

Opening a restaurant in El Paso Texas Area, Zipcode or Neighborhood

Recommendation Analysis

07/20/2020

Table of contents

- Introduction: Business Problem
- Data
- Methodology
- Analysis
- Results and Discussion
- Conclusion

1. Introduction (Business Problem)

1.1 Description of the problem and discussion of the background

El Paso Texas is a multi-diverse cultural city bordering with Mexico. It is one of the safest cities in the United States and the cost of living is very affordable. The problem is that we need to find out what area, zipcode or neighborhood is recommended to open a restaurant. We need to find the areas with highest density of restaurants since people will go to these areas to socialize and or eat.

1.1.1 Interest

Investors, retired people, and anyone willing to invest in opening a restaurant would be interested in the findings. Also, customers and Paso residents would be interested in knowing where a restaurant is recommended to be open.

2. Data

2.1 Description of the Data and how it will be used to solve the problem

The data contains the zip codes, the latitude, longitude, population, and density. The data source can be found in Simple Maps, US Zip Codes Database website: <https://simplemaps.com/data/us-zips>

We are going to find the venues with the most density areas because we are going to use the hypothesis that people will go to the densest areas instead of the lonely areas to socialize or eat. For example, features that can be extracted from the data can be population, zipcode area, latitude and longitude, most common venues, and the Foursquare data set.

2.1.2 Data preparation

We need to filter the zip codes that correspond to the city of El Paso Texas. Remove everything except rows for El Paso county since there are some districts that correspond to the same city, area, and city.

2.1.3 Features

These are the factors that will make us make a recommendation:

- Density of areas or zip codes where restaurants are located
- Number of populations in those areas
- Number of restaurants in those areas
- The most common types of venues and frequency of average

We will use the latitude and longitude of every zipcode to define our areas or neighborhoods.

Data source will be extracted and used:

- Density of restaurants and their most common venues and features in every zip code or area using Foursquare API
- Number of restaurants and their most common venues in every area using Foursquare API
- Zip codes will be extracted using a csv file from maps website
- Most common venues need to be analyzed to make a recommendation

3. Methodology.

In this study we found the areas with more density of restaurants so that we can recommend where people go to eat, we will limit to 800 meters around the city. We already have the data in csv format, we cleaned it, did visualizations, and identified venues using the Foursquare API.

Also, we are explored the density of restaurants within 800 meters from El Paso Texas. We

generated a map with the geospatial data latitude and longitude and analyzed the density and population of the most common venues categories and city areas. We also clustered the areas to see where in the El Paso city there is more density of restaurants and people that go to eat. We used **k-means** clustering algorithm to find out the areas in radius of 500 meters. We generated a map using folio and identified factors to make a recommendation of dense areas. This sort of Analysis is used since the grouping of geospatial coordinates by zipcode will give us a clear understanding of the areas and surrounding venues by segmenting into groups with similar categories and we can interpret the data with a sense of people going to eat where there are groups of restaurants or choices to eat and socialize.

3.1 Correlation between high density and population and area by zipcode

The relationship between the density and population variables can be visualized in the following figure. Refer to Table 1, Table 2, and Table 3.

Table 1 – population and density in areas by zip codes in El Paso county

	zipcode	Latitude	Longitude	city	state_id	state_name	population	density	county_name
0	79821	31.97693	-106.59781	Anthony	TX	Texas	7482	241.9	El Paso
1	79835	31.93522	-106.58693	Canutillo	TX	Texas	10810	414.2	El Paso
2	79836	31.57128	-106.20190	Clint	TX	Texas	5796	116.2	El Paso
3	79838	31.49183	-106.17359	Fabens	TX	Texas	6376	114.2	El Paso
4	79849	31.56127	-106.25047	San Elizario	TX	Texas	12780	363.9	El Paso

By assigning numerical values to categorical values we can run correlation analysis and conduct cross tabulation.

