Clustering Medical Centers in Puebla, Mexico

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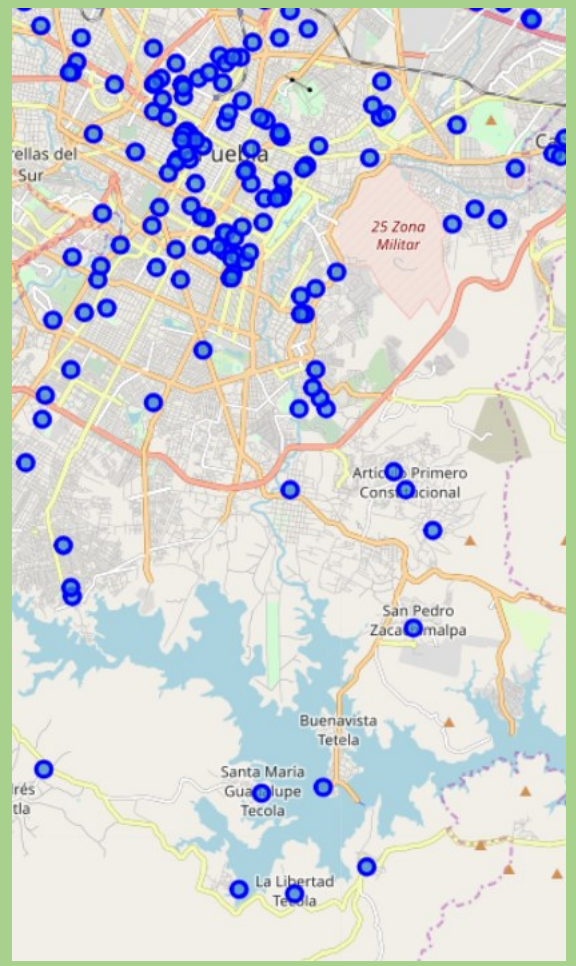
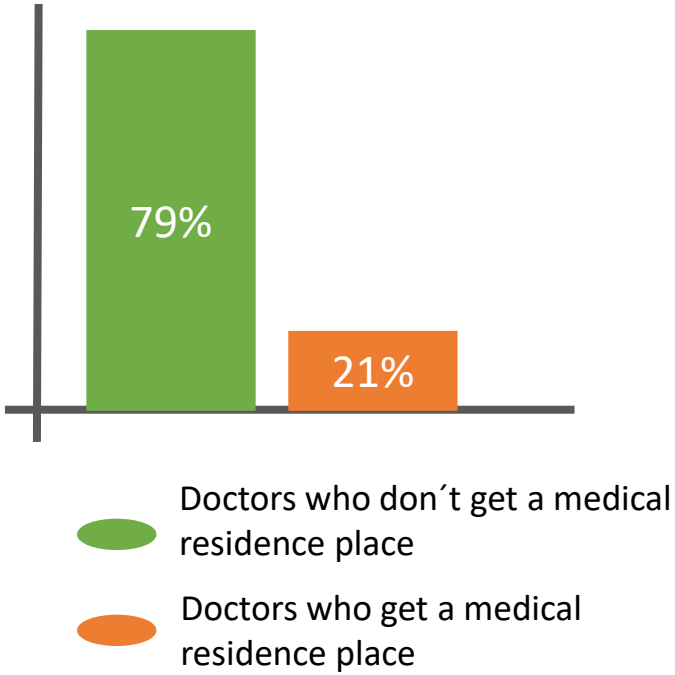


Introduction

- In 2017, the Mexican Association of Faculties and Schools of Medicine registered 38,600 applications for medical residences, of which only 21% obtained a place.

- Reasons because not all of the medical applicants get a place in a hospital:
  - There are not enough places
  - The location of the Hospital assigned doesn´t like to the doctor (mainly due to the amenities around the Hospital).
  - Payment
  - Medical specializations



Objective

- In this work, I ‘m interested in clustering the medical assistance centers of the Puebla state in Mexico, taking into account the amenities that are around the medical centers, in order to doctors can choose similar hospitals in their applications.

Data

- Dataset of Puebla, Mexico Locations of Municipal Buildings, Schools, Parks, Medical Assistance Centers, and Gardens. This dataset is provided by NYU, Spatial Data Repository.

