Determining the best location to Open a Pet Store in Orlando, Florida

Introduction:

The City of Orlando, Florida was given the nickname: *"the City Beautiful"*. It was one of the most-visited cities in the world primarily driven by tourism, major events, and convention traffic; in 2018 the city drew more than 75 million visitors. The two largest and most internationally renowned tourist attractions in the Orlando area include the Walt Disney World Resort, opened by the Walt Disney Company in 1971, and located approximately 21 miles (34 km) southwest of Downtown Orlando in Bay Lake; and the Universal Orlando Resort, opened in 1990 as a major expansion of Universal Studios Florida.

Business Problem

In this project, the goal was to find an optimal location for a Pet Store. This report will be especially useful to entrepreneurs interested in opening a pet store in Orlando, Florida.

There were many competing pet stores in the State of Florida. Therefore, I tried to detect locations that were not already crowded with pet stores, specifically around Orlando. I was also particularly interested in areas with dog-runs/parks but few pet stores in the surrounding area. Locations that were as close as possible to the city center were preferable, only if the previous two conditions were met.

In this project I generated a few of the most promising neighborhoods based on the established criteria.

Data

Considering the established problem, some of the factors I considered in decision-making were:

1. The number of existing dog parks in the neighborhood, regardless of the rating on Foursquare.
2. If any, the number of, and distance to each of the pet stores in the neighborhood.
3. The distance of each neighborhood from Orlando’s city center.

The data sources that were needed were:

1. Google Maps API
2. The coordinates of Orlando City center were obtained through the Google Maps API geocoding.
3. Foursquare API to get the location and number of pet stores, dog parks in every neighborhood.

Creating Potential/Prospective Neighborhoods:

I created the Lat.(latitude) & Long. (longitude) coordinates which would serve as the centroids of the Potential/Prospective neighborhoods. Afterwards, created a grid of cells covering the area of interest which was centered around Orlando City Centre within a radius of 30 Square kilometers (30km x 30km).

The first step was to find the Lat. & Long. of the Orlando city center, using a specific address and Google Maps geocoding API.

I chose a Central point for the Orlando City center neighborhood: the Orlando Centroplex known also as ‘Expo Centre: Orlando Centroplex’. I started by converting the address to its latitude and longitude coordinates.

Then created a hexagonal grid of cells: I offset every other row, and adjust vertical row spacing so that every cell center was equally distant from all its neighbors.

