

Logistics Last mile delivery optimization use case for the pharmaceutical industry - Saudi Arabia

Introduction

The pharmaceutical industry faces a number of challenges when it comes to distributing medications and other healthcare products to customers and patients. These challenges include:

Ensuring timely delivery

Pharmaceutical companies must ensure that medications and other products are delivered to customers and patients in a timely manner, as delays can have serious consequences for the health and well-being of the individuals involved.

Maintaining visibility

It is important for pharmaceutical companies to have visibility into the status of their deliveries at all times so that they can monitor the progress of each delivery and take any necessary action to ensure timely delivery.

Improving efficiency

Pharmaceutical companies can face significant costs associated with distribution, and optimizing their delivery processes can help to reduce these costs and improve efficiency.

Last-mile delivery optimization software can help pharmaceutical companies address these challenges by providing tools for planning and routing deliveries, tracking and visibility.

Problem statement

A major Pharmaceutical production company is producing and distributing multiple drugs and cosmetics products to the market in Riyadh - Saudi Arabia.

They serve 837 locations and have a list of customers' addresses as below, The use-case address how to use software and optimization to automatically manage last mile dispatching.

Pharmacy Name	Address
Habib Pharmacy	د. سليمان الحبيب الرئيسية العليا
Nahdi pharmacy صيدليه النهدى	Prince Sultan Bin Abdulaziz Rd, Al Olaya, Riyadh
Noura Pharmacy Riyadh Branch	نورا،الرياض
Al-Dawaa	Prince Muhammad Ibn Al-Dawaa, Prince Sultan Bin Abdulaziz Rd, Al Olaya, Riyadh 12222, Saudi Arabia
Nahdi pharmacy صيدليه النهدى	التجاري - نقاط، Prince Muhammad Ibn Abd Al Aziz
Medical Origin Pharmacy - MCO	Medical Origin Pharmacy - MCO, Olaya St, Al Olaya, Riyadh 12221, Saudi Arabia
صيدلية الدواء	Prince Muhammad Ibn Abd Al Aziz, Al Olaya, Riyadh 12331, Saudi Arabia
صيدلية ازهار البلسم للأدوية(17)	ر البلسم للأدوية(17)، 2721 طريق مكة المكرمة الفرعى، العليا، الرياض 12611 . 9429 12611
durat Lemon Pharmacy smc hospital	durat Lemon Pharmacy smc hospital, Al Olaya, Riyadh 12311, Saudi Arabia
صيدلية good health pharm	صيدلية الصحة الجيدة (1) العلية
الصيدلية الاستشارية Consulting Pharmacy	الصيدلية الاستشارية Consulting Pharmacy, Al Olaya, Riyadh 12313, Saudi Arabia
Boots Pharamcy Faisaliah	طريق الأمير سلطان بن عبدالعزيز ، 3441 ، Boots Pharamcy Faisaliah, Al Olaya , Riyadh 12
صيدلية Smart Apple Pharmacy	العام، Smart Apple Pharmacy, Olaya St, Riyadh 12211, Saudi Ara
Nahdi pharmacy صيدليه النهدى	Riyadh 12331، صيدليه النهدى ، فاطمة ام البهاء ، العليا Nahdi pharmacy
Boots pharmacy	Boots pharmacy, Mode Mall, Prince Sultan Bin Abdulaziz Rd, Al Olaya, Riyadh 1
Nahdi pharmacy صيدليه النهدى	Nahdi pharmacy Prince Abdulaziz Ibn Musaid Ibn Jalawi St, Al Ola
Ophthalmology/ Laser Center u0026 Habib Pha	.. سليمان الحبيب الجلدية، 2570 Ophthalmology/ Laser Center u0026 Habib Pharmacy
صيدلية د.سليمان الحبيب بمستشفى العظام	صيدلية د.سليمان الحبيب بمستشفى العظام، 8705 Hanifa Valley St, 2617, 2617, Saudi Ara
صيدلية الدواء	، Olaya St, As Sulimaniyah, Riyadh 12244, Saudi Arabia
صيدلية فيجن	صيدلية فيجن، Musa Ibn Nusair St, Al Olaya, Riyadh 12241, Saudi Arabia
صيدلية انوفا - Innova Pharmacy	PM2G+G2Q - صيدلية انوفا - Innova Pharmacy, Musa Ibn Nusair St, Al Olaya, Riyadh
صيدلية الحياة	MPJ2+P3J ،صيدلية الحياة، العليا Riyadh Saudi Arabia

Problem 1 – Mapping addresses

One of the challenges is converting addresses from text base to actual geographic locations on the Map. This problem is called Geocoding.

