NETWORKING FOR LOAD CARRYING VEHICLES

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ABSTRACT

This application connects a Fleet Owner and the users who are seeking to hire a load carrying vehicle to carry their load. When it comes to the road transport industry in India, this application can surely fill the gap between fleet owner and the common user. There's a need to address a wide range of challenging and complex Business Optimization problems such as Vehicle Routing problem (VRP) with constraints, Route Optimization and Pick-up & Delivery approaches. The Results can show the healthy pricing which are both beneficial for the businesses and the end user.

KEYWORDS : Logistics, Optimization Vehicles, Routing, Vehicle Hiring, Algorithm design and analysis, Vehicle Routing Problem (VRP)

I. INTRODUCTION :

This App offers On-demand Transportation solutions to cater to all users goods movement in both full load and part load capacity. It aims to deliver quality service at competitive price and back up every shipment with latest technology & outstanding customer service.This will provide modernistic way of truck hiring service & fleet solutions bestow the way people used to hire transport solutions and our mobile enabled technology. We will try to support our customers for their customized requirements which are not feasible for a local transporter. Direct connection with the Drivers and Fleet owners allows eradicating the Brokers / Transporters margin and hence reducing the expenses / cost for the customer.Both the Customers as well as Drivers make use of these applications to join this network.This App on either side enables quick response and transparency in the system

In many distribution systems,there is need to take effective delivery strategies to improve service levels, reduce freight costs. Therefore, vehicle routing problem is an important issue in urgent need of solution, which can be described as follows:

There are batches of goods demand points (or customers). The demand quantity of each point can be satisfied by no more than K vehicles from a central warehouse (or delivery center) to these demand points, and every vehicle load is constant.

It must arrange vehicle route to the shortest-distance route and meet no more than vehicle load. Demand quantity of every demand point must be met by only one vehicles

II. Literature Survey:

The Indian logistics sector is on a big growth tide. According to the domestic rating agency ICRA, Indian logistics sector is expected to grow at a rate 8-10 per cent over the medium term. This is an improvement over the compound annual growth rate (CAGR) of 7.8 per cent at which the industry grew during the last five years.

The logistics sector provides a livelihood to over 22 million people, which in the next couple of years is expected to grow significantly. Equipping the sector with the latest digital technologies and automation in operation would lead the increase in economy of logistics.

The current methodology comprises of insufficient integration of transport network, Information technology and warehousing and distribution facilities. Regulation exist at a number of different tiers, imposed by national regional and local authorities. However it differ from city to city hindering the creation of national network.

III. EXISTING METHODOLOGY :

1. To hire any Load Carrying Vehicle ,the user need to look for Private Transport Service.

2. In this Service Cost is defined by the Vehicle Fleet Owner.
3. Capacity constraint is one of the problem which many users face as Part Load and Full load follows same cost.
4. Routes are not defined, as Driver decides the route for Delivery.

IV. PROPOSED METHODOLOGY:

The application is meant for everyone, targeting the new comers in the logistics industries .

The pricing will be on the basis of distance travelled by the Driver from pick-up position to the drop position. Satisfying both the customer and the fleet owner.

Route Optimization

Smart tax-invoice system to save the precious time.

Transparent system to pay immediately after/before the delivery.

Tracking system with the Integrated check.

- **VEHICLE ROUTING PROBLEM (VRP):**

1. In the *Vehicle Routing Problem (VRP)*, the goal is to find optimal routes for multiple vehicles visiting a set of locations. When there's only one vehicle, it reduces to the Traveling Salesman Problem.
2. A better way to define optimal routes is to minimize the length of the longest single route among all vehicles. This is the right definition if the goal is to complete all deliveries as soon as possible.

- **APPROACHES TO THE VEHICLE ROUTING PROBLEM (VRP):**

1. Optimal routes meaning for a VRP is the routes with the least total distance. However, if there are ***no other constraints***, the optimal solution is to assign just one vehicle to visit all locations, and find a shortest route for that vehicle. This is essentially the same problem as the TSP.

