Faculty of Computer Science,
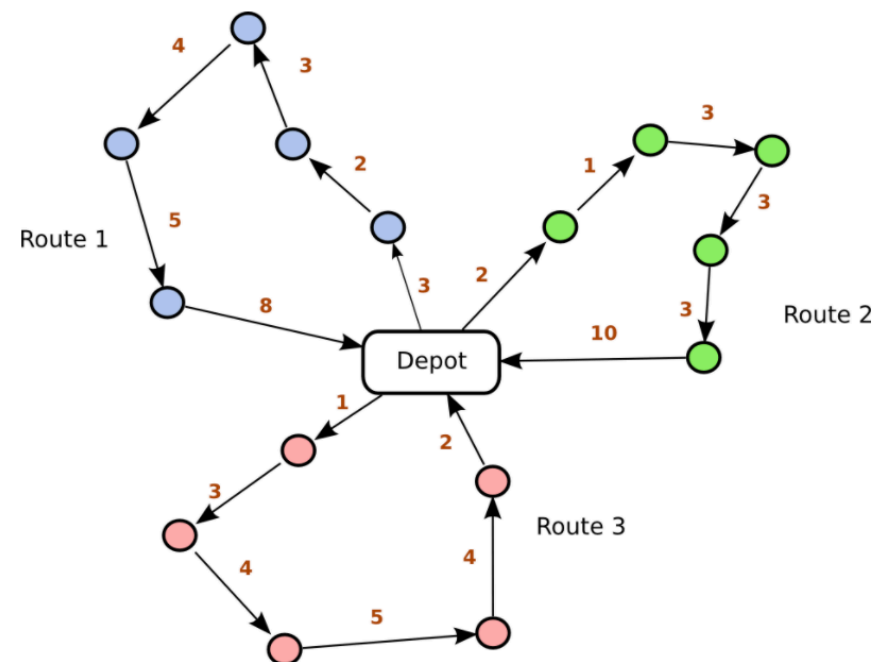AQL Project.

VEHICLE ROUTING PROBLEM

Capacitated Green Vehicle Routing Problem (CGVRP)

Moscow, 2018

VEHICLE ROUTING PROBLEM
Capacitated Green Vehicle Routing Problem (CGVRP)

What is VRP more importantly what is CGVRP

VEHICLE ROUTING PROBLEM
Capacitated Green Vehicle Routing Problem (CGVRP)

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.

VEHICLE ROUTING PROBLEM
Capacitated Green Vehicle Routing Problem (CGVRP)

Solving for single instance depot

n = the number of clients

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

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

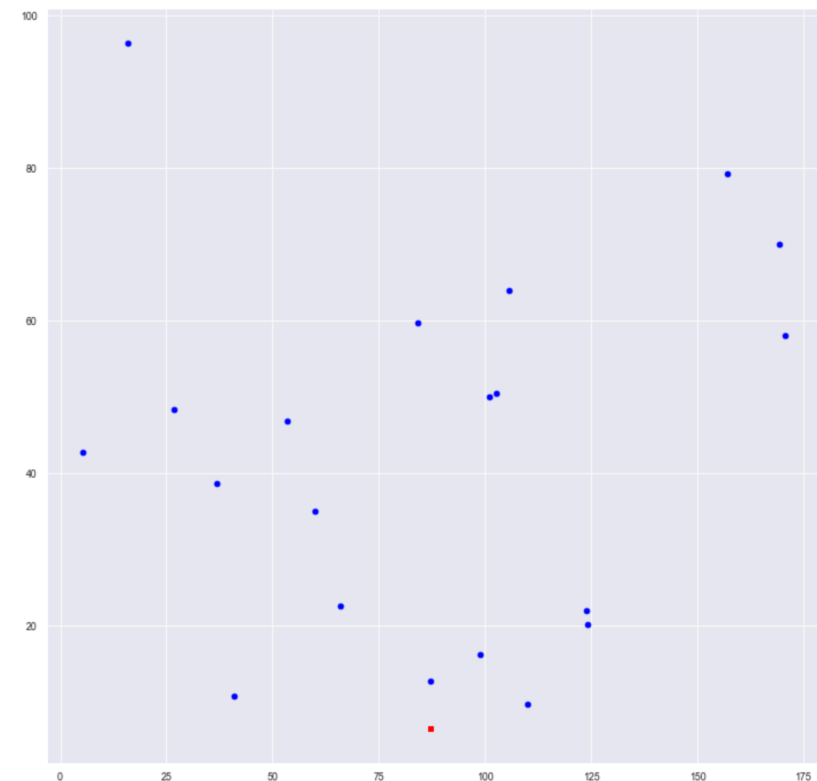A = set of arcs, with $A = \{(i,j) \in V^2 : i \neq j\}$