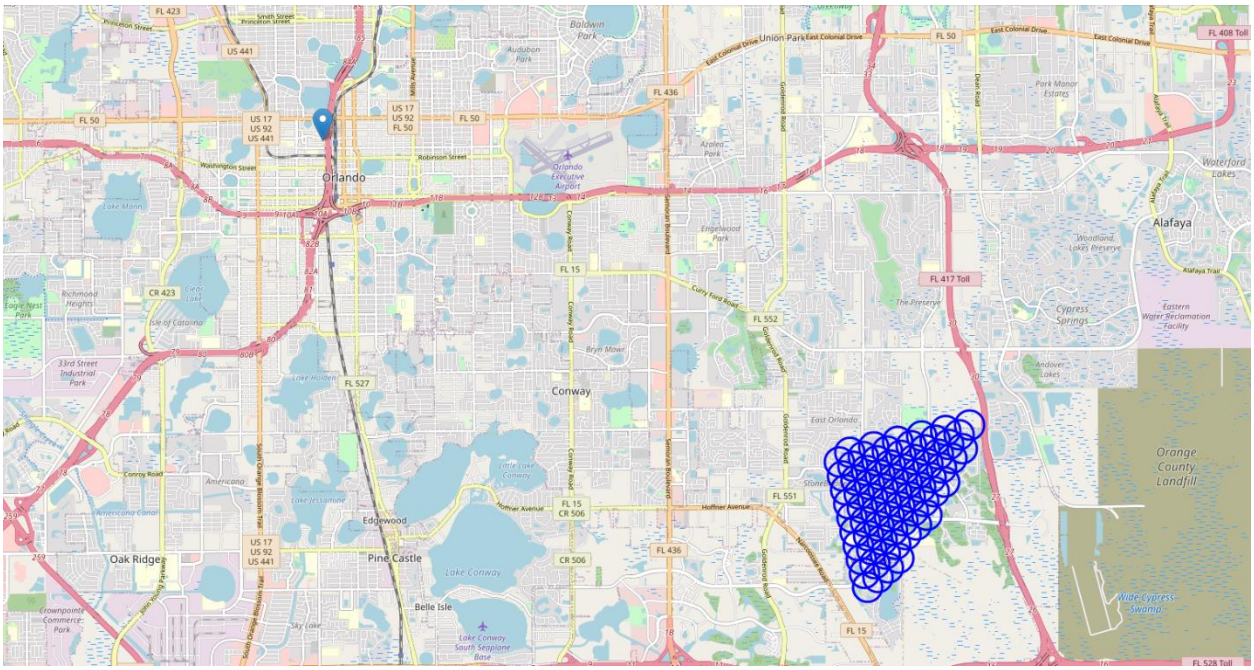

Figure 1: Visualized the data obtained so far: city center location and candidate neighborhood centers:

At this point, I had the coordinates of centers of locations/neighborhoods to be evaluated, equally spaced (distance from every point to its neighbors was exactly the same) and within 30km from Orlando Centroplex.

I then used Google Maps API to get approximate addresses of those locations and then placed it into the Pandas data-frame shown below:

Geographic Coordinates

[10]:

	Address	Latitude	Longitude	X	Y	Distance from center
0	NO ADDRESS	28.496009	-81.246508	-8.080897e+06	1.125006e+07	29820.965779
1	NO ADDRESS	28.491619	-81.248054	-8.081797e+06	1.125058e+07	29954.773716
2	NO ADDRESS	28.494208	-81.248716	-8.081197e+06	1.125058e+07	29585.950523
3	NO ADDRESS	28.489818	-81.250261	-8.082097e+06	1.125110e+07	29738.980089
4	NO ADDRESS	28.492407	-81.250923	-8.081497e+06	1.125110e+07	29361.317013
5	NO ADDRESS	28.494997	-81.251585	-8.080897e+06	1.125110e+07	28991.152732
6	NO ADDRESS	28.485427	-81.251806	-8.082997e+06	1.125162e+07	29927.335416
7	NO ADDRESS	28.488016	-81.252468	-8.082397e+06	1.125162e+07	29533.801061
8	NO ADDRESS	28.490606	-81.253130	-8.081797e+06	1.125162e+07	29147.305280
9	NO ADDRESS	28.493195	-81.253793	-8.081197e+06	1.125162e+07	28768.131763

Figure 2: *Location Addresses of Orlando, Florida and their respective distances from the City Centre (Orlando Centroplex)* saved this data into a local file.

Foursquare API:

I was interested in venues in 'dog run' and 'pet store' categories. I included in a list only venues that had 'dog run' in category name and made sure to detect and include all of the 2nd category of specifically 'pet store', as I needed the information on pet stores in the neighborhood.

I went over the neighborhood locations and get nearby dog runs/parks; and also maintained a dictionary of all found dog runs/parks and all found pet stores.