Example of categories. Refer Table 1.1.

Table 1.1 Venue Categories in El Paso Texas in zip code 79936 example

	zipcode	zipcode Latitude	zipcode Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
228	79936	31.77618	-106.29785	Applebee's Grill + Bar	31.771403	-106.304007	American Restaurant
229	79936	31.77618	-106.29785	Family Dollar	31.776763	-106.294192	Discount Store
230	79936	31.77618	-106.29785	Walgreens	31.781502	-106.301881	Pharmacy
231	79936	31.77618	-106.29785	SUBWAY	31.769920	-106.300909	Sandwich Place
232	79936	31.77618	-106.29785	Redbox	31.781798	-106.302176	Video Store
233	79936	31.77618	-106.29785	7-Eleven	31.782017	-106.302722	Convenience Store
234	79936	31.77618	-106.29785	Bourbon & Brews Bar & Grille	31.781753	-106.302513	Bar
235	79936	31.77618	-106.29785	Barfly	31.769892	-106.300274	Bar
236	79936	31.77618	-106.29785	Burridough	31.781221	-106.302817	Bakery
237	79936	31.77618	-106.29785	Tropical Snow Hawaiian Shaved Ice	31.781235	-106.302941	Food Truck
238	79936	31.77618	-106.29785	Sea Creatures	31.769918	-106.300560	Pet Store
239	79936	31.77618	-106.29785	Peiting's	31.769883	-106.300498	Chinese Restaurant
240	79936	31.77618	-106.29785	Mangos	31.781705	-106.302587	Bar
241	79936	31.77618	-106.29785	Nance eye care	31.769273	-106.299202	Optical Shop