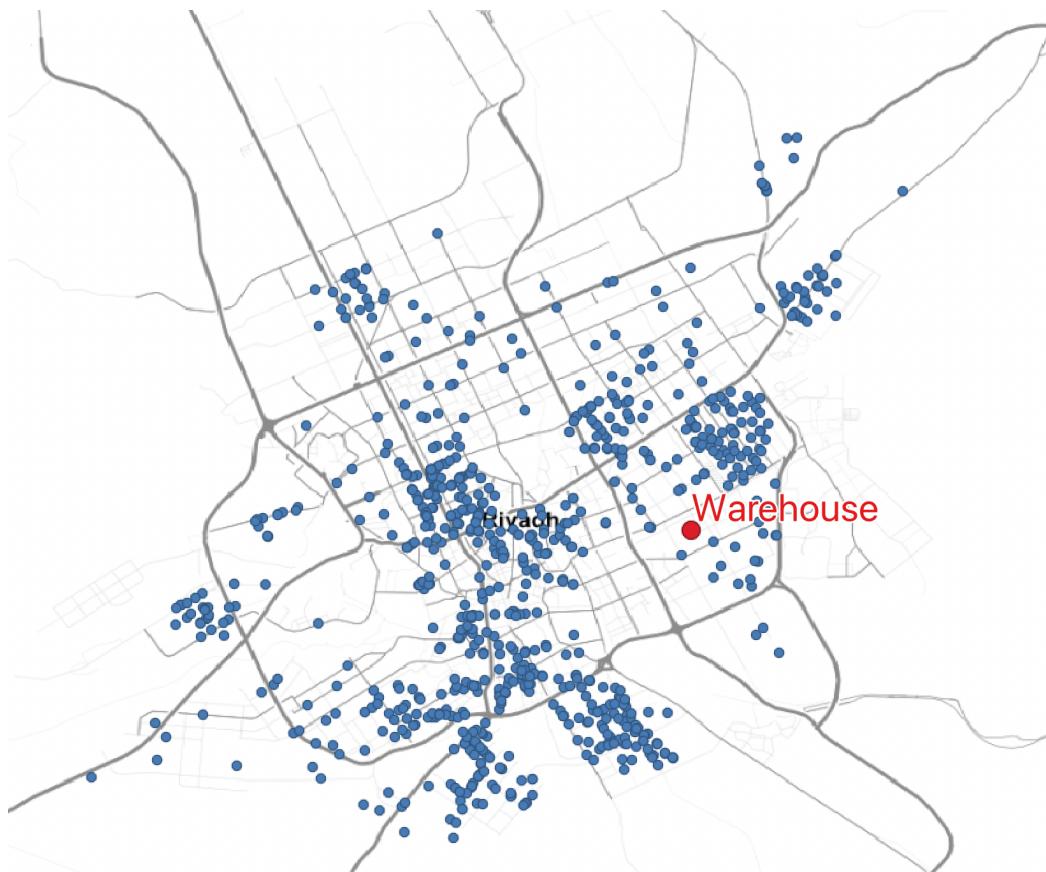
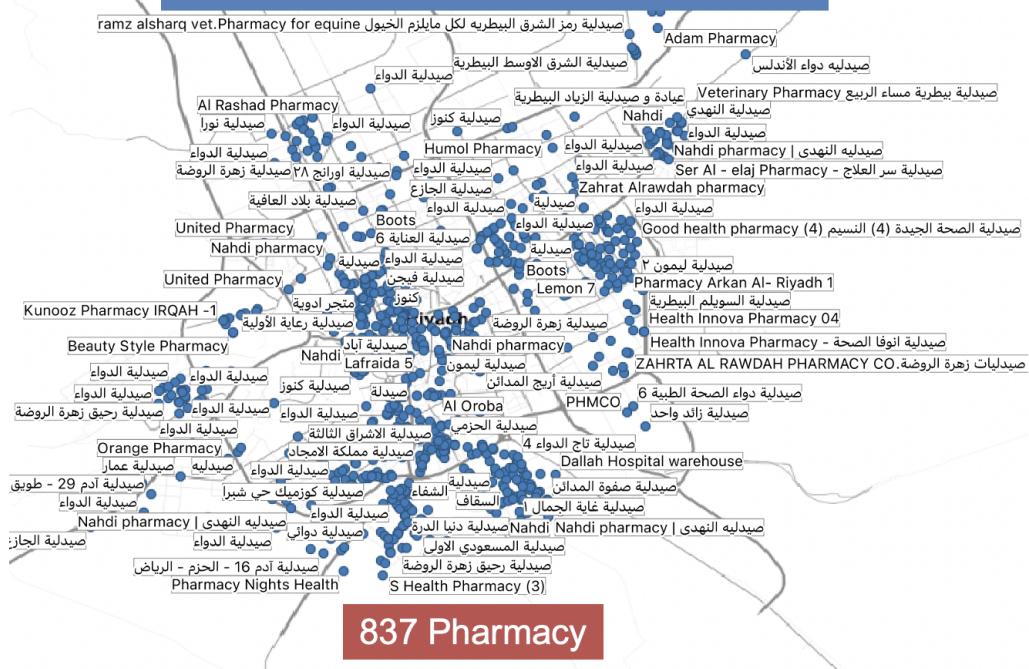
The result is as below, each point is displayed on the map