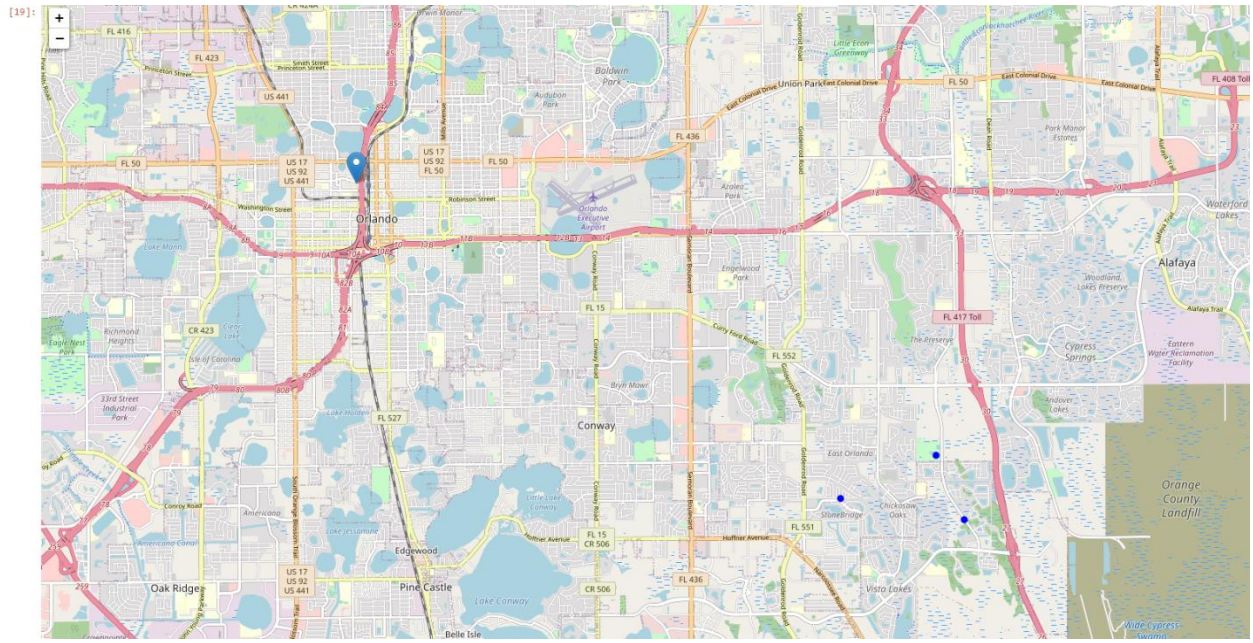

Figure 3: All the dog runs/parks in this area of interest on map, and also show Pet Stores in different color.

The progress thus far was encouraging. At this point, I had all the dog runs/parks in area within few kilometers of Orlando Centroplex, and knew which businesses around them were categorized as Pet Stores. I also knew exactly which dog-runs were in vicinity of the center of each prospective neighborhood.

The data gathering was now completed. I proceeded to use this data at the **Analysis** stage to produce the report on optimal sites/locations for a new Pet Store business.

Methodology

For this project the focus was detecting areas around Orlando that have low density of pet stores especially these adjacent to dog runs/parks. The analysis was limited to area 30km around a selected central point, Orlando Centroplex in the city center of Orlando, Florida.

In the previous step I had collected the required location data consisting of every pet store within a 30km radius of the selected central point. Moreover, also identified every park categorized by Foursquare as Dog Run within the same radius.

The next step was the calculation and exploration of 'Dog Park density' across different areas of Orlando, then using heatmaps I identified a few promising areas close to center with high number of dog runs/parks in general as well as no pet stores in vicinity and focus on those areas.

In the last step I focused on the most promising areas and within those create clusters of locations that meet the requirements that have been established. I took into consideration locations with no more than two pet stores in radius of 250 meters. I wanted locations without Pet stores in radius of 400 meters and presented map of all such locations and also created clusters, using k-means clustering. Of those locations general locations were identified to be taken into consideration when searching for the optimal place to set up shop.

Analysis

I performed some basic explanatory data analysis and derive some additional information from our raw data.

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Average number of dogruns in every area with radius=300m: 0.0273972602739726
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	Address	Latitude	Longitude	X	Y	Distance from center	dogruns in area
0	NO ADDRESS	28.496009	-81.246508	-8.080897e+06	1.125006e+07	29820.965779	0
1	NO ADDRESS	28.491619	-81.248054	-8.081797e+06	1.125058e+07	29954.773716	0
2	NO ADDRESS	28.494208	-81.248716	-8.081197e+06	1.125058e+07	29585.950523	0
3	NO ADDRESS	28.489818	-81.250261	-8.082097e+06	1.125110e+07	29738.980089	0
4	NO ADDRESS	28.492407	-81.250923	-8.081497e+06	1.125110e+07	29361.317013	0
5	NO ADDRESS	28.494997	-81.251585	-8.080897e+06	1.125110e+07	28991.152732	0
6	NO ADDRESS	28.485427	-81.251806	-8.082997e+06	1.125162e+07	29927.335416	1
7	NO ADDRESS	28.488016	-81.252468	-8.082397e+06	1.125162e+07	29533.801061	0
8	NO ADDRESS	28.490606	-81.253130	-8.081797e+06	1.125162e+07	29147.305280	0
9	NO ADDRESS	28.493195	-81.253793	-8.081197e+06	1.125162e+07	28768.131763	0

