TIME DELIVERY PROBLEM

Shistata Subedi
B Tech. Computer Science

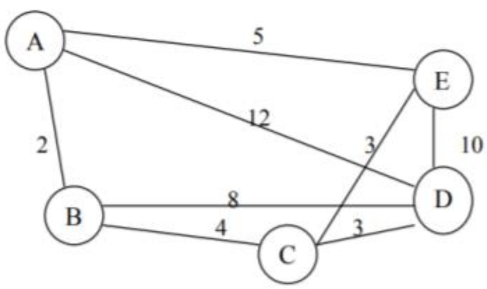
I. INTRODUCTION:

A real-time delivery problem is one of the most vital methods in the application of transportation service. The world needs a better way to travel, in particular, it should be an easy plan to an optimal route through multiple destinations. The best solution to this problem is the shortest distance path or path with a minimum of travel routes. The Travelling Salesman Problem is a classic algorithm problem in the field of computer science. The travelling salesman problem(TSP) can be explained in the following ways: TSP= {(T, x, t): T= (V, E) i.e. a graph} x is function V*V-> Z, t belongs to Z T is a graph that consists of salesperson's tour with the cost

II. PROBLEM DEFINITION ON THE SYSTEM WE HAVE DEVELOPED:

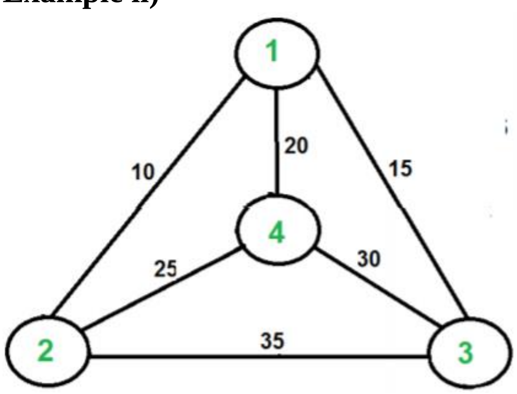
Example i)

If the number of cities given are 'n', we need to find the distance between them. A tour has to be figured which visits each and every location exactly once such the sum of the travel is minimum. Let us consider the given cities are allotted for the delivery problem.



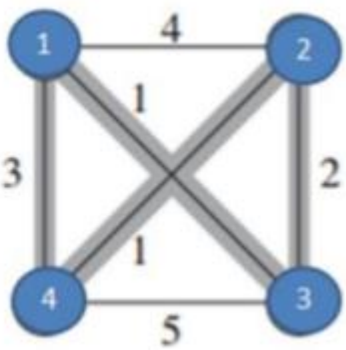
The problem is to find the minimum path which is passing from all the vertices once. In the given graph, the path A, B, C, D, E, A and the path2 A, B, C, E, D, A passes all the vertex whereas path1 is having the length of 24 and path2 has the length of 31.

Example ii)



Consider the given graph with 4 locations.
Starting from 1, choices to visit are:
2,3,4. Min= 1->2 =10
From 2, choices to visit are: 3,4.
Min = 2->4 = 25
From 4, choice is 3
Min= 4->3 =30
From 3, Choice is 1 =15
Total= 10+25+30+15 = 80

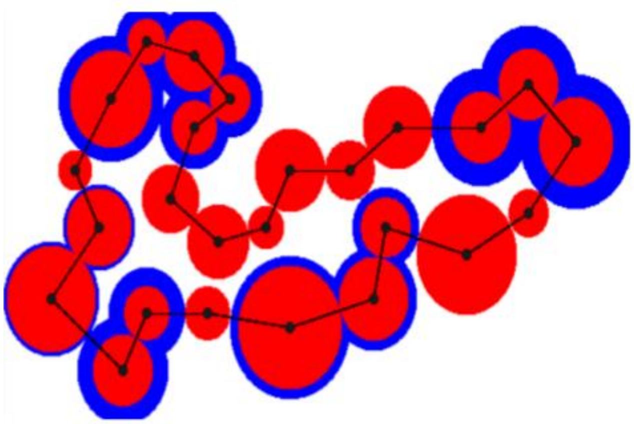
Consider this next:



$$\begin{array}{c c} & \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \end{array} & \left\{ \begin{array}{cccc} 0 & 4 & 1 & 3 \\ 4 & 0 & 2 & 1 \\ 1 & 2 & 0 & 5 \\ 3 & 1 & 5 & 0 \end{array} \right\} \end{array}$$