NYU Spatial Data Repository

97	Centro de Asistencia Médica	19.050759	-97.943619
98	Instalación Deportiva o Recreativa	19.054576	-97.940450
99	Templo	19.047924	-97.942135
100	Centro de Asistencia Médica	19.048078	-97.942903
101	Escuela	19.060329	-97.992656
102	Pozo	19.061705	-97.994583
103	Escuela	19.059127	-97.998996
104	Centro de Asistencia Médica	19.053554	-97.995795

- It contains the locations of the medical assistance centers, parks, schools, temples, municipal buildings and so on.
- Specifically, for this work we're interested in the **locations of the medical assistance centers in Puebla, Mexico**

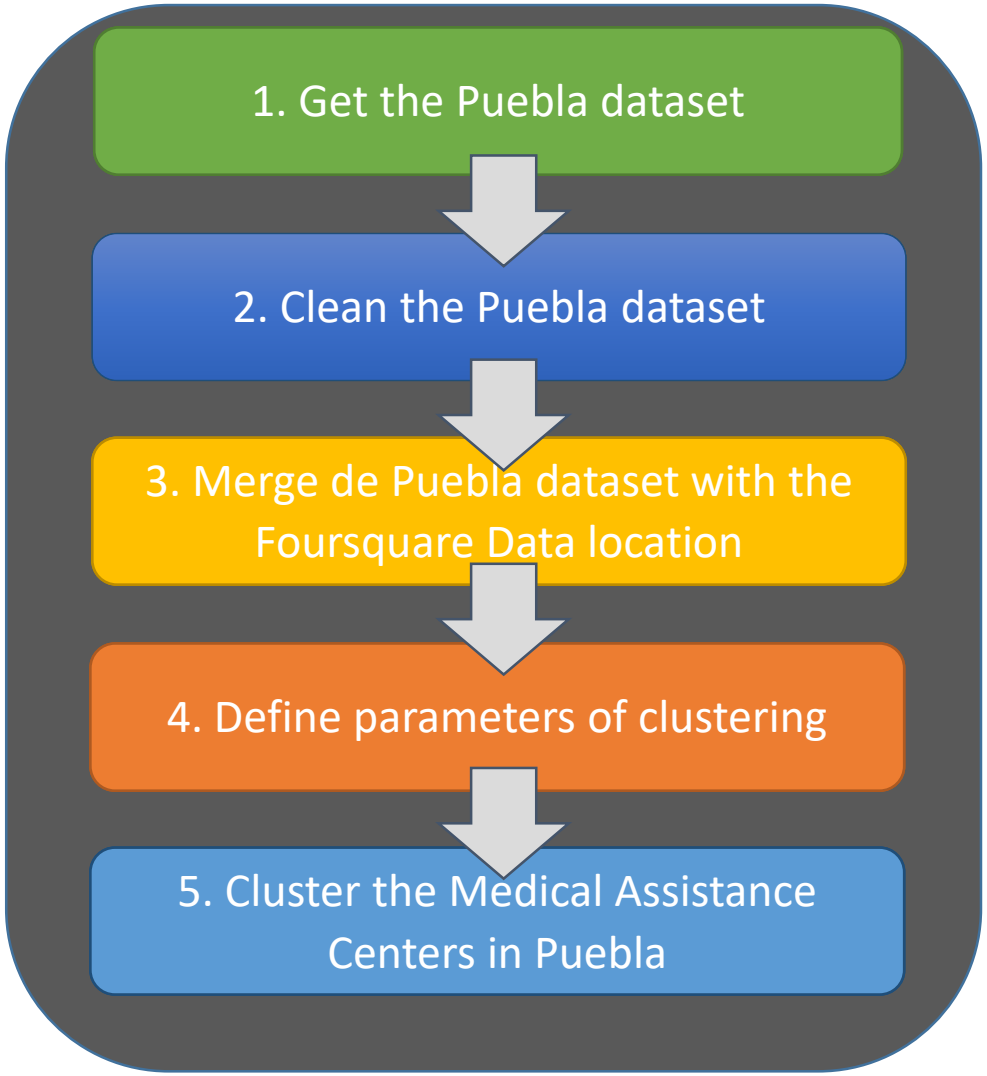
- The Puebla dataset contains **30340** instances and for each there are their latitude and longitude coordinates.