Figure 4: Table showing the number of dog-runs in every prospective area.

The next item was to calculate the distance to nearest Pet Store from the center of every prospective area/location; not only just those that were within the 300m radius, but I wanted the distance to the closest one, regardless of distance.

	Address	Latitude	Longitude	X	Y	Distance from center	dogruns in area	Distance to petstore
0	NO ADDRESS	28.496009	-81.246508	-8.080897e+06	1.125006e+07	29820.965779	0	10000
1	NO ADDRESS	28.491619	-81.248054	-8.081797e+06	1.125058e+07	29954.773716	0	10000
2	NO ADDRESS	28.494208	-81.248716	-8.081197e+06	1.125058e+07	29585.950523	0	10000
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5	NO ADDRESS	28.494997	-81.251585	-8.080897e+06	1.125110e+07	28991.152732	0	10000
6	NO ADDRESS	28.485427	-81.251806	-8.082997e+06	1.125162e+07	29927.335416	1	10000
7	NO ADDRESS	28.488016	-81.252468	-8.082397e+06	1.125162e+07	29533.801061	0	10000
8	NO ADDRESS	28.490606	-81.253130	-8.081797e+06	1.125162e+07	29147.305280	0	10000
9	NO ADDRESS	28.493195	-81.253793	-8.081197e+06	1.125162e+07	28768.131763	0	10000

Figure 5: Minimum distance to pet store was set to 10000m.

It looked like on average a pet store could be found within 10000m (10km) from the center of every prospective location/area.

