

Restaurant Investment Analysis in Miami, US

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1. Description of the problem and a discussion of the background:

As a consultant of restaurant investors, it is required to me provide recommendations to launch a new restaurant and the type of that restaurant in the City of Miami in the United States.

According to Wikipedia, Miami is the cultural, economic and financial center of South Florida. It is the sixth most densely populated major city in the United States. The Miami metropolitan area is home to 6.1 million people, the seventh largest in the nation. Moreover, Miami is a major center and leader in finance, commerce, culture, arts, and international trade and the city was ranked as the third richest in the United States and the eighth richest in the world in terms of purchasing power (2018 UBS study).

Based on this information it would be recommended to invest in a gourmet restaurant or haute cuisine. The potential clients would be clients with age range over 35, couples with high income and executives in business meetings, medium-high ticket, high service expectations, planned and booked in advance, prefer accessible and comfortable places. They are willing to travel if necessary.

2. Description of the data and how it will be used to solve the problem:

Once you have decided what type of business you will create and who your target customer is, you must choose a location that is easily accessible to your customers. Who they are, what areas they move through, and which locations are populated (and active) enough to support your business will help you choose the right location.

One way to start evaluating possible locations that are accessible can be to segment the city based on the most common venue category in each neighborhood, and then, group these neighborhoods into clusters.

Our decision will be influenced by the numbers of restaurants in each neighborhood, density population, the location of the most influential central business districts or the presence of major business offices as well as national and international banks, Hotels, courthouses, financial headquarters, cultural and tourist attractions. Our premise will be the closer your business is to where the consumers who make up your target audience live, frequent or transit, the greater the chance that they will visit you.

To achieve our objectives, I will use Foursquare API in order to get the most common venues, location and type of business of every neighborhood. Some public information will be used to obtain data related to social and economic conditions of clients and demographics.

3. Methodology:

3.1 Data Cleaning:

First of all, all of dependencies required to do this work was downloaded. Data was obtained from <https://en.wikipedia.org/wiki/Miami> and show us background of the City of Miami, and information about Neighborhoods, their coordinates, population, population density, etc.

Initially, Data wrangling was conducted in order to process data from the initial format to a format that was better to analyze it.

	Neighborhood	Demonym	Population2010	Population/Km²	Sub-neighborhoods	Coordinates	vteNeighborhoods in Miami	Unnamed: 1	vteMiami articles	Unnamed: 2
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Mayors	Government	NaN
3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Hospitals Fire Police	Emergency services	NaN
4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Miami-Dade Transit Metro rail Bus people mover...	Transportation	NaN
5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Cuisine Dialect Film LGBT culture in Miami Mus...	Culture	NaN
6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Miami-Dade County Public Schools Elementary sc...	Education	NaN

Table 1. *df.tail()* of the dataframe

As we can see in table 1, the table extracted from a web page contains several columns and row which information is not required for further analysis. Also, several missing values was identified in the dataframe.

For evaluating missing data, we used built-in functions as `.isnull()` to identify those missing values. Drop rows, columns and replace functions were used to deal with those kinds of data.

The built-in functions `.dtype()` and `.astype()` was used in the last step of the data cleaning to convert data to proper format, and check and make sure that all data is in the correct format.

The final dataframe is shown as follows in the table 2:

	Neighborhood	Population2010	Population/Km²	Longitude	Latitude
0	Allapattah	54289	4401	-80.224	25.815
1	Arts & Entertainment District	11033	7948	-80.190	25.799
2	Brickell	31759	14541	-80.193	25.758
3	Buena Vista	9058	3540	-80.192	25.813
4	Coconut Grove	20076	3091	-80.257	25.712

Table 2. Dataframe of the City of Miami

3.2 Foursquare API:

In this section, the *geopy* library was used to get the latitude and longitude values of the city of Miami, and the *folium* library to create a map with neighborhoods superimposed on top. See Figure 1:

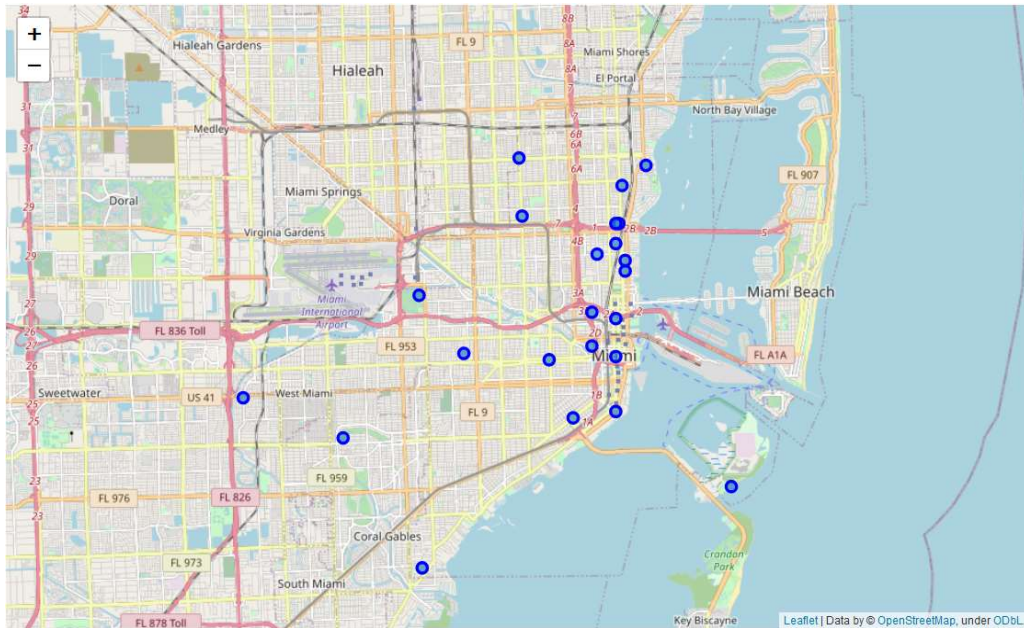


Figure 1. Map of City of Miami with their neighborhood superimposed on top.

A horizontal bar plot was used to represent the population density of each neighborhood, the y-axis is used for labelling, and the length of bars on the x-axis corresponds to the magnitude of population density of the top 10 neighborhood. The figure 2 shows this result.