2. The *capacitated vehicle routing problem* (**CVRP**) is one in which vehicles with limited carrying capacity need to pick up or deliver items at various locations. The items have a quantity, such as ***weight or volume***, and the vehicles have a maximum *capacity* that they can carry. The problem is to pick up or deliver the items for the least cost, while never exceeding the capacity of the vehicles.

- There are three ways to solve the Vehicle Routing Problem:

1. ***Manually*** (& with the help of Google Maps) – GIven all the constraints presented, this becomes a math problem impossible to solve in a real situation. Google will likely guide you to the best route considering traffic but will not be able to know which is the order you must follow to be able to deliver all the parcels in time.

2. ***Preset solvers*** – This method can be a little faster, but the problem is those solvers only satisfy two to three basic constraints. And this method can only be applied in "academic settings", not in the real world.

3. ***Route Optimization*** – The most effective way is having our own route optimization feature or platform, that will developed a complex algorithm that will solve the VRP with our own constraints in seconds, generating the optimal route automatically.

V. ARCHITECTURE:

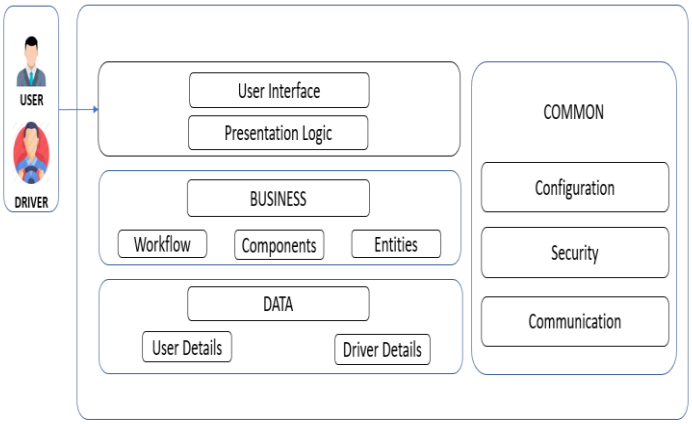


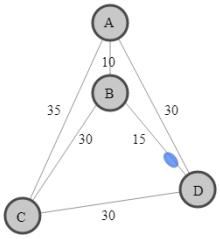
Fig – Architecture of Application

V. ALGORITHM :

- **Traveling salesman problem (TSP), the classic routing problem in which there is just one vehicle.**

Steps:

1. The First Step will be to create the data i.e *distance matrix* which is an array whose i, j entry is the distance from location i to location j.
2. Using previous data the second will be to create a callback function that takes any pair of locations and returns the distance between them.
3. Show the total distance of the optimal vehicle route, and displays the route and its distance.
4. Compute the total distance of optimal vehicle route.



The path with the Shortest sum of Weights : - **A - C - D - B - A**

- **Vehicle routing problem (VRP), a generalisation of the TSP with multiple vehicles.**

1. First Step will be to create the Data Model which consists of:
   - distance_matrix: An array of distances between locations on meters.
   - num_locations: The number of locations.
   - num_vehicles: The number of vehicles in the fleet.
   - capacity-constraints: The Weight of Pick-up items.
2. The Second Step will be same as TSP , which will create Distance Callback that will return the distance between locations and passes it to Solver
3. Before going to Solver Function the Algorithm will consider both the Weight of Pick-up item and its respective Distance
4. The Solver is the Decision function which will distribute the Equal Distance among the number of Vehicles with Optimal Route.
5. Display the routes for the vehicles.

VI. CONCLUSION :

It will provide Analytics which helps owner to find out the operational costs.

Our Mobile applications make truck/Vehicle hiring feasible.

Both the Customers as well as Drivers make use of these applications to join this network.

VII. Reference

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