The path traced is 1->3 = 1 3->2 = 1+2
2->4 = 1+2+1 4->1 = 1+2+1+3
Total Cost=7

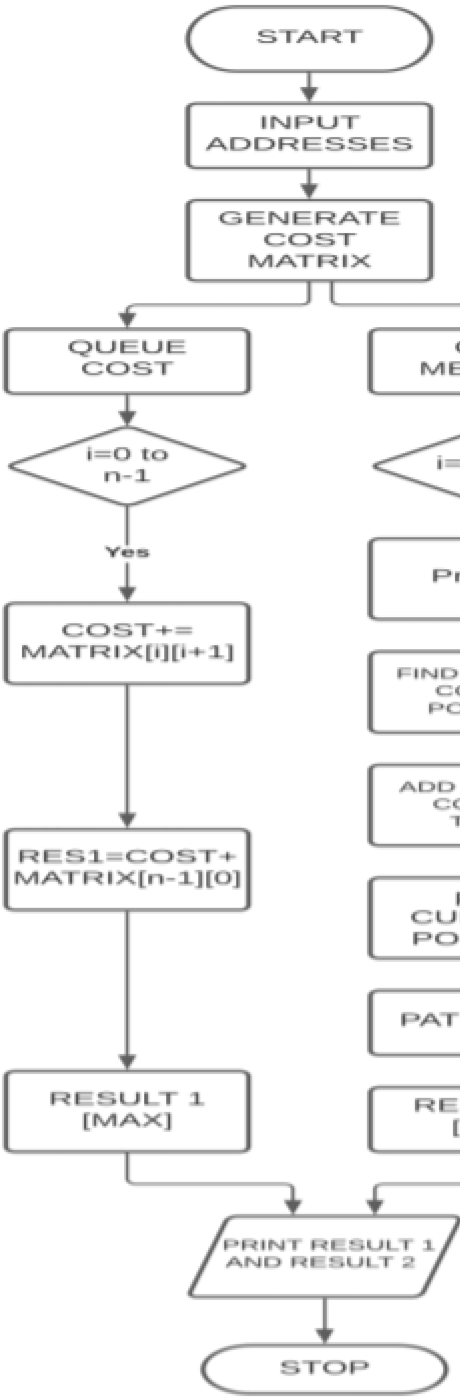
Consider the set of the given cities along with the cost of the entire travel between each and every pair, the algorithm finds the shortest distance for the complete delivery path.



The traveling salesperson person is among the most studied problems in mathematics and still, no effective solution has been figured out. The resolution of TSP could settle the P vs NP problem that could transform the way of minimum cost traveling.

Already there is ongoing research on whether P==NP. Whether the optimization problems can have a perfect solution computed.

III. DIAGRAM THAT DEPICTS THE WORKFLOW OF THE INFORMATION THAT YOU HAVE IMPLEMENTED:



IV. TIME COMPLEXITY:

The other ways to find the optimal solution are Branch and Bound, Dynamic Programming etc. Our method has an advantage over them because of its lesser time complexity. That is O(n2) Since, Finding the minimum cost in from one location to another takes a complexity of O(n). Finding the minimum cost for locations from n location to another n locations takes O(n*n) unit of time. Whereas, Branch & Bound has a time complexity of O((n-1)!). Dynamic Programming has a time complexity of O (n 2 * 2n).

V. COMPARISON:

S No.	Number of Addresses	Queue Cost	Our Method's Cost
1	1	0	0
2	5	209.167755	206.426147
3	10	3219.107910	2896.343506
4	20	7740.936035	4435.609375
5	50	44568.17968	27758.699219
6	100	Float Limit Exceeded	40601.699219

When range of coordinates of delivery address is reduced:

S No.	Number of Addresses	Queue Cost	Our Method's Cost
1	1	0	0
2	10	13.4867	12.274157
3	25	161.116	102.276726
4	50	280.677	124.393112
5	75	581.483	284.161163
6	100	500.201	124.585869
7	150	803.706	372.977966
8	200	1921.47	474.072662

VI. CONCLUSION AND FUTURE:

The traveling salesman problem, as a case of the combinatorial optimization problem, finds much practical importance in real-world applications, inter alia, traffic jams, network load balance routing, etc. Our study produces a good ideal solution with less computational time in a vibrant environment. A fall in distance corroborates the argumentation that prediction brings forth a leap in efficacy in terms of overhead reduction, a robust solution born out of comparisons, that strengthen the quality of the outcome. We have observed the example for the given problem for the Travelling Salesman Problem which produces better results than the present famous algorithms. This is true for general and requires more research in the coming future. We found the results as expected. This greedy algorithm for the delivery problem proves to be more efficient in terms of time and space complexity. We can observe that Delivery Problem is applicable today and will continue to be relevant in the upcoming days.

In future work, we have to implement other metaheuristic algorithms, as the Ant Colony and the Genetic algorithms, compare them with the solution that was proposed, and to verify if it obtains the best solutions for the proposed problem. Traveling salesman problem can also be done for the suppliers with uncertain demand and without integrating the nodes. The further time window for TSP can also be considered to form routing considering loading time, delay penalties, real-time constraints, etc. Evaluating the efficiency of the system by means of comparison tools like histogram to find the efficiency and performance of the system

VII. REFRENCES:

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