

Drugstores in Santiago de Chile

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1. Introduction

1.1 Background

In Chile there are about three thousand pharmacies in all and half of them are part of the three main chains: Cruz Verde, Farmacias Ahumada and Salcobrand, which control 90% of the market.

Medicines in Chile have the highest prices in Latin America for patented remedies, which can be found at half the price in Argentina or Brazil.

Companies previously sanctioned were already judged by cases of collusion due to sustained price increases and exclusive agreements with laboratories when supplying other companies

On the other hand, in this market dominated by a commercial oligopoly we can find a large number of independent pharmacies which divide the remaining 10% of revenues.

Chile is a country with an estimated 18.5 million inhabitants and the Metropolitan Region, which has 40.5% of the total population, is highly centralized in the capital zone, within which there is a sub-sector called the Santiago Commune.

Within this commune we can see that in its central area only one of its stations (Universidad de Chile) circulates approximately 1,074,068 people.

1.2 Problem.

So through this exercise we can see if there is a clear competitive advantage in the location of a pharmacy in that sector and how is the current distribution in the area.

And mainly answer:

What advice would you give to someone who wants to invest in a pharmacy in the area?

1.3 Interest

Independent companies of the pharmaceutical area that want to invest in a certain area or state agencies that want to appreciate the distribution of this type of premises to guarantee free competition.

2. Data acquisition and cleaning

2.1 Data sources

The data were originally obtained from Foursquare (ref 1), but these had a bias that did not allow the exercise since they only included the addresses of the main chains and a limited registry of independent pharmacies, for which data was used in a complementary way of the government of Chile in a public portal containing pharmacies under different filters (ref 2).

2.2 Data cleaning.

The data obtained was filtered and the records of points outside the area to be investigated were eliminated and the rest of the data that were not relevant for the exercise, such as contact telephones or web pages, etc. Finally getting 197 drugstores in the area to study.

Subsequently, it was entered as a dataframe with 3 columns [Nombre_farmacia, Latitud, longitud], which are the basis of the models.

3 Methodology

3.1 First stage

Objective: to represent each of the drugstore in the commune of Santiago to appreciate its location on the map.

Once the data is loaded into the dataframe, we perform the following steps:

First we look for our data and transform it into a dataframe.

```
In [4]: # The code was removed by Watson Studio for sharing.
```

```
Out[4]:
```

	Latitud	Longitud	Nombre_farmacia
0	-33.450806	-70.677501	CRUZ VERDE
1	-33.437406	-70.654749	SALCOBRAND
2	-33.444407	-70.655378	SALCOBRAND
3	-33.444274	-70.657607	SALCOBRAND
4	-33.439681	-70.655282	SALCOBRAND

```
In [5]: df.shape
```

```
Out[5]: (197, 3)
```

In the next step.

We find the coordinates of santiagos to locate us on a Folium map.

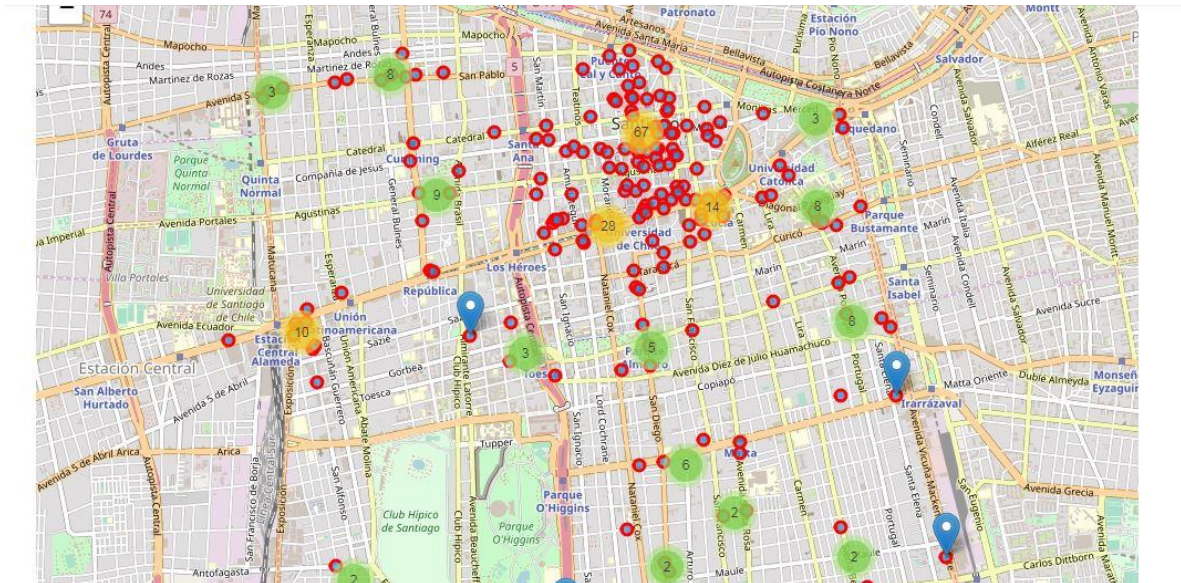
```
address = 'Santiago, Chile'

geolocator = Nominatim(user_agent="on_explorer")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of Santiago are {}, {}'.format(latitude, longitude))
```

