

# Route Optimization

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## 1 Factors affecting route optimization

- Customer time windows: amend the driver's available routes to better ensure they can make the delivery within the time
- Vehicle capacity: the number of packages transported in the vehicle at once according to weight and volume capacity  $\rightarrow$  calculate how many orders can be delivered while on route to determine the number of stops required
- Traffic congestion: notify drivers of any known traffic congestion, accidents, or road closures
- Distance between stops: distance between their designated stops

## 2 A real-time and continuous optimization

By combining real-time and continuous optimization, the routes will be more efficient and adapted to field reality. All data defining the day's activity (orders/tasks to be carried out and available resources) are integrated into the optimization plan.

- A real-time route optimization : the optimization is done at each moment, adapting to the events that are taking place. It is thus possible to react immediately in case of a problem: change the routes by assigning certain points to be visited to other drivers, proactively inform customers of the delay of their delivery, etc. This allows the user to check in real time how the routes are evolving in the field, to follow their progress and to adjust to any arising changes.
- Continuous optimization: never stops optimizing. From the first package that enters the system to the last delivery made, the software continuously optimizes during this period and suggests recommendations. The planner never needs to proactively restart the optimization with new data. The algorithm is constantly connected to the real world and has permanent exchanges with the information system.

## 3 Dynamic route optimization

Dynamic route optimization means that routes are created from scratch using a given set of orders and also allow adjustments based on traffic-related or weather issues. Dynamic route planning software also lets fleet managers and the dispatch team track and monitor vehicles in real-time. This functionality is incredibly useful, as the dispatch team can make adjustments if drivers are likely to be delayed. The dispatch team can act accordingly, e.g. by sending a different driver or informing the customer ahead of time that the delivery window will likely be missed.

## 4 How to build a route optimization model

### 4.1 Parameters

Routes optimization uses a multitude of parameters to solve a complex efficiency equation. The optical parameters include:

- Cargo capacity: the quantity of cargo the vehicle can carry or the volume of the space the vehicle has for cargo
- Pickup or delivery destination: departure time, service time (how long you will stay at a destination), destination time
- Vehicle/driver's schedule: working hours, break time
- Vehicle capabilities
- Distance: addresses or geolocation
- Traffic: real-time traffic conditions, redirect routes in incase of delay, live to track

### 4.2 How to get distance between 2 locations

- use google API → return coordinates ( latitude, longitude)
- use distance matrix: have distance among each location
- use suburbs pin codes

### 4.3 Get real time traffic data

- use GPS to Track Routes: A GPS tracker is a device that uses the Global Positioning System to determine and track a vehicle's location, speed, time, and direction. Through GPS satellite data, businesses get access to both real-time and historical navigation data on the vehicles in their fleet

### 4.4 The core functionalities

- Route plan visualization
- Driver app integration
- Live to track
- Analytics and reporting