Pet Venues in the city of São Paulo (Brazil)

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1. Introduction

1.1 Background

São Paulo is the largest city of Brazil and the largest city proper in the Americas and the southern hemisphere. It's one of the top 10 largest metropolitan areas in the world. The city of São Paulo is located in the state of São Paulo, being its capital. The State of São Paulo concentrates 25% of the population of pets in Brazil and its capital has a good share in this number.

Brazil is the 4th in number of pets in the world, and the number of pets keeps growing every year as more and more people and families are looking for a pet for companionship, giving and receiving affection and attention. With that, the demand and needs for pet services increases at the same proportion.

1.2 Interests

The proposal of this work is to map the concentration per district of venues related to the pet market and, by doing this, help people to understand the districts with the most venues providing services to their pets and at the same time help entrepreneurs to better understand the pet market in the city of São Paulo.

Wards in São Paulo, called Distritos (districts), are subdivisions of the boroughs, without a self-government.

2. Data

2.1 Description

To achieve the objectives of this research it was necessary the data shown below:

- Data containing all the Districts of São Paulo from a wikipedia link;
- DataFrame cleaned with only the name of the districts;
- Used Geopy library to get the latitude and longitude values of the districts of São Paulo;
- Used Foursquare API to get the venues per district filtered by the categories related to Pets;
- All the information of venues grouped by district to help infer a conclusion;

2.2 Data Use Solution

The objective of the data collected is to retrieve the number of pet venues per district in the city of São Paulo as well as present the districts with the highest concentration of pet services through a map of the city.

3. Methodology

3.1 Requesting Data from wikipedia to get the names of the districts

The first step to achieve the goals was to retrieve and find the name, location and number of the districts in São Paulo. To do so, through web scraping it was easy to get the districts and their respective names. It retrieved 96 districts.

	Posição	Distrito	População 2010	Unnamed: 3
0	1.0	Grajaú	360.787	NaN
1	2.0	Jardim Ângela	295.434	NaN
2	3.0	Sapopemba	284.524	NaN
3	4.0	Capão Redondo	268.729	NaN
4	5.0	Jardim São Luís	267.871	NaN
...	...	...	...	...
92	93.0	Sé	23.651	NaN
93	94.0	Pari	17.299	NaN
94	95.0	Barra Funda	14.383	NaN
95	96.0	Marsilac	8.258	NaN
96	NaN	NaN	NaN	NaN

97 rows × 4 columns

3.2 Cleaning the data to show only the important information

Then the incorrect and inaccurate parts of the table retrieved were cleaned remaining only the interesting data for the next step.

	Distrito
0	Grajaú
1	Jardim Ângela
2	Sapopemba
3	Capão Redondo
4	Jardim São Luís
...	...
91	Jaguara
92	Sé
93	Pari
94	Barra Funda
95	Marsilac

96 rows × 1 columns

3.3 Using Geopy library to get the latitude and longitude values of the districts of São Paulo

Using Geopy library the information of latitude and longitude for each district could be acquired and merged with the previous data.

	District	Latitude	Longitude
0	Grajaú	-23.785907	-46.665197
1	Jardim Ângela	-23.712528	-46.76872
2	Sapopemba	-23.604326	-46.509885
3	Capão Redondo	-23.671903	-46.779435
4	Jardim São Luís	-23.683573	-46.737762
...	...	...	...
91	Jaguara	-23.507446	-46.755315
92	Sé	-23.550443	-46.633446
93	Pari	-23.532976	-46.615849
94	Barra Funda	-23.525462	-46.667513
95	Marsilac	-23.937142	-46.71023

96 rows × 3 columns

3.4 Retrieving the venues for each District with Foursquare API

With the new data and using the Foursquare API, the Pet related venues for each district were obtained by a loop over a JSON file that was got using the API request. And with this new information the DataFrame below was created with 1852 venues in total for the city of São Paulo. The categories selected related to Pets were "Pet Services", "Pet Store", "Dog Runs" and "Veterinarians"