The geograpical coordinate of Santiago are -33.4377968, -70.6504451.

And then

We created a map showing the number of pharmacies in the commune.



3.2 Second stage.

Objective: To carry out a clustering of the totality of the Drugstore in order to see their location relative to the other points and to appreciate where there is a greater concentration.

To perform the clustering with a K with greater accuracy the step we see below was necessary.

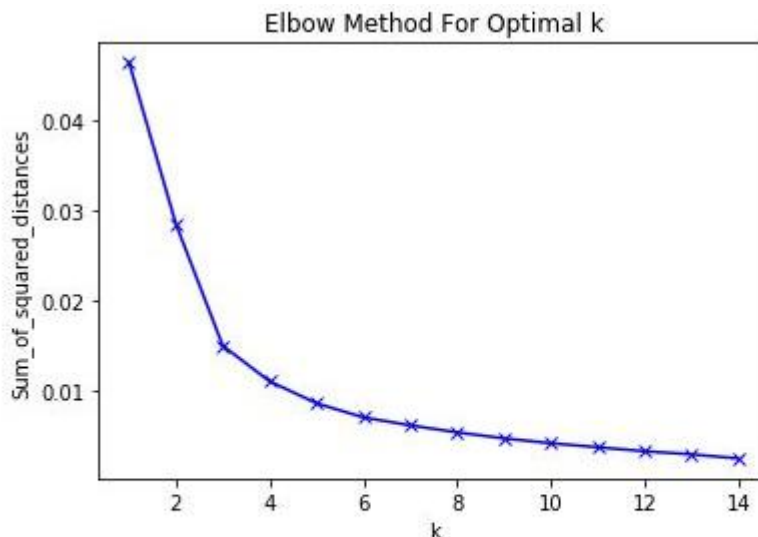
We look for the K to perform the clustering.

```
dfg = df.drop('Nombre_farmacia', 1)

Sum_of_squared_distances = []
K = range(1,15)
for k in K:
    km = KMeans(n_clusters=k)
    km = km.fit(dfg)
    Sum_of_squared_distances.append(km.inertia_)

plt.plot(K, Sum_of_squared_distances, 'bx-')
plt.xlabel('k')
plt.ylabel('Sum_of_squared_distances')
plt.title('Elbow Method For Optimal k')
plt.show()
```

El siguiente gráfico nos muestra que la mayor punto de inflexión esta entre $k=3$ y $k=4$



With our K = 4 we perform the clustering.

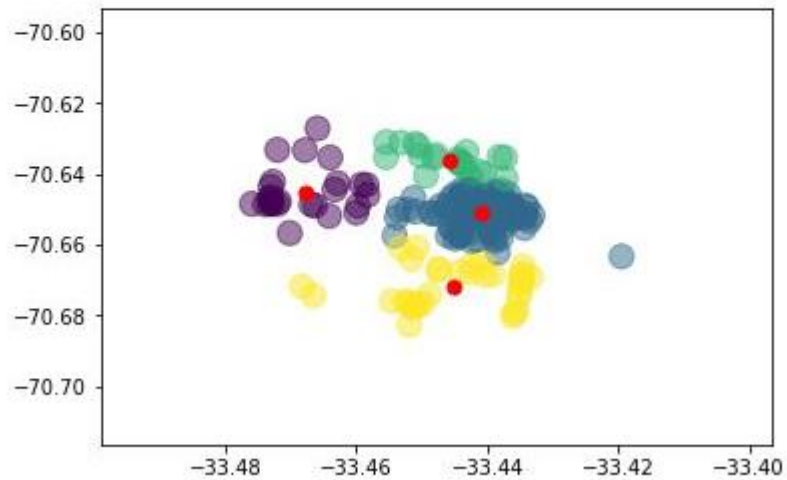
Obtaining the following coordinates of the respective centers and their corresponding representation.

```

[[-33.46781331 -70.64507238]
 [-33.44096974 -70.65109503]
 [-33.44562673 -70.63623736]
 [-33.44507309 -70.6717835 ]]

```

Out[17]: <matplotlib.collections.PathCollection at 0x7ff0003707f0>



3.3 Third stage

Objective: Divide the database into 4 groups to obtain the total amount of each pharmacy of "Chain" and what is the location of these 4 groups in the plan of the commune.