Pharmacy Name	Address	Longitude	Latitude
د. سليمان الحبيب الرئيسية العليا	Habib Pharmacy 8807	46.676716800	24.7043986000
صيدليه النهدى Nahdi pharmacy	Nahdi pharmacy صيدليه النهدى	46.689546700	24.6903948000
دلية نورا,الرياض Noura Pharmacy	Noura Pharmacy Riyadh Branch	46.676341400	24.6937437000
Al-Dawaa	Al-Dawaa, Prince Sultan Bin Ab	46.688820900	24.6905607000
صيدليه النهدى Nahdi pharmacy	Nahdi pharmacy صيدليه النهدى	46.673201900	24.6899007000
Medical Origin Pharmacy - MCO	Medical Origin Pharmacy - MCO	46.690020300	24.6851209000
صيدلية الدواء	Prince Muhammad, صيدلية الدواء	46.675879800	24.6934709000
صيدلية ازهار البلسم للأدوية(17)	العليا، الرياض 12611 9429	46.695953200	24.6813960000
durat Lemon Pharmacy smc hospital	durat Lemon Pharmacy smc ho	46.687073200	24.6810085000
good health pharm صيدلية الصحة الجيدة (1) العليا	good صيدلية الصحة الجيدة (1) العلياء	46.696435800	24.6825345000
الصيدلية الاستشارية Consulting Pharmacy	الصيدلية الاستشارية Consulting Ph	46.674186100	24.6878857000
Boots Pharamcy Faisaliah	Boots Pharamcy Faisaliah, Al C	46.685670500	24.6892639000
Smart Apple Pharmacy صيدلية التفاح الذكي	Smart Apple P صيدلية التفاح الذكي	46.688952400	24.6855810000
صيدليه النهدى Nahdi pharmacy	Nahdi pharmacy صيدليه النهدى	46.678470900	24.6983367000
Boots pharmacy	Boots pharmacy, Mode Mall. Pu	46.685600000	24.6895330000
صيدليه النهدى Nahdi pharmacy	Nahdi pharmacy صيدليه النهدى	46.700463900	24.6812864000
Ophthalmology/ Laser Center u0026 Habib Pha	Ophthalmology/ Laser Center u	46.677554100	24.7044700000
صيدلية د.سليمان الحبيب بمستشفى العظام	سليمان الحبيب بمستشفى العظام, 8705	46.677839400	24.7033372000
صيدلية الدواء	Olaya St, As Sulima, صيدلية الدواء	46.677694000	24.7081110000
صيدلية فيجن	Musa Ibn Nusair St, صيدلية فيجن	46.686292900	24.7056561000
Innova Pharmacy - صيدلية انوفا	PM2G+G2Q - صيدلية انوفا - Innova	46.675120900	24.7013477000

