



VEHICLE ROUTING PROBLEM

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 Salesperson Problem.)

The distances between locations are calculated using Manhattan distance, in which the distance between two points, (x_1, y_1) and (x_2, y_2) is defined to be $|x_1 - x_2| + |y_1 - y_2|$.

Running the programs

When you run the programs, they display the following output:

```
Route for vehicle 0:
0 -> 8 -> 6 -> 2 -> 5 -> 0
Distance of route: 1552m

Route for vehicle 1:
0 -> 7 -> 1 -> 4 -> 3 -> 0
Distance of route: 1552m

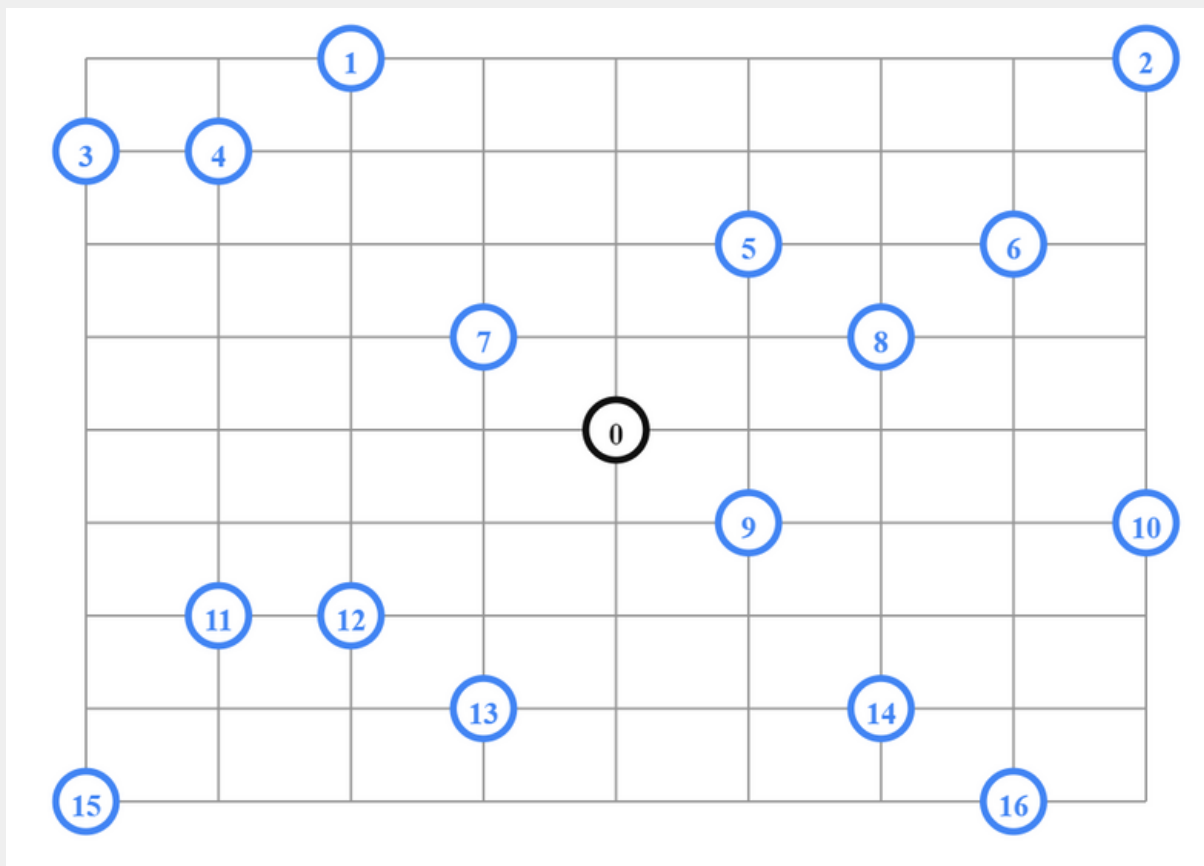
Route for vehicle 2:
0 -> 9 -> 10 -> 16 -> 14 -> 0
Distance of route: 1552m

Route for vehicle 3:
0 -> 12 -> 11 -> 15 -> 13 -> 0
