

Project Statement: Given a set of n (250 approx) nodes and m (47) vehicles of k (4) types, to find a solution that can solve the CVRPTW Problem within 15 minutes. Our objective is to minimize the total cost (variable cost + fixed cost).

Requirements:

Input Data:

A. Customer data

1. **customer_id:** Unique ID of the customer.
2. **buyer_lat:** Latitude of the buyer
3. **buyer_long:** Longitude of the buyer
4. **weight(kg):** maximum demand of the customer
5. **transaction time(min):** time taken by a vehicle at each customer node
6. **delivery_slot_start:** starting time of the customer at which it can be visited.
7. **delivery_slot_end:** ending time of the customer at which it can be visited.
8. **hub_lat:** Latitude of Hub
9. **hub_long:** Longitude of Hub
10. **E:** conversion of **delivery_slot_start** in minutes (considering the start time to be 0 minutes)
11. **L:** conversion of **delivery_slot_end** in minutes
12. **customer_no:** unique name to each customer (for simplification)

B. Vehicle Data

1. **vehicle_type**: different types of vehicles
2. **Max Buyers/Customers (per day)**: Maximum number of buyers that a vehicle can visit in a day in its journey.
3. **Fixed Cost**: Fixed cost of the vehicle, applied only when a vehicle is in use that is when the vehicle leaves the hub.
4. **Free KMs**: free kilometers of the vehicle.
5. **Variable Cost**: Variable cost of the vehicle, applied only when the distance traveled by a vehicle in its journey is more than free km.
6. **Max KMs (per day)**: Maximum kilometers of the vehicle that it can travel in a day.
7. **Min weight per buyer/customer**: Minimum weight a buyer can demand.
8. **Max weight per buyer/customer**: Maximum weight a buyer can demand.
9. **Max Time (Minutes)**: Maximum time of a vehicle in its journey.

C. Constraints

1. Capacity constraints
2. No of buyers
3. Distance
4. Time
5. Max load per customer
6. Min load per Customer
7. Max Load per Vehicle Type
8. Min load per Vehicle Type