Pharmacies Locations in Riyadh, Saudi Arabia

837 Pharmacy

Pharmacies Locations in Riyadh, Saudi Arabia



Problem 2 – Assigning packages to drivers

Depending on the number of customers and the number of packages for every customer on this day, the number of delivery cars needs to be decided.

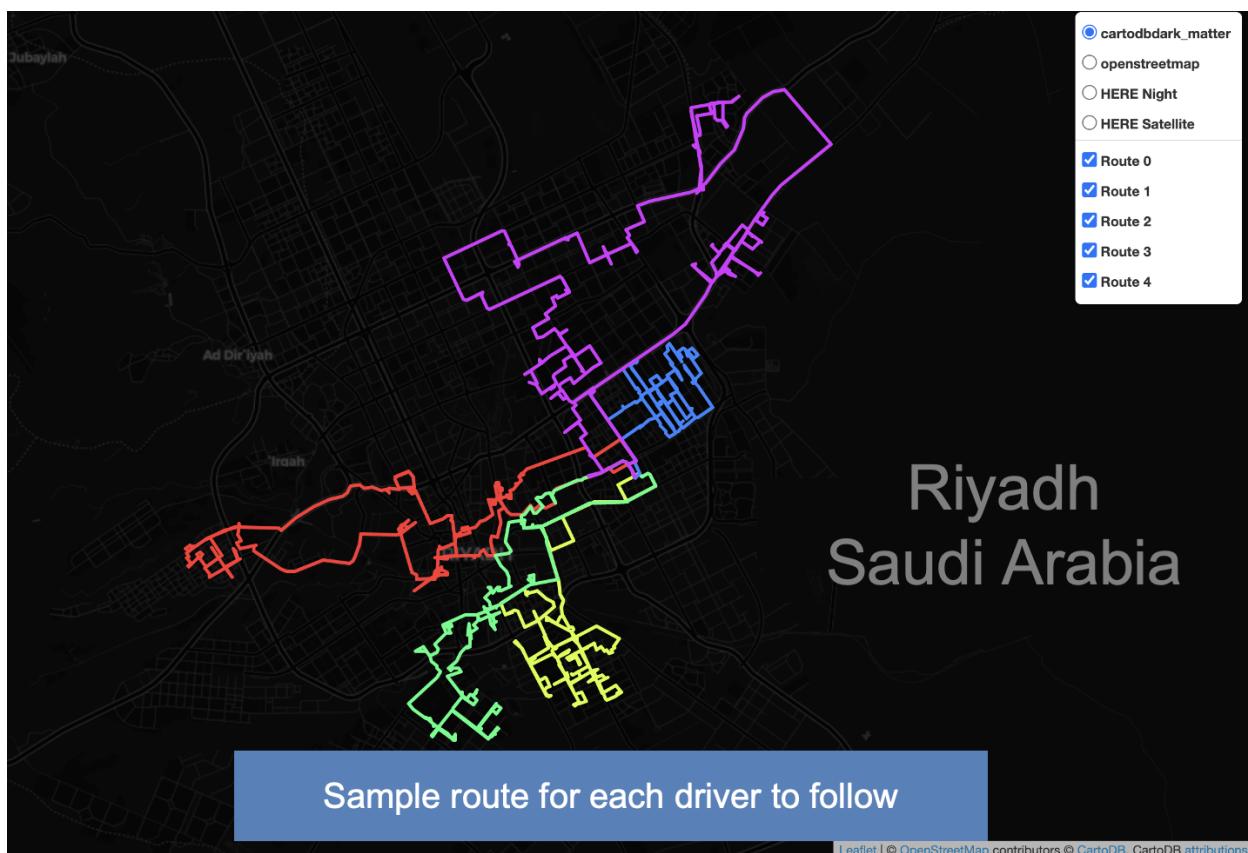
Based on the capacity of each car, and maximum working hours per car, we are able to calculate the total number of cars needed and the best distribution for each package to each driver.

