NATIONAL RESEARCH UNIVERSITY

Faculty of Computer Science,
AQL Project.

VEHICLE ROUTING PROBLEM

Capacitated Green Vehicle Routing Problem (CGVRP)

Moscow, 2018

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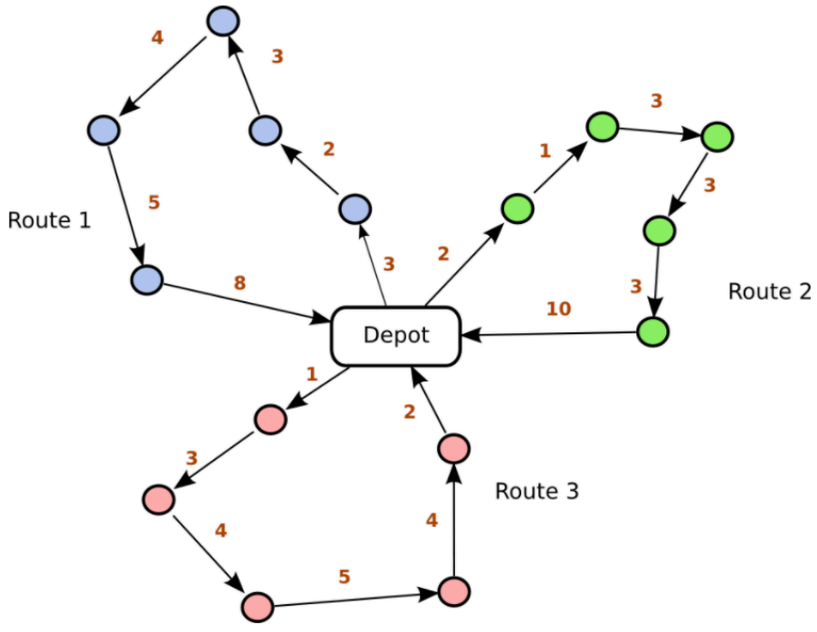
Capacitated Green Vehicle Routing Problem (CGVRP)

What is VRP more importantly what is CGVRP



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Our Problem

We present a situation where a distributor has to manage multiple fleets, comprising of green vehicles and conventional vehicles with the goal of maximising the use of green vehicles and minimising the use of conventional vehicles.

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Solving for single instance depot

n = the number of clients

N = set of clients, with $N = \{1,2,\dots,n\}$

V = set of vertices (or nodes), with $V = \{0\} \cup N$

A = set of arcs, with $A = \{(i,j) \in V^2 : i \neq j\}$

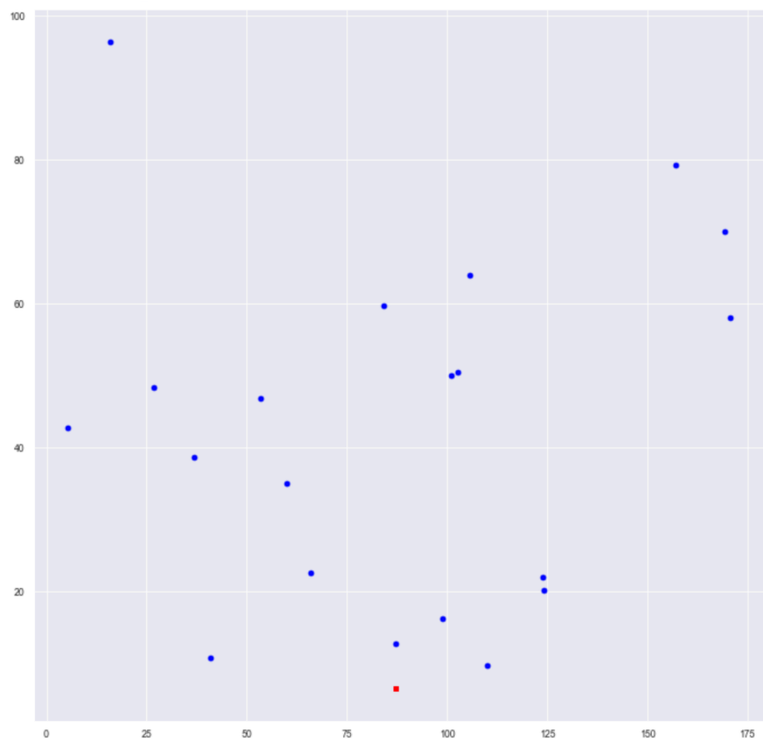
c_{ij} = cost of travel over arc $(i,j) \in A$

Q = the vehicle capacity

q_i = the amount that has to be delivered to customer $i \in N$

GVs = set of Green Vehicles, with $GVs = \{1,2,\dots,n\}$

CVs = set of Green Vehicles, with $CVs = \{1,2,\dots,n\}$



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Our Algorithm - Partition Method

1. Define a threshold distance which is equal to (maximum travel distance of the green vehicle)/2
2. Compute the euclidean distance for all arcs and sort in ascending order
3. From each node naively select the minimum arc, starting from the depot (node 0)
4. Continue with *step 3* as long as the total distance covered is less than the threshold
5. All nodes accumulated in step 3 are removed from the main graph thereby creating two graphs. One for GVP and another for CVP
6. Solve each graph a CVRP

The name of the unit, laboratory, faculty, etc.