Now we will filter again the initial dataframe taking 4 groups, the 3 primary chains of drugs plus one in which all the others are.

	Latitud	Longitud	Nombre_farmacia
5	-33.442348	-70.665591	AHUMADA
6	-33.440019	-70.649679	AHUMADA
7	-33.444903	-70.658318	AHUMADA
8	-33.444085	-70.654269	AHUMADA
12	-33.434793	-70.669061	AHUMADA

```
ahu_df.shape
```

```
(15, 3)
```


	Latitud	Longitud	Nombre_farmacia
0	-33.450806	-70.677501	CRUZ VERDE
14	-33.440679	-70.653243	CRUZ VERDE
15	-33.442373	-70.656187	CRUZ VERDE
16	-33.440225	-70.668661	CRUZ VERDE
17	-33.439456	-70.653961	CRUZ VERDE

```
cv_df.shape
```

```
(43, 3)
```

	Latitud	Longitud	Nombre_farmacia
1	-33.437406	-70.654749	SALCOBRAND
2	-33.444407	-70.655378	SALCOBRAND
3	-33.444274	-70.657607	SALCOBRAND
4	-33.439681	-70.655282	SALCOBRAND
66	-33.440481	-70.648611	SALCOBRAND

```
sb_df.shape
```

```
(23, 3)
```

	Latitud	Longitud	Nombre_farmacia
9	-33.433471	-70.653276	MANRIQUEZ
10	-33.434523	-70.666099	FRANCESA
11	-33.434659	-70.668311	JARDIN
13	-33.434691	-70.670191	TORRES
23	-33.434969	-70.673558	RENACER

```
e12.shape
```

```
(116, 3)
```

Finally we locate the group location by color on a map.



4 Results

As we can see, there are approximately 197 pharmacies in the commune of Santiago, which has an area of 23.2 km², of which 81 local belong to the so-called "Chain Pharmacies", the remaining reach 59% which is close to 57%. which shows that the proportion shown at the national level is maintained.

Another observation that we can make is that there is a very high concentration in an area smaller than approximately 30 blocks (about 300 m²), this high concentration is located in a neuralgic zone of the country, in which the "Plaza de Armas" is located, the Government Palace and countless government agencies and private companies.

This high concentration is composed mostly of the three largest companies, leaving the rest in peripheral areas.

5 Conclusion

We can see through this exercise that in the Chilean pharmaceutical market there is definitely an oligopoly of 3 large companies, and for its market strategy it is of vital importance the location of its premises, agglomerating almost 30% of the pharmacies of the commune in an area of approximately 1% of the area in question, most of which are located in the previously mentioned chains and the other companies are in peripheral areas.

One of the factors of this distribution may be the value of the land in case of purchase or lease, which would be excessively high serving as a barrier to entry for other possible competitors along with the excessive centralization that exists in the country-region-commune-area that discourages growth elsewhere

Another point to consider is the type of drugstore to be installed, since of the few independents that have been inside the "Principial" zone as a possible competition, most of them are dedicated to other types of drugs, more oriented to alternative medicines. , topic which could be further investigated in another opportunity.

In conclusion, we would suggest someone who wants to invest in this type of business to invest in an establishment located in the "Main" zone and preferably sell drugs related to alternative medicines to avoid a direct commercial confrontation with companies that already dominate the market.

Reference 1

Foursquare

<https://es.foursquare.com/explore?mode=url&near=Santiago%20de%20Chile%2C%20Metropolitana%20de%20Santiago%20de%20Chile%2C%20Chile&nearGeold=72057594041799272&q=farmacia>

Reference 2

Farmanet.

<https://farmanet.minsal.cl/maps/#>

Other sources

1. <https://www.odepa.gob.cl/wp-content/uploads/2018/03/Metropolitana.pdf>
2. <https://www.cooperativa.cl/noticias/pais/transportes/metro/el-metro-de-santiago-esta-transportando-a-2-6-millones-de-personas-en/2018-06-27/093857.html>
3. https://nbviewer.jupyter.org/github/Rentm81/Coursera_Capstone/blob/master/semana9-5-code.ipynb