	District	District Latitude	District Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Sapopemba	-23.604326	-46.509885	Pet Shop Picharrão	-23.605249	-46.505833	Pet Store
1	Sapopemba	-23.604326	-46.509885	Pet Shop Trovão do Sul	-23.600555	-46.512103	Pet Store
2	Sapopemba	-23.604326	-46.509885	Pet Shop Imperador	-23.595375	-46.503918	Pet Store
3	Sapopemba	-23.604326	-46.509885	Pet Shop Bancário	-23.592216	-46.511424	Pet Store
4	Sapopemba	-23.604326	-46.509885	Pet Shop	-23.592958	-46.511234	Pet Store
...	...	...	...	...	...	...	...
1847	Barra Funda	-23.525462	-46.667513	ElevenChimps	-23.536500	-46.660449	Pet Service
1848	Barra Funda	-23.525462	-46.667513	Happy Pets	-23.533499	-46.670977	Pet Store
1849	Barra Funda	-23.525462	-46.667513	Petland	-23.538435	-46.679265	Pet Store
1850	Barra Funda	-23.525462	-46.667513	Tutti & Petti	-23.527236	-46.674573	Pet Store
1851	Barra Funda	-23.525462	-46.667513	Big House	-23.531114	-46.681486	Pet Store

1852 rows × 7 columns

3.5 Cleaning the data and retrieving the information of the number of venues per district

With this most important step, the table that was the main goal of this research could be created. A table containing the number of pet related venues for each district with its longitude and latitude information ready to create a map visualization with Folium and to be analysed.

	District	Latitude	Longitude	Number of Venues
0	Grajaú	-23.785907	-46.665197	0
1	Jardim Ângela	-23.712528	-46.768720	0
2	Sapopemba	-23.604326	-46.509885	13
3	Capão Redondo	-23.671903	-46.779435	8
4	Jardim São Luís	-23.683573	-46.737762	5
...	...	...	...	...
91	Jaguara	-23.507446	-46.755315	16
92	Sé	-23.550443	-46.633446	39
93	Pari	-23.532976	-46.615849	6
94	Barra Funda	-23.525462	-46.667513	42
95	Marsilac	-23.937142	-46.710230	0

96 rows × 4 columns

3.6 Last DataFrame with the quantity of districts per range of numbers of venues

|	Quantity of Districts
Range Pet Venues	
0-12	39
13-25	30
26-37	11
38-50	16

4. Results and Discussion¶

4.1 Plotted Maps with Folium showing the conclusion of the research¶

After all the data collected, cleaned and checked, it's time to understand and visualize the results and make some conclusions of it.

There will be 3 maps: one of them showing the distribution of the Pet Venues for the city of São Paulo. The Second showing the distribution of the districts, and the last one showing graphically the concentration of venues per district. The markers on this last map wich correspond to the districts were divided into 4 ranges: (0-12),(13-25),(26-37), (38-50). Each range going from color red to green where red corresponds to the districts with less number of Pet Venues and green correspondes to the districts with more number of Pet Venues.