Table 2 – Top 5 population by zipcode

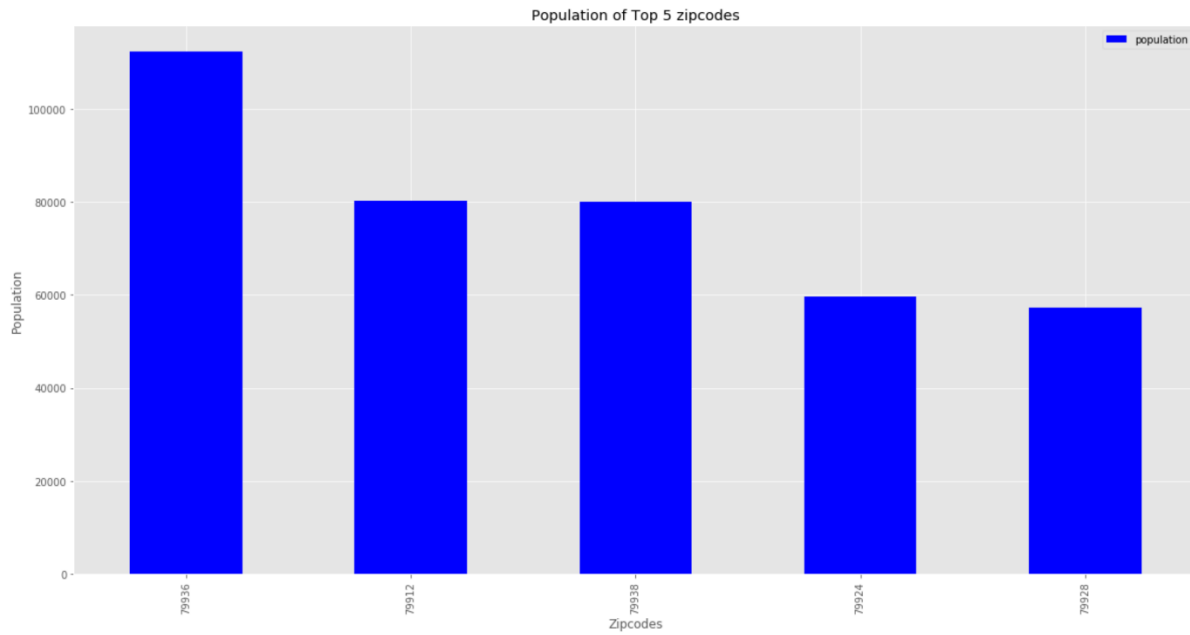
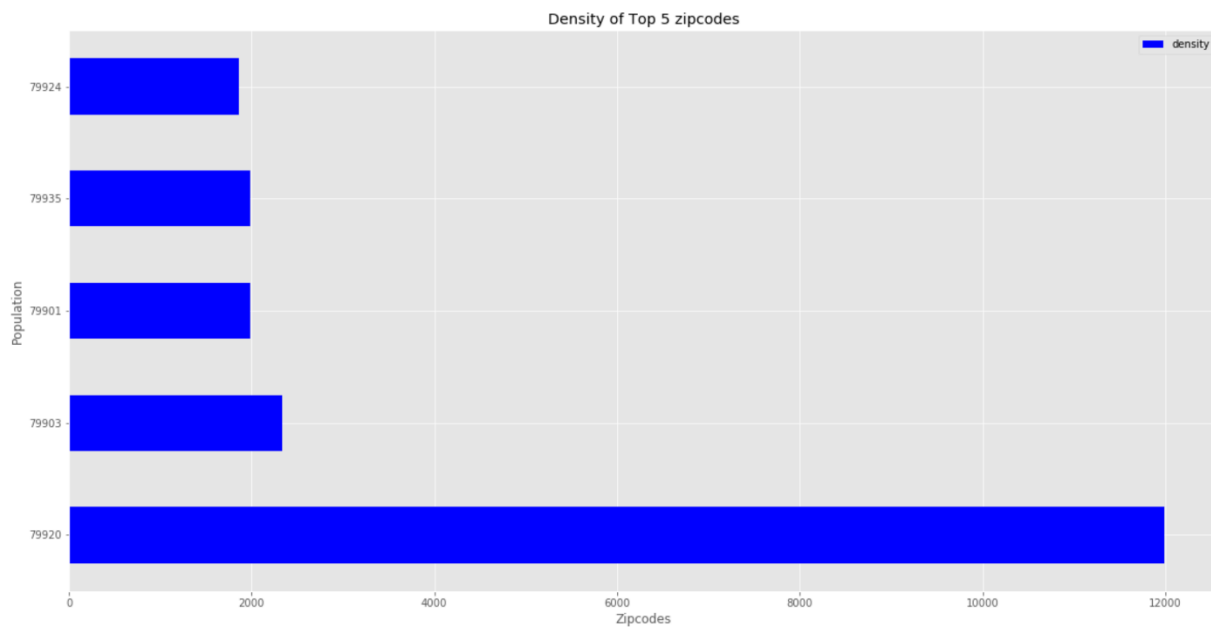