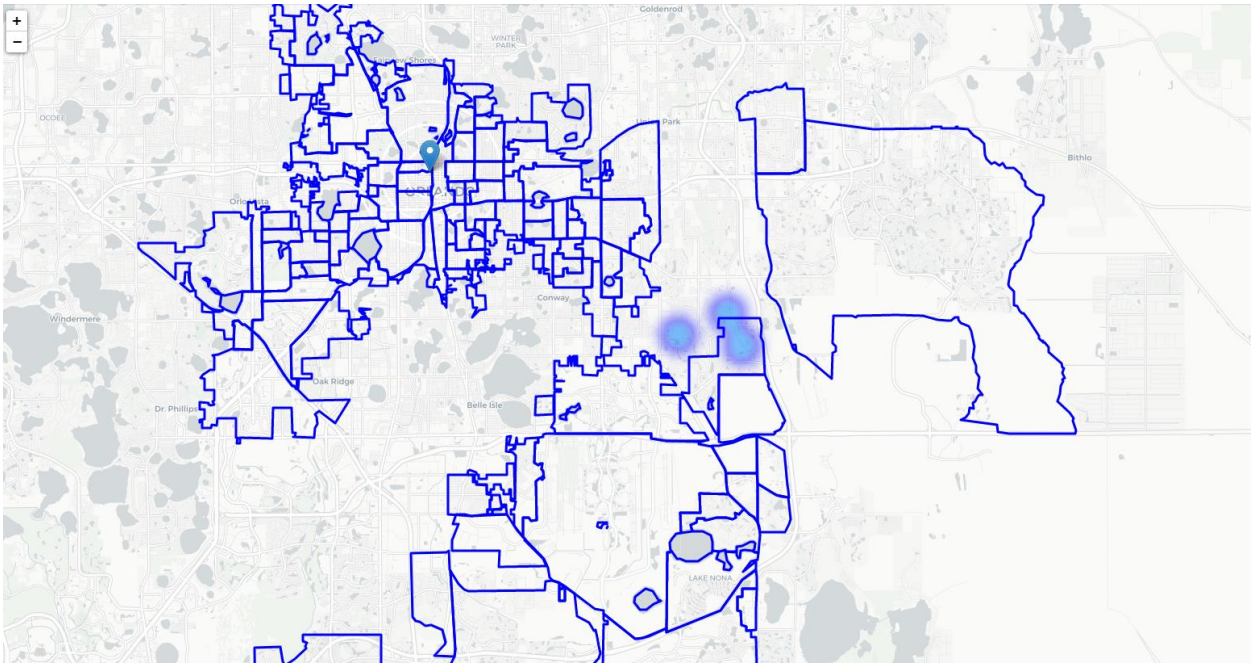

Figure 6: A map showing heatmap / density of dog-runs and try to extract some meaningful information from that. Showing borders of Orlando neighborhoods on the map and a few circles indicating distance of 1km, 2km and 3km from Orlando Centroplex.

Defining a narrower region of interest.

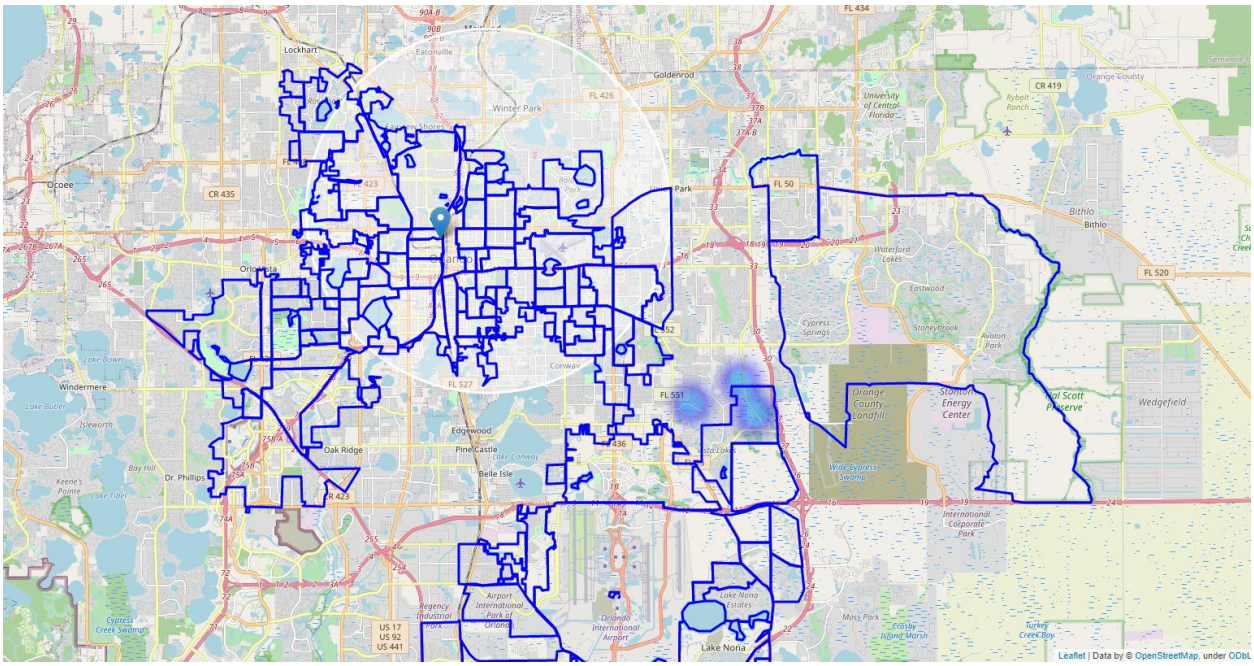

Figure 7: The pockets of low dog run density closest to the Orlando City Center.

Calculated two most important things for each location candidate: number of dog-runs in vicinity (we'll use radius of 2500 meters) and distance to closest pet store.