4.2 Distribution of pet related venues over São Paulo ¶
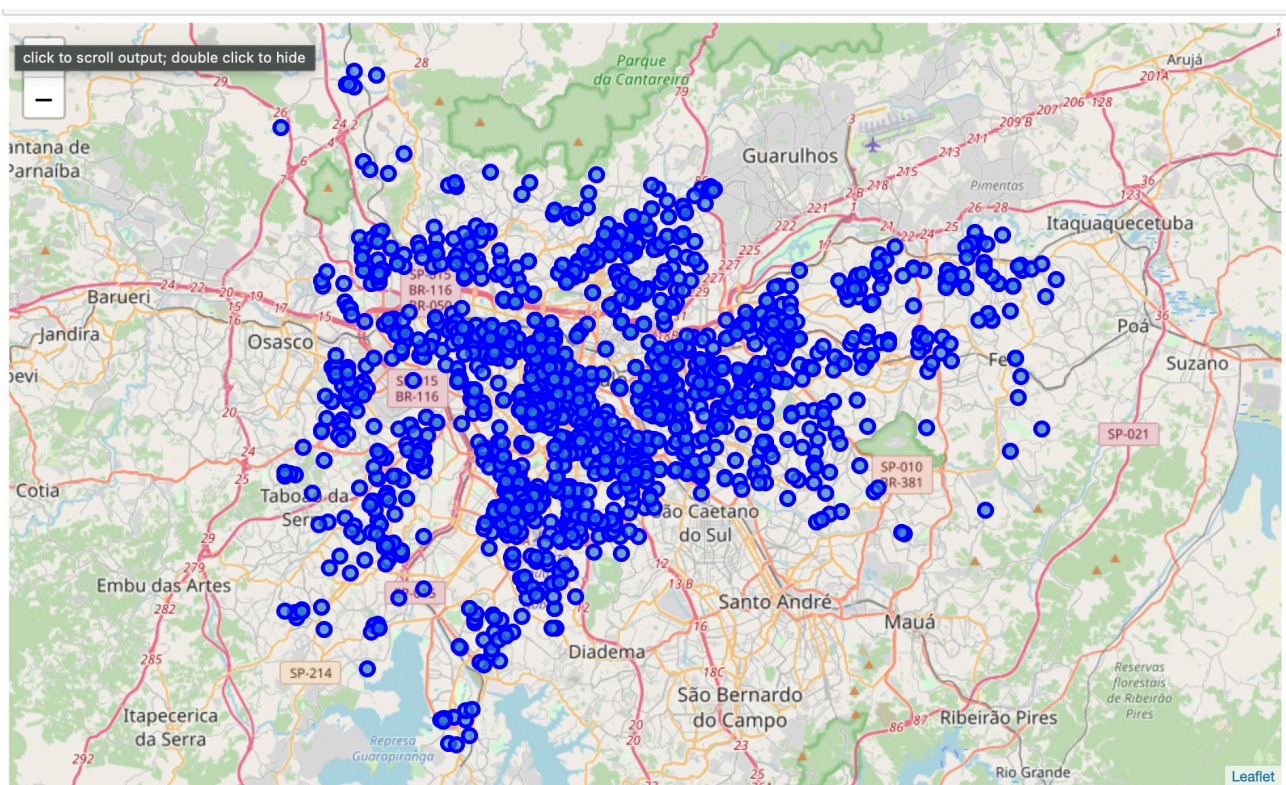
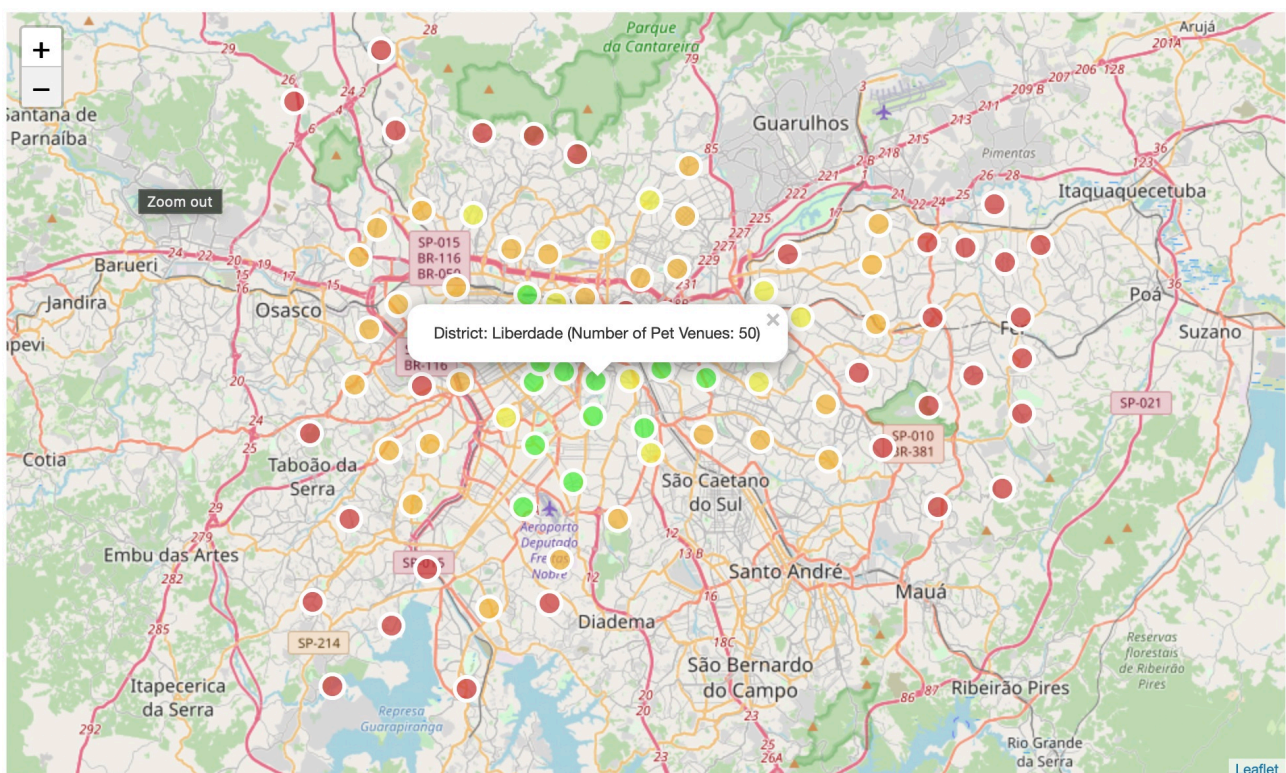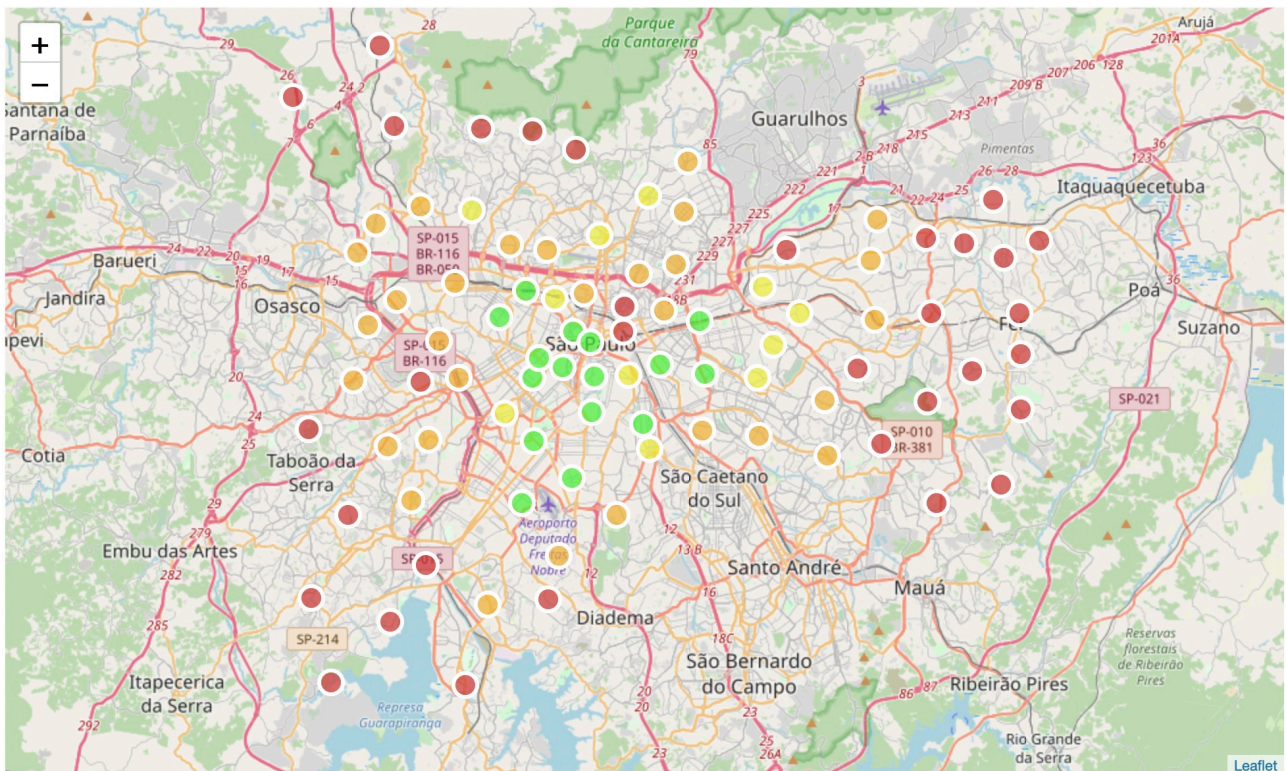## 