Distance of route: 1552m

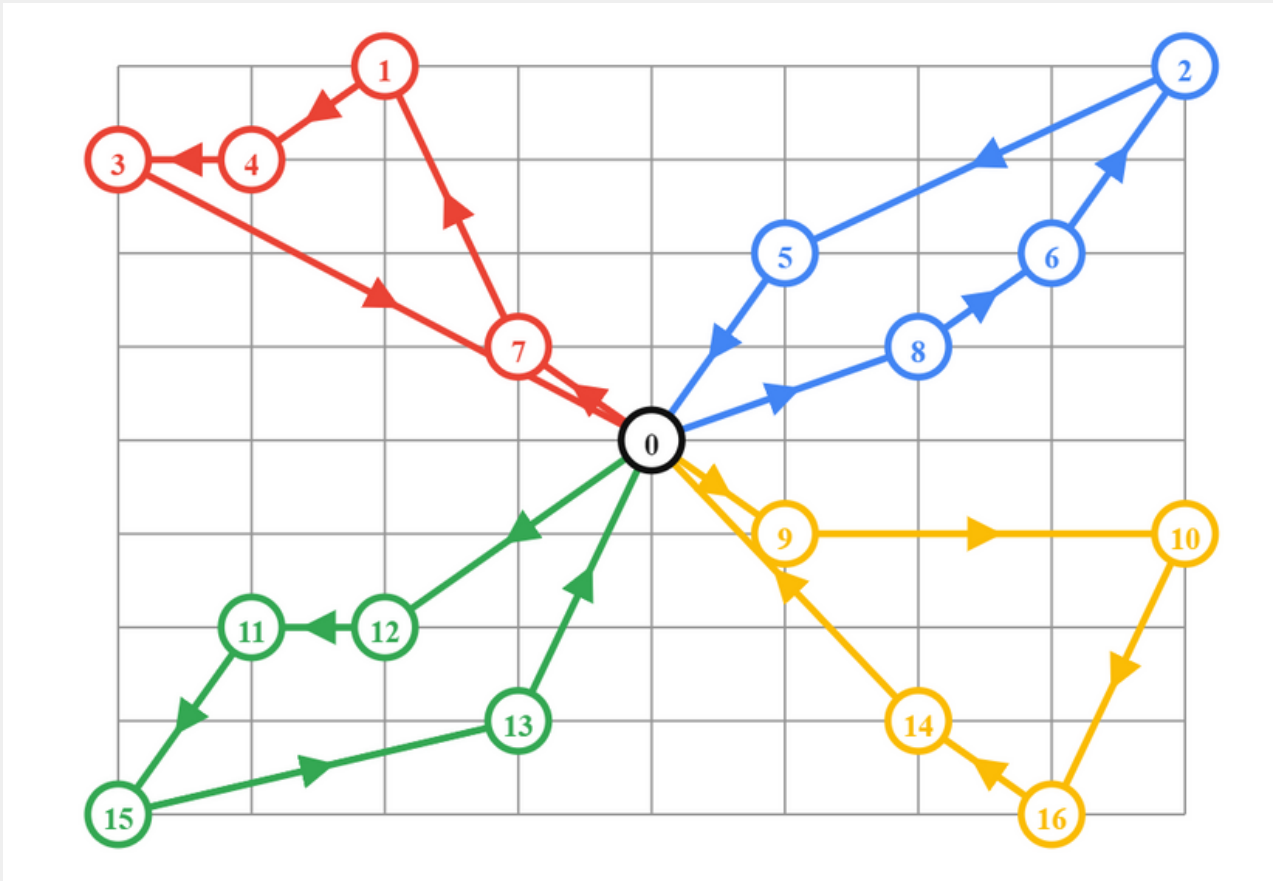
Total distance of all routes: 6208m
```

This section presents an example of a VRP in which the goal is to minimize the longest single route.

Imagine a company that needs to visit its customers in a city made up of identical rectangular blocks. A diagram of the city is shown below, with the company location marked in black and the locations to visit in blue.



How the model and algorithm work.



The project is on GitHub.

Team: (AMA954)

- Mohammad Sherif Mousa Dabour 221101055
- Abdelkhalek Mohamed Abdelkhalek 221101029
- Ahmed Ali Ahmed Mohamed 221101004

Supervised: Prof. Ahmed Emam, Eng. Ismail Ahmed