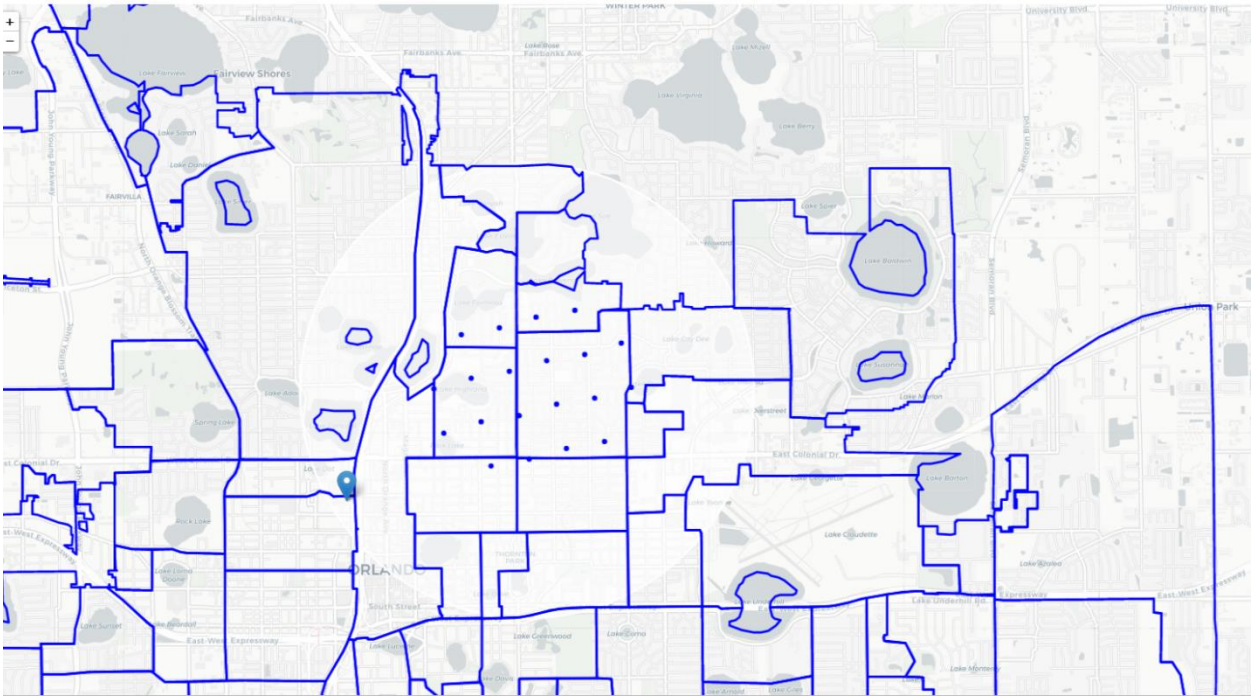

Figure 8: Filtered locations. The interest was in locations with no more than two dog runs in radius of 2500 meters, and no pet stores in radius of 4000 meters.

At this point there were several locations that were fairly close to the city center, Orlando Centroplex. Any of those 20 locations were potential candidates for a new pet store, at the very least based on the criteria of proximity to competition.