- And also, the **Foursquare Data Location** will be used

FOURSQUARE

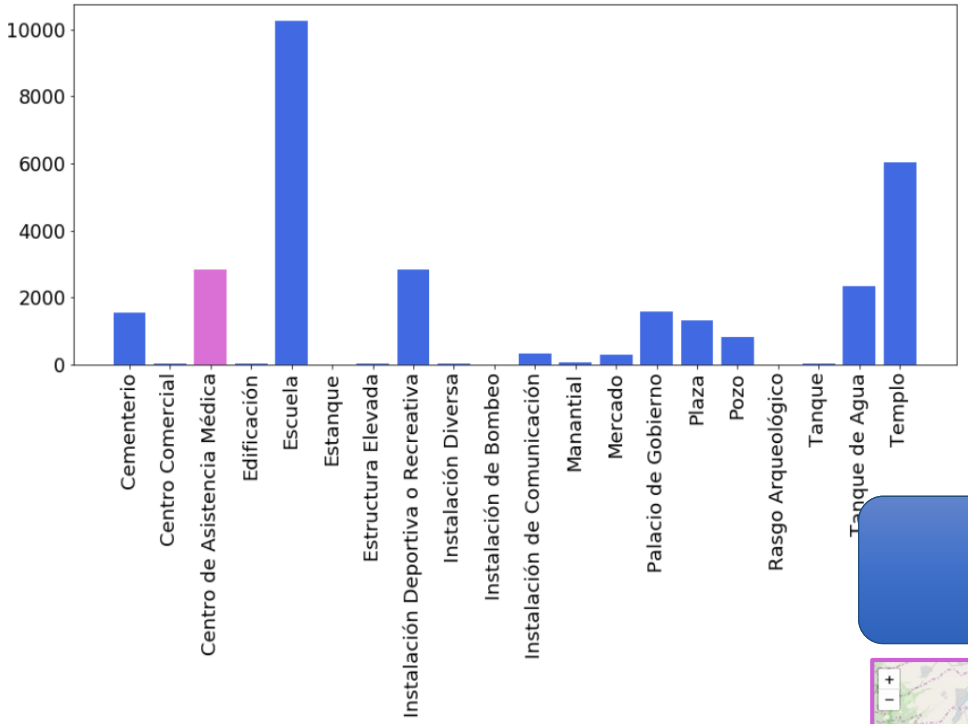
Methodology

Proposed Methodology



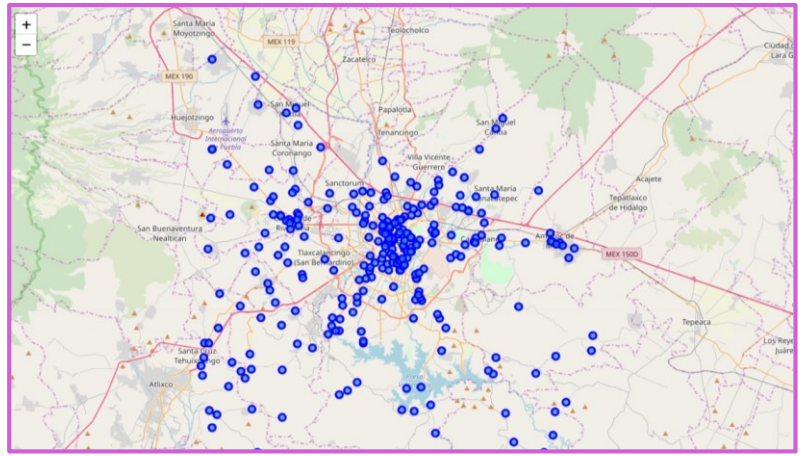
Methodology

1. Get the Puebla dataset



30340 instances

2. Clean the Puebla dataset



From **30340** to **283** instances of medical centers

Methodology

3. Merge de Puebla dataset with the Foursquare Data location

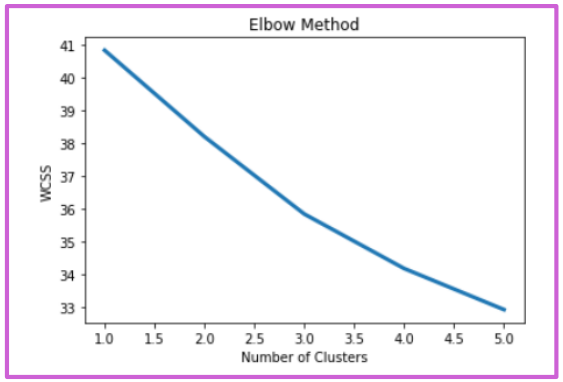
	Geografico	Latitude	Longitude
0	Centro de Asistencia Médica	19.043619	-98.125337

	name	categories	lat	lng
0	Antigua Taquería La Oriental	Taco Place	19.045189	-98.122697
1	Little Caesars	Pizza Place	19.044940	-98.124210
2	Pollos Mazatepec	Fried Chicken Joint	19.045393	-98.121341
3	Domino's Pizza	Pizza Place	19.044781	-98.123346
4	Restaurante Casa Blanca	Mexican Restaurant	19.044569	-98.123837

	Medcenter	Medcenter Latitude	Medcenter Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Centro de Asistencia Médica	19.043619	-98.125337	Antigua Taquería La Oriental	19.045189	-98.122697	Taco Place
1	Centro de Asistencia Médica	19.043619	-98.125337	Little Caesars	19.044940	-98.124210	Pizza Place
2	Centro de Asistencia Médica	19.043619	-98.125337	Pollos Mazatepec	19.045393	-98.121341	Fried Chicken Joint
3	Centro de Asistencia Médica	19.043619	-98.125337	Domino's Pizza	19.044781	-98.123346	Pizza Place
4	Centro de Asistencia Médica	19.043619	-98.125337	Restaurante Casa Blanca	19.044569	-98.123837	Mexican Restaurant