We limit the maximum total working hours to 8 hours per driver.

Our solution **suggests 23 cars** to use to cover 837 Pharmacy while constraining the working hours of each driver to less than 8 hours a day.

Sample results routes per driver:

[Click Here](#)



Example route per driver



Example route per driver – Order assignment sheet.

The driver will deliver 39 packages, he starts at 08:00 am and finishes at 15:50
We identify the time he will arrive at each facility

Each driver can have a list of ordered customers

stop_order	id	arrival timestamp
0	start_depot	08:00
1	Innova Pharmacy_7	08:21
2	صيدلية طيف نجد_695	08:31
3	صيدلية الدواء_688	08:42
4	Health - صيدلية بيت الصحة (انوفا)	08:53
5	Orange Pharmacy_690	09:03
6	صيدلية باسم مملكة الدواء_703	09:14
7	صيدلية دنيا الورقة_698	09:25
8	Zahrat Al Rawdah Pharmacy_AI	09:35
9	Orange Pharmacy_706	09:46
10	صيدلية السقاف_701	09:56
11	صيدلية_712	10:06
12	Pharmacy Corner Flower K-4_6	10:17
13	صيدلية النهدي_705	10:29
14	Aljazea Pharmacy_174	10:40

stop_order	id	arrival timestamp
21	صيدلية ياسمين_741	12:06
22	Nahdi pharmacy 721	12:22
23	Nahdi Pharmacy_727	12:35
24	صيدلية الدواء_696	12:47
25	Drug Pharmacy_728	12:58
26	صيدلية الخليجية والسفاق_714_15	13:09
27	صيدلية العروبة_726	13:19
28	صيدلية قمر العروبة_708	13:32
29	Tala Pharmacy_699 صيدلية تالا	13:42
30	Nahdi Pharmacy_689	13:52
31	Al Riyadh Pharmacy_380	14:03
32	الشفاء_722	14:14
33	صيدلية دانة الدواء_764	14:24
34	صيدلية الدمام_687	14:35

This driver will deliver 39 items and finish at 3:50 pm when he start at 08:00 am

15	Health Pharmacy_693	11:00
19	صيدلية دلتا (4)_729	11:42
20	Pharmacy Drug rack_735	11:56

38	صيدلية سارية الدواء الثالثة_692	15:20
39	end_depot	15:50

Generating a summary report per driver

This include, the capacity of the car filled

Number of orders they will cover

Total distance they will travel

Total working time

Total travel time on the road (factoring traffic)

[Click here](#)

We can generate a
list of all drivers and
understand the total
working time and
driving time

route_id	capacity	#orders	distance	total time	travel time
0	0.38	38	67852.0	7.84	1.5066
1	0.4	40	46638.0	7.842	1.1758
2	0.39	39	64423.0	7.950	1.4502
3	0.37	37	74154.0	7.926	1.7594
4	0.38	38	55183.0	7.823	1.4902
5	0.29	29	135714.0	7.803	2.9705
6	0.37	37	66573.0	7.979	1.8125
7	0.41	41	40924.0	7.811	0.9780
8	0.4	40	60090.0	7.936	1.2697
9	0.4	40	61514.0	7.898	1.2313
10	0.35	35	104815.0	7.866	2.0333
11	0.39	39	64442.0	7.862	1.3627
12	0.36	36	90201.0	7.902	1.9022
13	0.38	38	62354.0	7.721	1.3883
14	0.31	31	137707.0	7.928	2.7622
15	0.38	38	64576.0	7.928	1.5952
16	0.34	34	106057.0	7.870	2.2038
17	0.17	17	50721.0	4.175	1.3422
18	0.38	38	57014.0	7.592	1.2591
19	0.39	39	66669.0	7.895	1.3955
20	0.37	37	91813.0	7.998	1.8322
21	0.36	36	95346.0	7.935	1.9352
22	0.4	40	60710.0	7.944	1.2780

Contact

To optimize logistics and distribution for your use-case, contact us at:

sales@xmap.ai