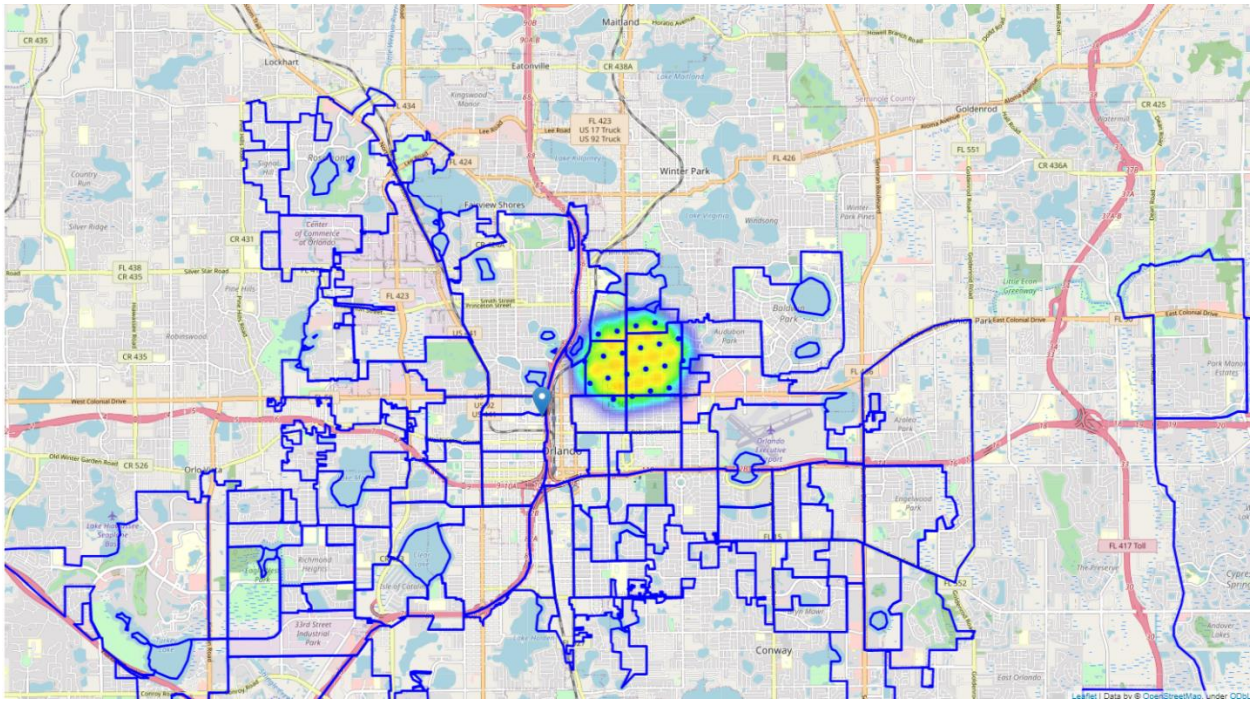

Figure 9: Next, was showing those **'good'** locations on a heatmap.

At this point, there was a clear indication of zones with low number of dog-runs in their vicinity, and absolutely *no* pet stores at all nearby. Thereafter, I could cluster those locations to create centers of zones containing good locations. These zones and their centers were the final result of the analysis.