Table 3 – Top 5 density by zipcode



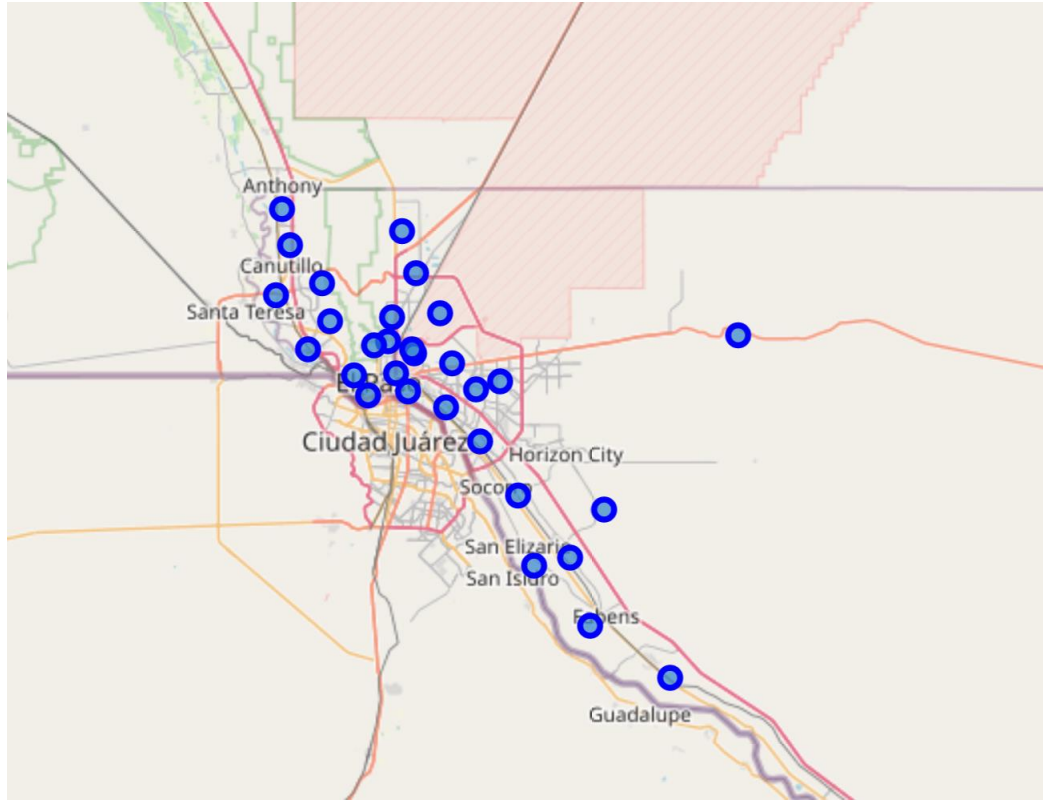
From the above visualizations we can clearly see that zip codes 79936, 79912, 79938, 79924, and 79928 are the areas with most population.

3.2 Data points in el Paso Texas city

The zip codes with all the relevant zip codes are geographically in Figure 4. Refer Figure 4.

Examining specific attributes like most common venues suggests overwhelming concentration of data points near areas in zip codes. While there is more density in some areas the participating populations are remarkably similar since some zip codes are near each other. The data set contains the highest population with more common categories to conduct a broader array of statistics such as correlation analysis. Refer to Table 3.1

Table 3.1 Data points of areas by zipcode in el Paso Texas city



3.3 Statistics of Data Points

The data points show how the data looks like in the frequency of every category by zipcode in every area with latitude and longitude. Refer to Table 5.

Table 5 – Statistics in data points

	zipcode Latitude	zipcode Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
zipcode						
79821	2	2	2	2	2	2
79835	1	1	1	1	1	1
79849	1	1	1	1	1	1
79853	1	1	1	1	1	1
79901	36	36	36	36	36	36
79902	8	8	8	8	8	8
79903	10	10	10	10	10	10
79904	7	7	7	7	7	7
79905	19	19	19	19	19	19
79906	10	10	10	10	10	10
79907	10	10	10	10	10	10
79911	1	1	1	1	1	1
79912	5	5	5	5	5	5
79915	8	8	8	8	8	8
79916	2	2	2	2	2	2
79920	14	14	14	14	14	14
79922	28	28	28	28	28	28
79924	21	21	21	21	21	21
79925	14	14	14	14	14	14
79927	2	2	2	2	2	2
79930	5	5	5	5	5	5
79932	10	10	10	10	10	10
79935	13	13	13	13	13	13
79936	14	14	14	14	14	14

3.3.1 Most common venues

Using the Foursquare API, the most common venues were explored and found out the 1st Most common Venue around the zipcode area in an 800 meters radius around. Please refer to Table 6.