4. Define parameters of clustering

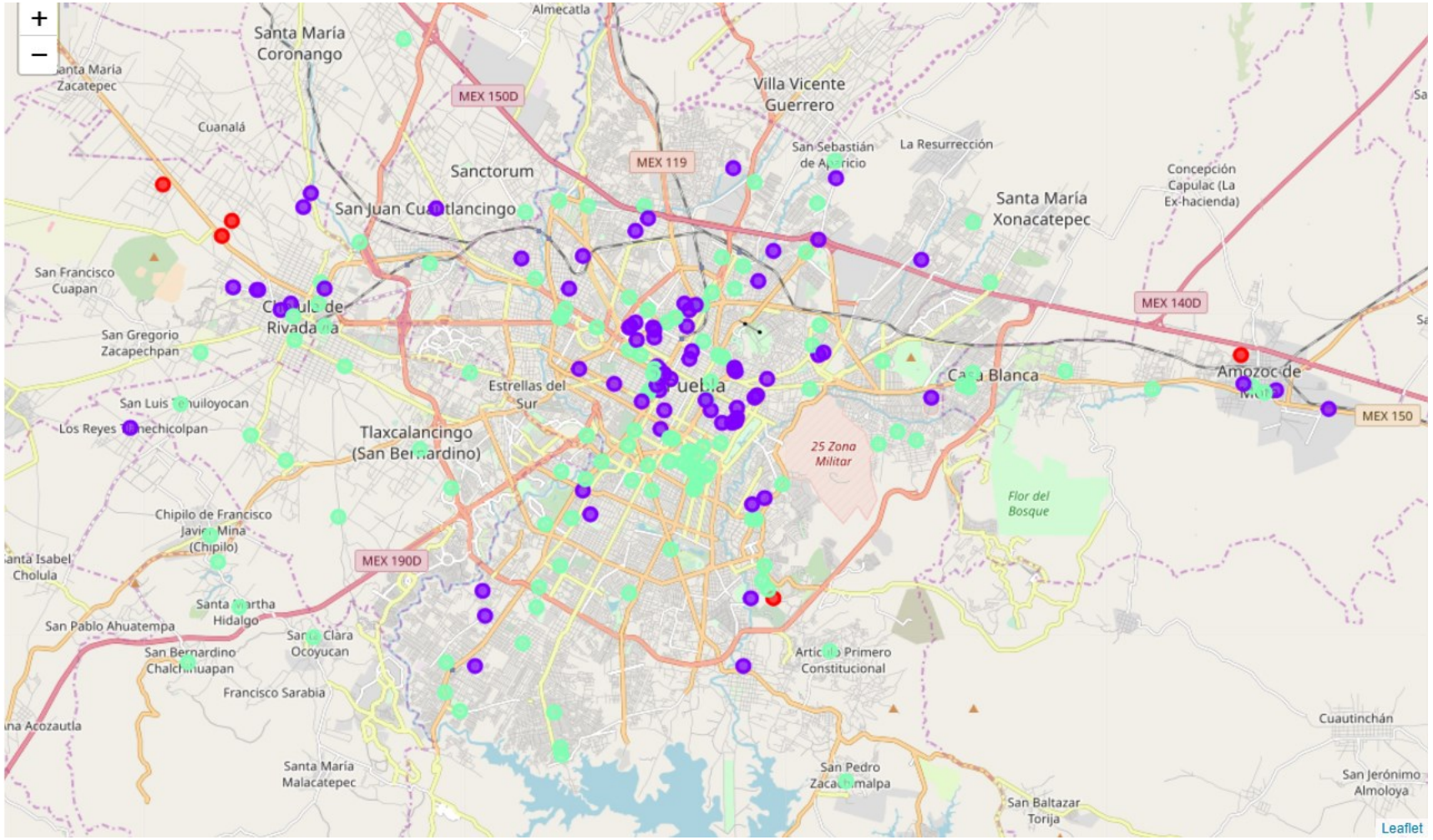
Elbow Method



5. Cluster the Medical Assistance Centers in Puebla

Results and discussion

Medical Assistance Centers clustering in 3 groups



Cluster 1: **Cluster 2:** **Cluster 3:**

Results and discussion

Cluster 1:

Zoo Exhibit, Event Space and Flower shops

Cluster 2:

Taco places, Pizza places and Food and Drink Shops

Cluster 3:

Taco Place, Convenience Store and Food Court

Conclusions

- In this study, I analyzed the similitude of Medical Assistance Centers of Puebla Mexico, based in the common near venues of each medical center. I identified that the common venues for each cluster are different and they can be a guide for the doctors at the moment of choose their three options for medical residences allocations.
- This work is only a first step as the study of similitudes of different medical centers. As a future work, it could be a good idea to explore and analyzed the medical centers of different states in Mexico, because the assignation of medical residence is a national level.