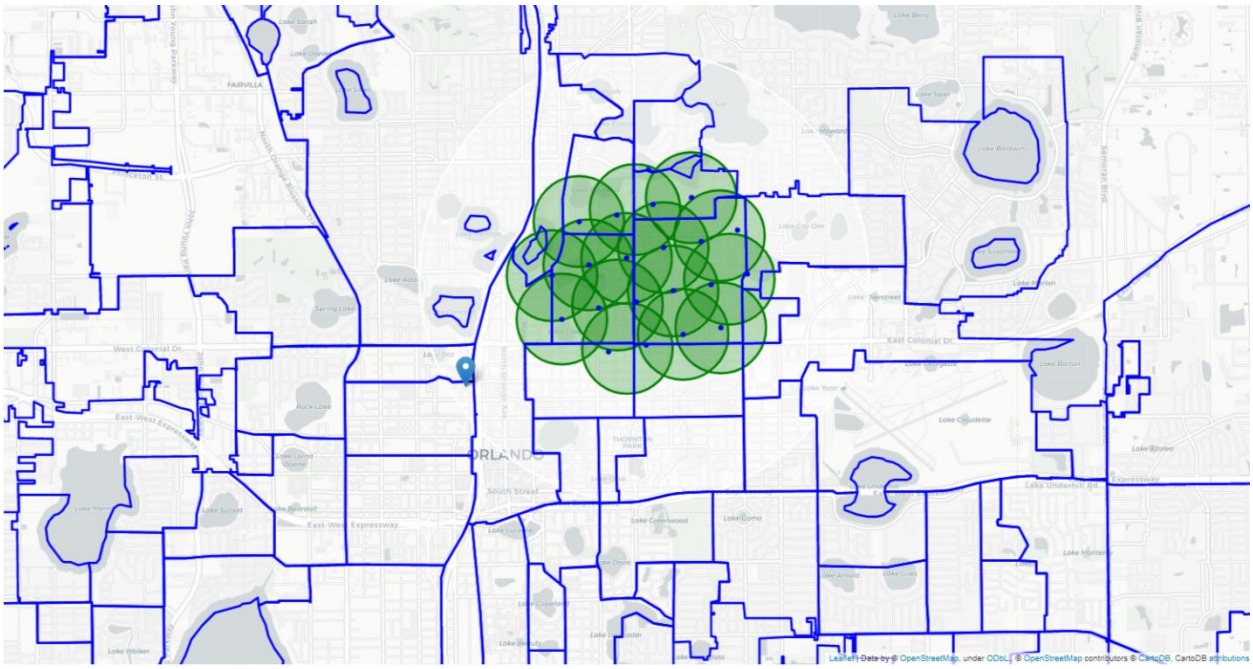

Figure 10: The locations of the centers of these clusters will be a good starting point for exploring the neighborhoods to find the best possible location based on the specifics of each neighborhood.

The above clusters represent groupings of most of the prospective locations and cluster centers were placed nicely in the middle of the zones that were full of with prospective locations.

The analysis had been completed at this point. 15 different prospective location centers had been identified and they contained locations with low number of dog runs/parks and had no pet stores whatsoever nearby. All the zones being fairly close to city center (all of them being within 4km from Orlando Centroplex. About half of those less than 2km from Orlando Centroplex). Although the **green circle areas** were shown on the map, each having a radius of 500 meters, their actual shape was very irregular. Therefore, the centers are only be considered as a starting-points for exploring the surrounding neighborhoods in search for potential Pet store business locations.

Results and Discussion ¶

The analysis showed that although there was a great number of dog runs/parks in the Orlando, Florida area, there were pockets with low density of the same and considerably close to Orlando city center. Highest concentration of dog runs/parks was detected South East of Orlando City Center, and a lack of Pet stores within 20km radius of the city center. Therefore, attention was focused on proximity to the city center being an area that would be very desirable to set up a new business. Directing attention to this narrower area of interest, I first created a dense grid of prospective locations; the locations were then filtered so that those with more than two dog runs/parks in radius of 2500m and those with a Pet Store closer than 4000m were removed.

These prospective locations were then clustered to create areas/zones of interest which contain greatest number of location candidates. A recommendation for further analysis would be generating the addresses of the centers of those areas/zones of interest. This can be done using reverse geocoding to be used as indicators for starting points for more detailed and local analysis based on other factors depending on individual stakeholder preferences.

The final result of this project was the identification of 15 zones containing largest number of potential new business locations based on number of and distance to existing venues - both business establishments in general and Pet stores in particular. This project does not conclude or imply that the identified zones were the most optimal for a new Pet Store. However, the purpose of the concluded analysis was simply to provide information concerning areas that were close to the Orlando city center area, that were not overrun by existing business establishments, specifically Pet Stores. Therefore, the areas/zones that have been identified (or recommended) should only be considered starting points for more detailed analysis which should culminate in the selection of a location far from competition, strategically located to reach potential customers among other stakeholder-specific requirements.

Conclusion

The purpose of this project was to identify areas close to Orlando City Center with low number of stores, particularly Pet Stores. This was in order to help entrepreneurs/stakeholders to narrow down their search for the optimal locations for new Pet Stores. By calculating the density and distribution of dog runs/parks from Foursquare data, I have first identified general neighborhoods that justify further analysis based on proximity to customers. I then generated extensive collection of locations which satisfied a simple requirement regarding existing nearby pet stores. Clustering of these locations was subsequently performed in order to identify and create the major zones of interest in the map. These clustered locations contained the greatest number of prospective locations. The final decision concerning the optimal location for a new Pet store will be made by the concerned entrepreneur/stakeholder, based on the specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location (proximity to dog runs/parks, etc.), pollution levels, and other socio-economic aspects of every neighborhood.