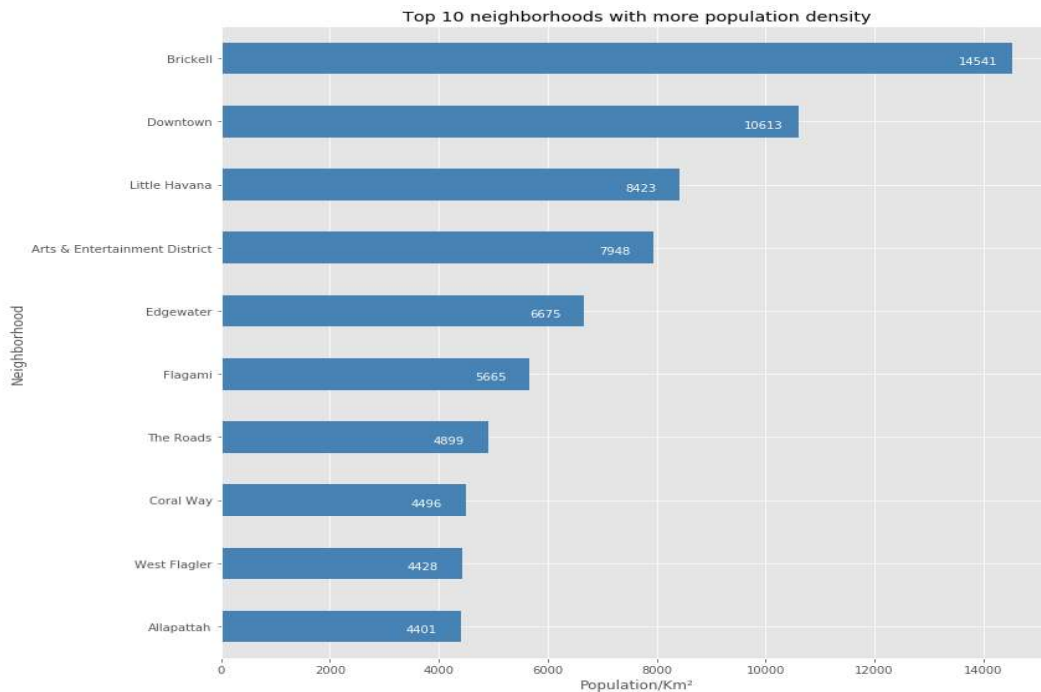


Figure 2. Horizontal bar plot – Neighborhood population Density

The next step is to use Foursquare API to explore the neighborhoods, segmented and cluster them. Firstly, we analyzed the neighborhood with more population density of the city, which is the Brickell neighborhood. At least 53 venues were obtained within a radius of 500 meters in the Brickell neighborhood. See the first 5 venues in the following table:

	name	categories	lat	lng
0	Four Seasons Hotel Miami	Hotel	25.759078	-80.191875
1	PM Buenos Aires Fish & Steak-House	Argentinian Restaurant	25.758777	-80.193550
2	Rik Rak Salon • Boutique • Bar	Salon / Barbershop	25.759102	-80.192197
3	Obba Sushi & More	Japanese Restaurant	25.756834	-80.191018
4	Valentia Miami	Restaurant	25.758641	-80.193133

Table 3. Dataframe of the venues of the Brickell neighborhood.

The top 10 most common venues category is shown in the following table:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Allapattah	Ice Cream Shop	Art Gallery	Café	Restaurant	Brewery	Coffee Shop	Seafood Restaurant	Mexican Restaurant	Pizza Place	Bar
1	Arts & Entertainment District	Ice Cream Shop	Art Gallery	Café	Park	Coffee Shop	Bar	Pizza Place	Brewery	Food Truck	Restaurant
2	Brickell	Hotel	Seafood Restaurant	Italian Restaurant	Japanese Restaurant	Argentinian Restaurant	Bar	Park	Grocery Store	Restaurant	Latin American Restaurant
3	Buena Vista	Ice Cream Shop	Art Gallery	Coffee Shop	Pizza Place	Italian Restaurant	Café	Restaurant	Mexican Restaurant	Park	Brewery
4	Coconut Grove	Italian Restaurant	American Restaurant	Park	Gym / Fitness Center	Shopping Mall	Cuban Restaurant	Seafood Restaurant	Dog Run	Japanese Restaurant	Cupcake Shop

Table 4. Top 10 most common venues in the Brickell neighborhood.

As we can see the most common venue in the Brickell neighborhood is Hotels and Restaurants.

3.3 Examine Cluster Neighborhood:

In this section a new dataframe was constructed, that includes the clusters as well as the top 10 venues for each neighborhood.

The process of clustering was used to group a set of objects in such a way that venues or location in the same group are more similar to each other than to those presents in other clusters. The K-mean algorithm (which it is an unsupervised algorithm and one of the most widely used) was implemented in this study.

The number of clusters was set after running the whole process multiple times with different starting conditions. For our purpose K=3 results an optimum value for the numbers of clusters.

This number of clusters clearly define the most common venue in each section and would indicate, based on our premises, possible recommendations for the location of our restaurant.