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 $GVs = \{1,2,...,n\}$

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

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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
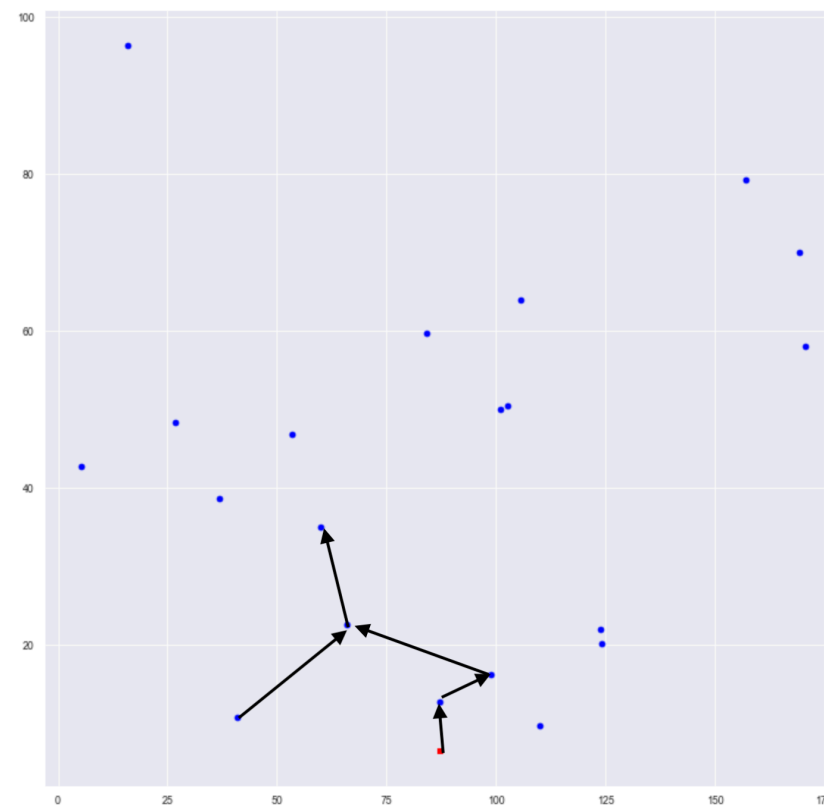
6. Solve each graph a CVRP

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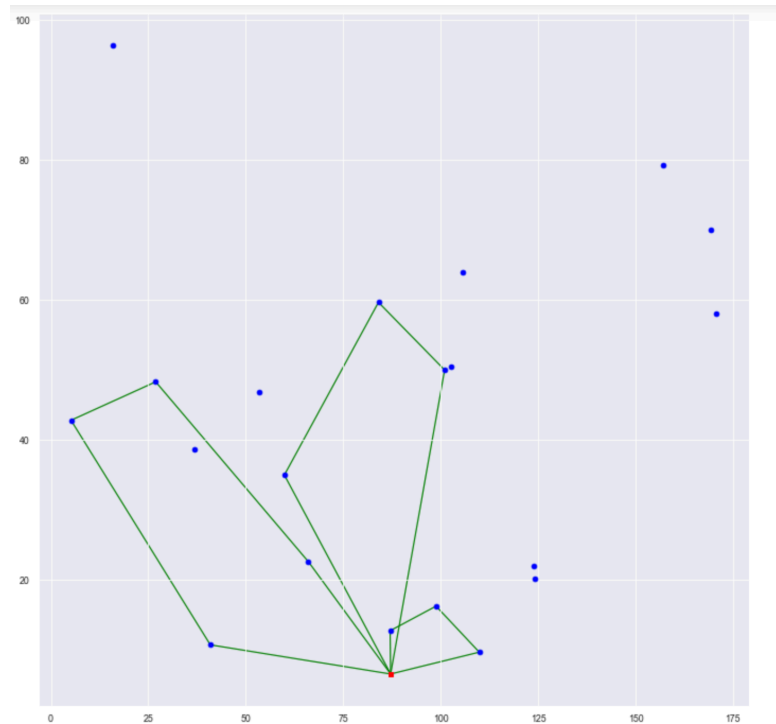
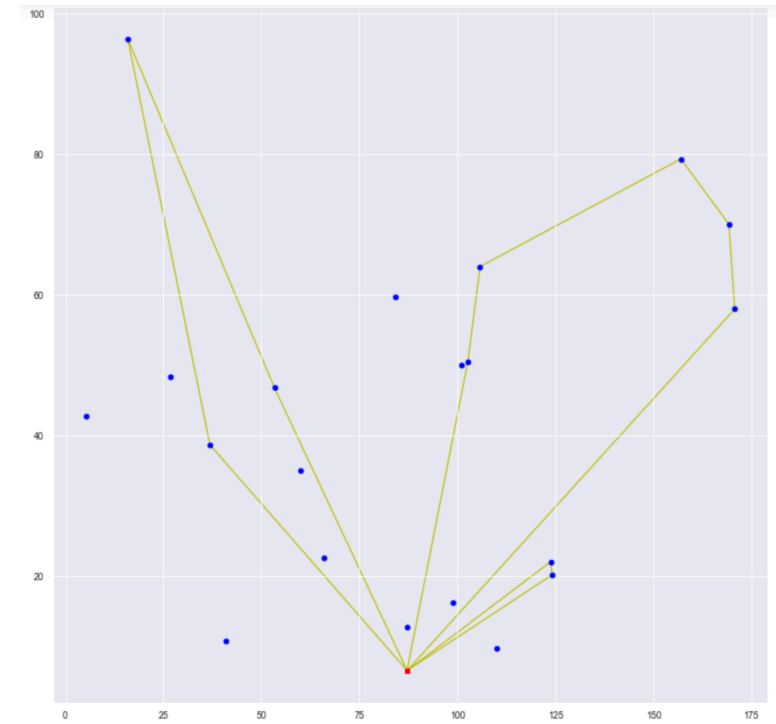## Our Algorithm - Partition Method

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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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