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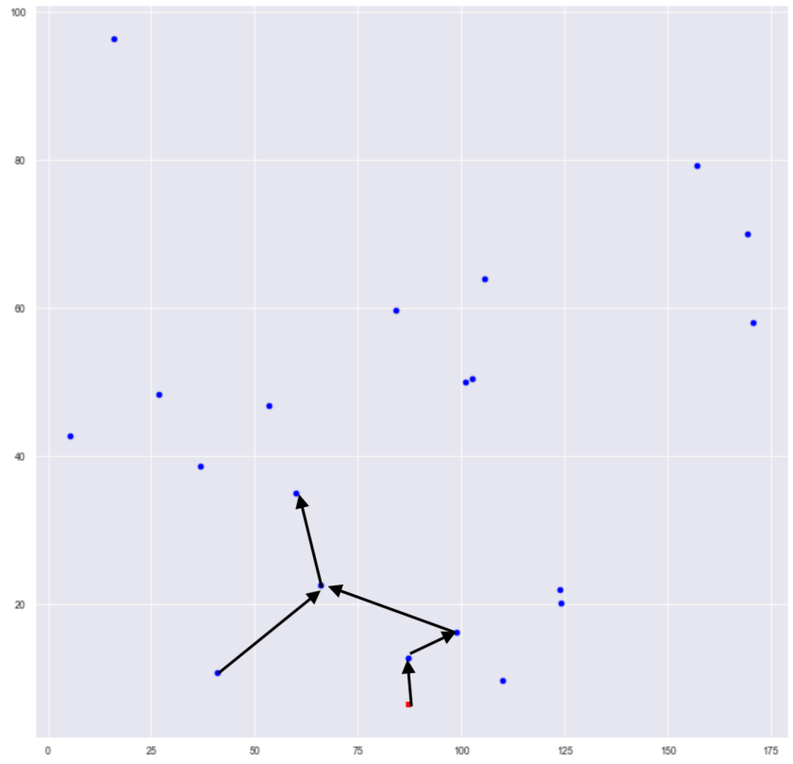

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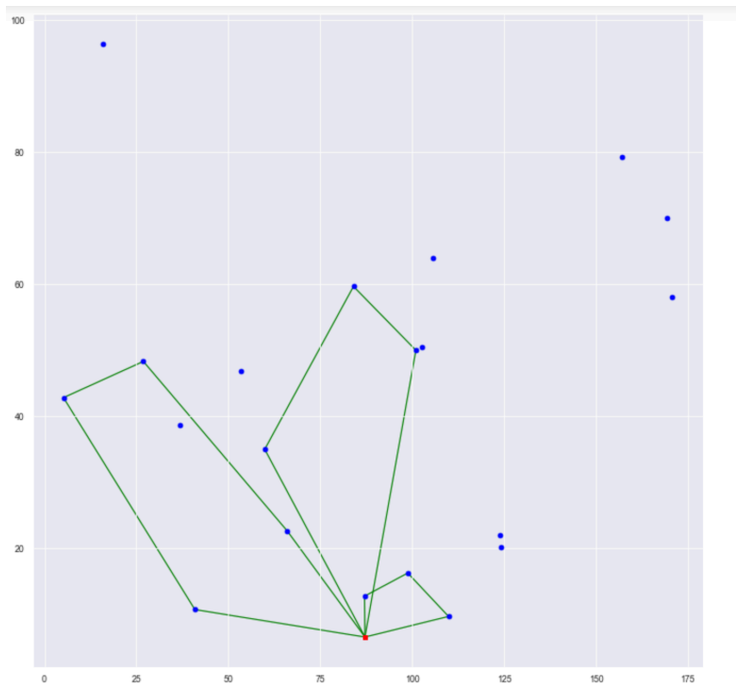
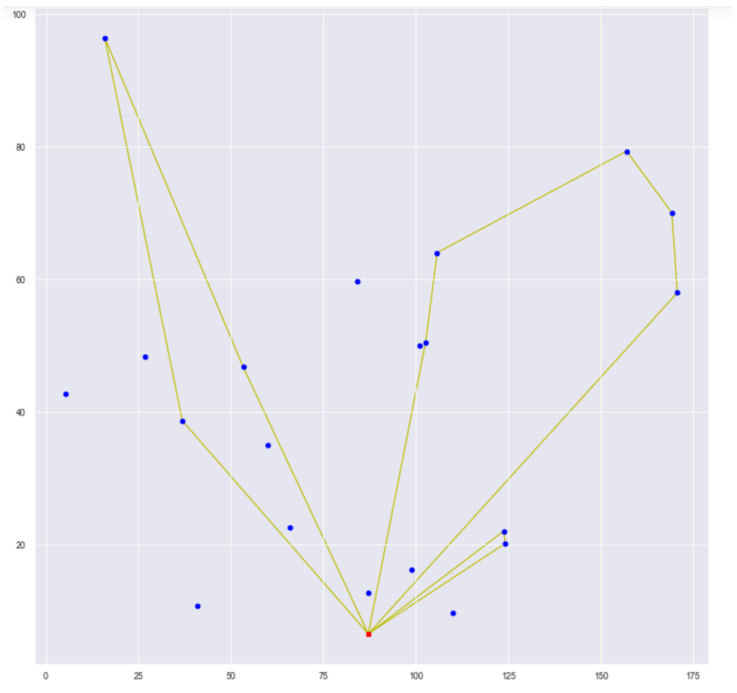
Results for 20 clients

GV



CV



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Next Steps

- Testing the limitations of the algorithm
- Extending to Multiple Depots

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