**Algorithms And Problem Solving Lab Project**

**Travelling Cities – U.S. Exploration**

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**Overview**

Project aims to create a random network of 100 countries provided in the list and implement the following three options on the created network –

1. To go from your hometown to any other place.

1. To visit all the connected cities in minimum time and cost.
2. Want to reach a destination by showing love to your favourite city.

In option one the project finds minimum distance and minimum cost path from the user inputted source and destination.

In option two the project finds the minimum cost and distance of travelling all the cities connected to the source inputted by the user.

In option three the project finds the minimum distance and the minimum cost path from source to destination via certain inputted country.

**Implementation**

The main algorithm used in the project is dijkstra’s

Single source shortest path algorithm and prims minimum cost spanning tree.

The choice 1 and 3 are implemented in two stages using dijkastra’s single source shortest path algorithm.

1. For calculating the minimum distance path (void dijkstrafordistance(struct Graph\* graph2, int src).
2. For calculating the minimum cost path (void dijkstraforcost(struct Graph\* graph2, int src).

pathtracerforcost[100][100];

pathtracerfordistance[100][100];

distforallsourcecost[100][100];

distforallsourcedist[100][100];

These are the different cost and distance matrices updated after the implementation of the algorithm for the purpose of printing the costs and tracing the path from the entered source and destination.

For implementation of option 2 stated above , the algorithm used is prims minimum cost spanning tree. The user enters the source city and the code the finds out the minimum cost and distance of travelling the whole network of the cities.

Here are certain screenshot from the output screen