4.3 Distribution of São Paulo Districts¶
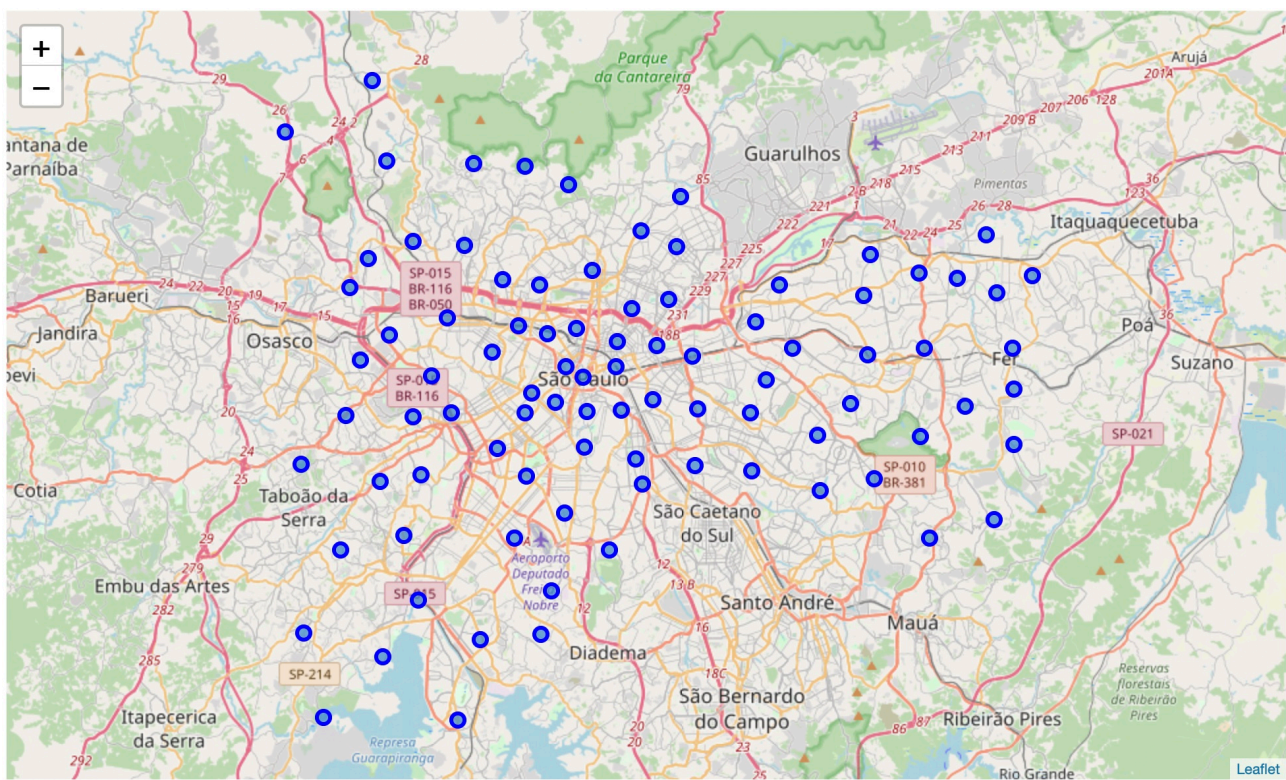
4.4 Distribution of São Paulo Districts colored with the range explained below:

