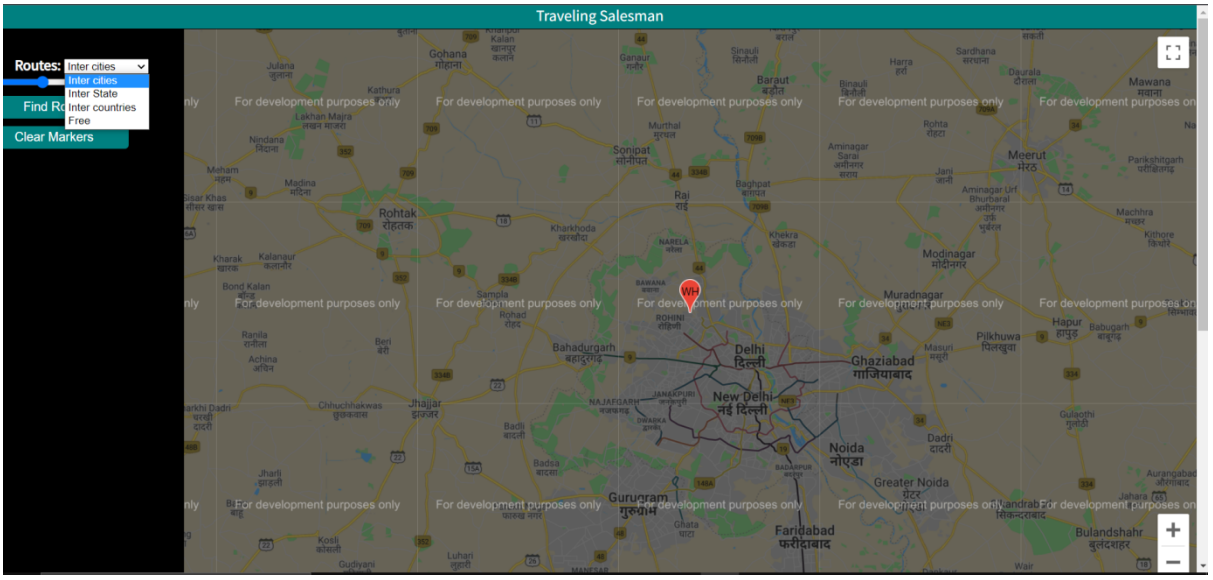
We start with all the small sets of size 2 and calculate the C (S, i) of all the sets where S is the subset, then calculate the C (S, i) of all the small sets S size 3 and so on. Note that 1 must be present in all sets below.

11. Technologies Used

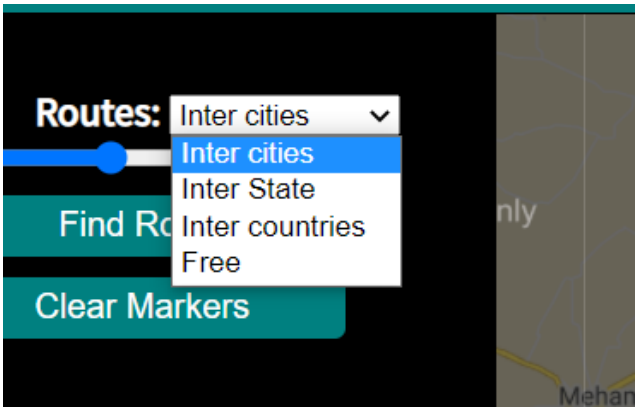
1. Html: HTML 5 Canvas has been used to unable the drawing og the markers and routes on the map and give the site its basic content.
2. CSS: CSS has been used to style the web page.
3. Java Script: JS has be used to write the algorithm, passing markers, routes and distances, activating click functions, etc
4. Google API: An unpaid google API key has been used only for the development purposes.
5. Github: Used as a hosting platform for the website.

12. Working

- **Start page**

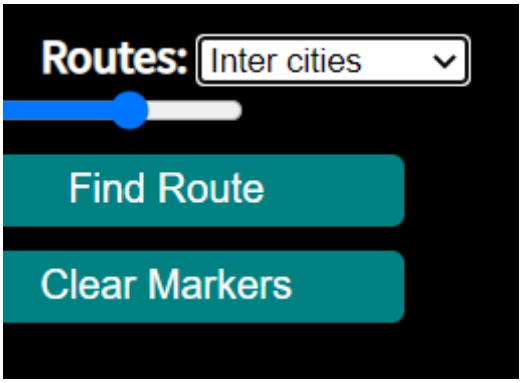


- **Step 1: Select the scale of the map onto which the service provider provides the service which could be inter cities, interstates, or worldwide.**



- **Step 2: Add markers where the users are available.**

- **Step 3: Click on find routes to find the shortest path.**



- **Step 4: Click on clear markers to repeat.**

13. Refrences

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