Table 6 – 1st Most Common Venue by Zip Code in El Paso Texas

	zipcode	1st Most Common Venue
0	79821	Furniture / Home Store
1	79835	Stables
2	79849	Supermarket
3	79853	Concert Hall
4	79901	Mexican Restaurant

3.4 Clustering Analysis

The K-means algorithm was used to cluster the zipcode areas into 5 clusters. Since el Paso Texas is a small but diversified city, the areas look like the same since areas are too close and small.

Segmentation of zip codes were performed using the elbow method showing the optimal k technique. Refer to Table 8 and Table 9.

Table 8 – K-means optimal value

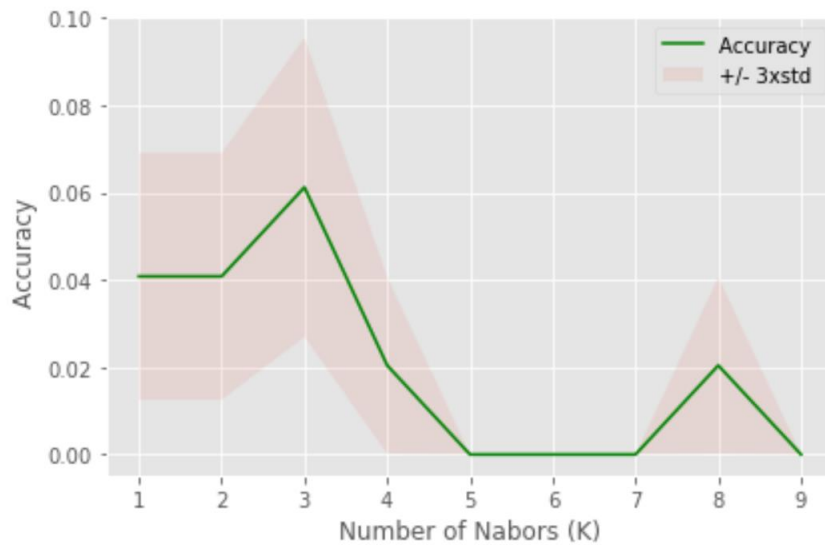
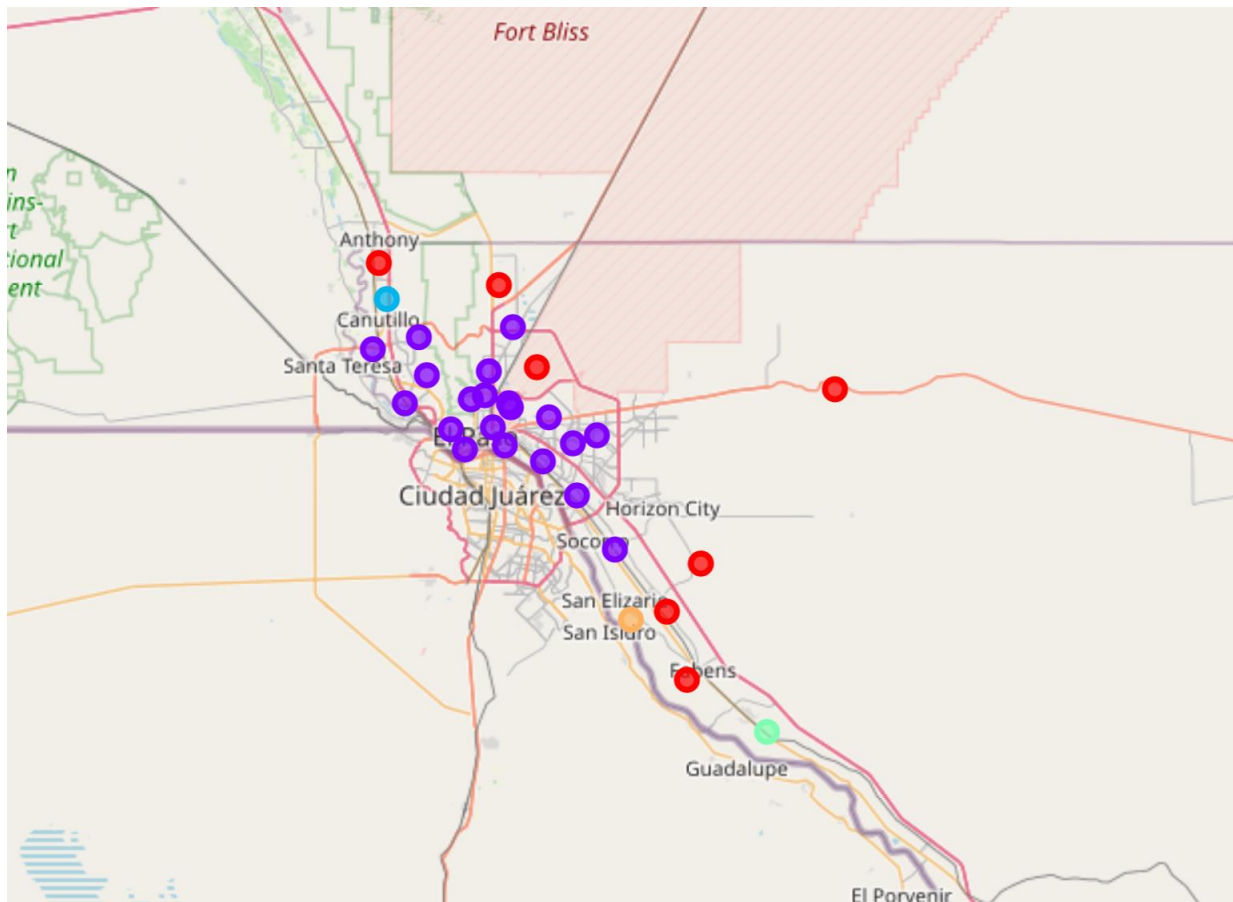