District Markers color specs:

Number of Pet Related Venues by district:

- From 0 to 12 = Red color;
- From 13 to 25 = Orange color;
- From 26 to 37 = Yellow color;
- From 38 to 50 = Green color;

As seen on map item 4.2, São Paulo has a large number of venues that are Pet Related. Actually, the foursquare API returned 1852 places for pets in the city. The number of districts in São Paulo is 96.

By the map on item 4.4 we are able to notice, as expected, how the districts that are closest to downtown have the higher number of Pet Venues. As we move away from downtown, the offer of pet services and others drop proportionately.

Through the results above and knowing the characteristics of the city we can infer that districts with greater purchasing power tend to have more options for those who have pets.

For the entrepreneurs who are aiming to start a new pet business, maybe it's time to look for areas further from downtown to have less competition and be able to serve the population that often cannot or does not want to walk so much around the city in search of services for their own pets.

5. Conclusion

The pet market in Brazil and, specially, in São Paulo growns every year as more and more people are looking and desiring a pet for companion.

This project achieved its objective on showing the Pet Market for the city of São Paulo with a clear and defined view of the situation and aimed to help the population and businesses on knowing the distribution for Pet venues in the city and helping them to decide to more information when looking for a place to live or starting a business.

For the analytic approach it was selected the descriptive approach as the purpose of the work was to show relationships between Districts and its pet related venues in a simple way.