The following map shows the resulting clusters:

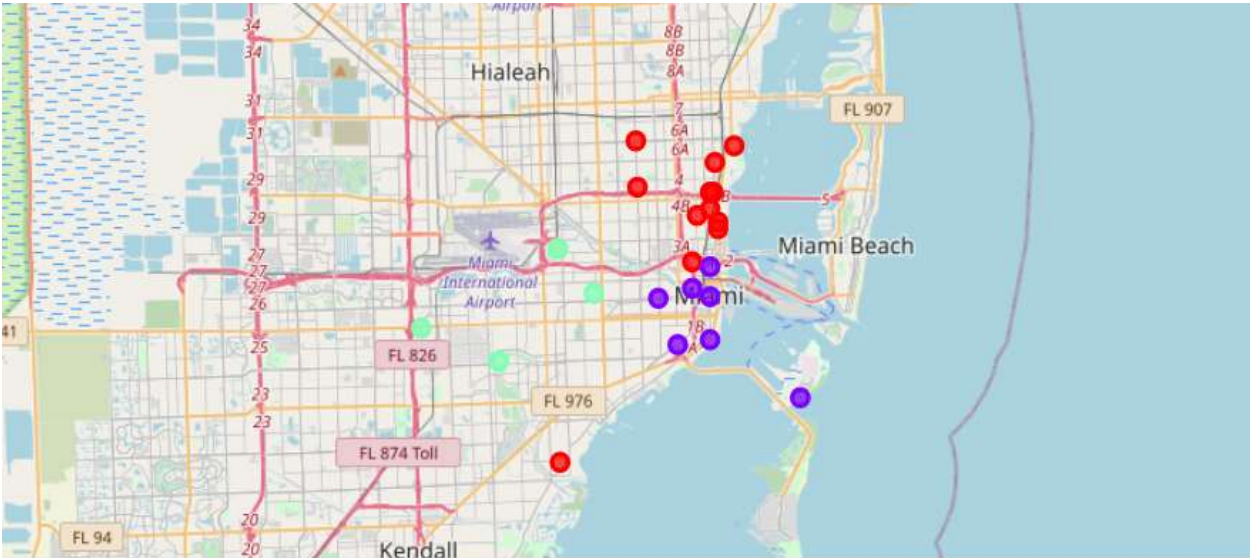


Figure 2. Clusters of City of Miami using K-values algorithm

One example of the resulting of cluster_0 is shown in the following tables:

	Neighborhood	Population2010	Population/Km²	Longitude	Latitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	
0	Allapattah	54289	4401	-80.224	25.815	0	Ice Cream Shop	Art Gallery	Café	Restaurant	Brewery	Coffee Shop	R
1	Arts & Entertainment District	11033	7948	-80.190	25.799	0	Ice Cream Shop	Art Gallery	Café	Park	Coffee Shop	Bar	
3	Buena Vista	9058	3540	-80.192	25.813	0	Ice Cream Shop	Art Gallery	Coffee Shop	Pizza Place	Italian Restaurant	Café	R
6	Design District	3573	3623	-80.193	25.813	0	Art Gallery	Ice Cream Shop	Coffee Shop	Italian Restaurant	Restaurant	Brewery	
8	Edgewater	15005	6675	-80.190	25.802	0	Art Gallery	Ice Cream Shop	Coffee Shop	Bar	Park	Restaurant	

Table 5. Top 10 most common venues in Cluster 0.