Table 9 – clusters in el Paso Texas



We can see that the labels with the categories are group and segmented by zipcode area. We can see that the area in the east side are the ones with more population and more restaurants.

4. Results and discussions

We can see that el Paso Texas even though is a small city, it is diversified in all areas. However, the top 9 zip codes that the number "1st most common venue" are in Table 10:

Table 10 – most common venues and their population density

Zip code	Population	Density	1 st Most Common Venue
79901	112355	1988.7	Mexican Restaurant
79905	22447	1550.9	Mexican Restaurant
79907	53277	1563.4	Pizza Place
79915	35445	1734.6	Sandwich Place
79916	3039	690.7	American Restaurant
79920	6	11985.9	Fast Food Restaurant
79922	8236	527.6	Mexican Restaurant
79925	39711	921.6	Mexican Restaurant
79932	28682	675.9	Mexican Restaurant

We can see that in the east side area it is the most recommended place to open a restaurant with the 1st Most common Mexican Restaurant venue. This makes sense since most people in el Paso Texas are Hispanic.

5. Conclusions

We can conclude that we can recommend starting a new restaurant in the east side area of el Paso since the data shows that the most common venues are of type of restaurants and those areas are the areas with most density and population.

However, it is a business decision to decide if they want to open a restaurant in an area where there is a lot of restaurants and people go a lot or if they want to be pioneers and open a restaurant in areas where there is no restaurants near by which in this case would be in area zip code 79928 districts that are in the boundary side of el Paso Texas but they are still part of the El

Paso County and might grow in population and number of restaurants in the future. While this is not an exhausted analysis of the data points, it will provide an idea of the type of data available and a sense of analytical landscape. It is interesting that the same data can be interpreted differently by different points of views and could lead into more insights and findings.

References

Home snacks <https://www.homesnacks.net/best-neighborhoods-in-el-paso-tx-128151/>

El Paso, Texas Wikipedia https://en.wikipedia.org/wiki/El_Paso,_Texas

Foursquare API

Simple Maps US Zip Codes Database <https://simplemaps.com/data/us-zips>