The sum of most common venues can be achieves by applying the method value_counts() to each cluster:


```
miami_cluster_0['1st Most Common Venue'].value_counts()
```

```
Art Gallery      4
Ice Cream Shop   4
Hotel            1
Name: 1st Most Common Venue, dtype: int64
```

```
miami_cluster_0['2nd Most Common Venue'].value_counts()
```

```
Art Gallery      4
Ice Cream Shop   4
Café             1
Name: 2nd Most Common Venue, dtype: int64
```

```
miami_cluster_1['1st Most Common Venue'].value_counts()
```

```
Hotel            5
Seafood Restaurant 1
Italian Restaurant 1
Name: 1st Most Common Venue, dtype: int64
```

```
miami_cluster_1['2nd Most Common Venue'].value_counts()
```

```
Seafood Restaurant 4
Italian Restaurant  1
Latin American Restaurant 1
Hotel              1
Name: 2nd Most Common Venue, dtype: int64
```

```
miami_cluster_2['1st Most Common Venue'].value_counts()
```

```
Cuban Restaurant      3
Latin American Restaurant 1
Name: 1st Most Common Venue, dtype: int64
```

```
miami_cluster_2['2nd Most Common Venue'].value_counts()
```

```
Bakery            1
Cuban Restaurant  1
Italian Restaurant 1
```

Figure 3. Most common venues for each cluster.

4. Results:

Results can be showed by classifying the most predominant venues in each cluster. We can level each cluster as follows:

- Cluster_0: Art Gallery and Ice scream Shop
- Cluster_1: Hotels, Sea Food and Italian Restaurants
- Cluster_3: Cuban Restaurants

These results could confirm previous information about zones that can be defined as potential zones to invest on restaurant businesses.

Firstly, the neighborhoods with major population and population density are the Downtown and Brickell neighborhood. Thus, when we examined the most common venues of the Brickell neighborhood, we can observe that Hotels, and different kinds of restaurants as a Seafood, Italian, Japanese and Argentinian Restaurant are the most common business presents in the zone. Also, the Downtown neighborhood belongs to this same cluster_1. As we can see, we observed the same type of location: Hotels and Restaurants.

In cluster_0, neighborhoods are mainly Art Galleries and Ice scream Shops, some hotels and cafes are also presented. It seems that there are too many entertainment venues, theaters, museums, parks and performing arts centers in this neighborhood.

Cuban and Latin American restaurants are the predominant venues in Cluster 3, This sector reflects the fact that the City of Miami is highly influenced by its diverse population, with a heavy influence from Caribbean and Latin American cousine.

5. Discussion:

For this project, we know that the investors would like to invest in a restaurant which potential clients with age range over 35, and professionals with high income and executives. Moreover, we established a basic rule: the closer your business is to where the consumers who make up your target audience live, frequent or transit, the greater the chance that they will visit you.

Another important aspect is that we are looking for zones with enough population and density.

When we started to evaluate possible locations, these premises play an important role in our final recommendations. In this way, we think that that the Brickell neighborhood could be a potential zone to accomplish our objectives.

Firstly, this study determines that there are many hotels and restaurants already established in Brickell. Therefore, potential clients always are visiting these locations. Secondly, it is the public domain that the residents of Brickell are people with high purchasing power. According to <https://en.wikipedia.org/wiki/Brickell> Brickell neighborhood “is a dense, high-rise residential neighborhood with many upscale, luxury condominium and apartment towers”. And this information confirms us what segment of clients we will interact with.

However, the kind of restaurant that we will establish needs further analysis. For example, an Italian or Seafood Restaurant could face a hard competition, since there are already restaurants established in the zone. Further business analysis needs to be carried out in order to know the future challenges that will face in the future.

6. Conclusion:

In conclusions, geolocation can be used to determine common locations in many cities, in this study, Foursquare API permit us to determine the most common location of neighborhoods of the City of Miami. Using pandas, and generally, Python and its libraries, we evaluated locations where we could invest and locate a new restaurant. Our premises were basically population density, family high income, and offices business that support and guarantee potential clients visiting our restaurant. In this way, The Brickell neighborhood accomplish these premises. It is dense, high-rise residential neighborhood, and has luxury condominium and apartment towers. There are many restaurants established yet. Therefore, a fierce competition could be presented if we decide to launch an Italian or Seafood Restaurant. However, a further business analysis as competitive analysis will be necessary to complement the findings of this report.

References

<https://en.wikipedia.org/wiki/Miami>

<https://en.wikipedia.org/wiki/Brickell>