Athens Wine Bars Business Analysis 2019

DECEMBER 31

This analysis was prepared in the context of Applied Data Science Capstone by IBM/Coursera The Battle of Neighborhoods

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Athens Wine Bars – Business Analysis 2019

Note: This is the final report of Coursera Capstone Project (Week 2).

"Applied Data Science Capstone Project
The Battle of Neighborhoods"

Introduction – Business Opportunity

Athens Tourism Growth

A total of 33 million people visited destinations in Greece in 2018, generating more than 16 billion euros in revenues and breaking all performance records to date. The Greek Tourism Ministry is expecting Greece to see an increase in revenue from tourism and travel in 2019, compared to 2018[1]. This trend is expected to continue in 2020.

According to recent data, the city of Athens continues to increase its share in Greece's tourism market, establishing itself solidly as a tourist destination all on its own. A total of 563,580 travelers arrived in Athens between October 1 and October 31, 2019, a number up by 9.6 percent compared to those seen in October of last year. The Greek capital hosted an impressive 5.7 million tourists between January 1 and October 31 this year, a figure up by 11.6 percent compared to 2018[2].

Athens Nightlife

Nightlife is one the highlights of Athens and business related to food and drinking has been always profitable. Visitors growth, led to new business opportunities, yet many neighborhoods became overpopulated with restaurants and bars. Competition became a significant barrier to open a successful business. Service diversification and location selection are nowadays the most important factors of success.

Greek Wine Trend

Between 2009 to 2016, Greek wines sales have increased by 81% in the United States by 562% in Japan, 556% in China, and 105% in Australia, a country that has its own

[1] https://news.gtp.gr/2019/09/16/greece-expects-rise-2019-tourism-revenue/
[2] https://greece.greekreporter.com/2019/11/29/athens-continues-to-increase-its-share-in-greeces-tourism-market/

reputation in fine winemaking. In addition to an increase in quantity of sales, consumers are also willing to pay more for Greek wine[3]. Greek wine is gaining reputation and opening a Greek wine related business is a good alternative to diversify from competition.

Business Opportunity – Wine Bars

In the current analysis we will try to locate the optimal location for opening a new bar business in Athens within 2020. Specifically, this report will be addressed to stakeholders interested in opening a Wine Bar in Athens, willing to exploit the tourism growth opportunities and Greek wine attraction which creates a diversification opportunity.

How we will work

Since there are lots of bars in Athens, we will try to detect locations that are not already crowded with bars. At the same time, we will focus particularly in areas with no wine bars in vicinity. Since the tourism related areas are located mainly around the center of Athens, we would prefer locations as close to city center as possible. Nevertheless, areas near the seafront, which is not far from city center and at the same time is crowded with hotels and Airbnb accommodation, will be also examined.

For the analysis we will use data science tools to generate a cluster of promising neighborhoods based on the above-mentioned criteria. Advantages and disadvantages of each area will then be presented so that best possible final location can be chosen by stakeholders.

In the following chapter we will outline the data we will be using to solve the above-mentioned problem.

[3] https://www.dimins.com/blog/2019/10/29/greek-wines/

Data

Based on definition of our problem, factors that will influence our decision are:

- number of existing bars in each neighborhood (any type of bar).
- number of and distance to Wine Bars in the neighborhood.
- distance of neighborhood from city center.
- trendy or famous areas proximity.

For the mapping analysis we will use regularly spaced grid of locations, centered around city center (Syntagma Square), to define Athens' neighborhoods.

A series of credible data sources will be used to extract/generate all necessary information required for the analysis. Specifically:

- Athens center's coordinates will be located using Google Maps API geocoding[4]. For the task a well-known Athens location, Syntagma Square will be selected.
- center points of candidate areas will be generated algorithmically. The approximate address (longitude and latitude) of each center point will be obtained using Google Maps API reverse geocoding.
- number of bars and their type and location in each neighborhood will be obtained using Foursquare API[5].
- city's boroughs will be mapped using a public source providing their coordinates[6].

[4] https://developers.google.com/maps/documentation/geocoding/intro
[5] https://developer.foursquare.com/docs/api
[6] https://raw.githubusercontent.com/codeforamerica/click_that_hood/master/public/data/athens.geojson

Data I - Neighborhoods Mapping using Google Maps API

We will start our data analysis by locating the latitude and longitude coordinates of neighborhoods' centroids. The area of interest extends over a radius of 6 km around the center of Athens (Syntagma Square) reaching the seafront. The grid of cells eventually will be covering an area of ~113km2km2 (πR2R2) centered around Syntagma Square.

Using Syntagma Square address and Google Maps geocoding API we will find the latitude & longitude of Athens city center. Below is the code output:

```
Coordinates of Syntagma Square, Athens, Greece: [37.9756512, 23.7340008]
```

After locating the coordinates of the city center, we will proceed by creating a grid of areas. The areas will be equally spaced, centered around city center and within a radius of 6km around Syntagma Square. Our neighborhoods will be defined as circular areas with a radius of 300 meters which means a diameter of 600km and a surface of ~0.28km2km2. We expect almost 400 (113/0.28) candidate areas to be formulated.

Note: To accurately calculate distances we need to create our grid of locations in Cartesian 2D coordinate system which allows us to calculate distances in meters (not in latitude/longitude degrees). Then we'll project those coordinates back to latitude/longitude degrees to be shown on Folium map. Below is the code output:

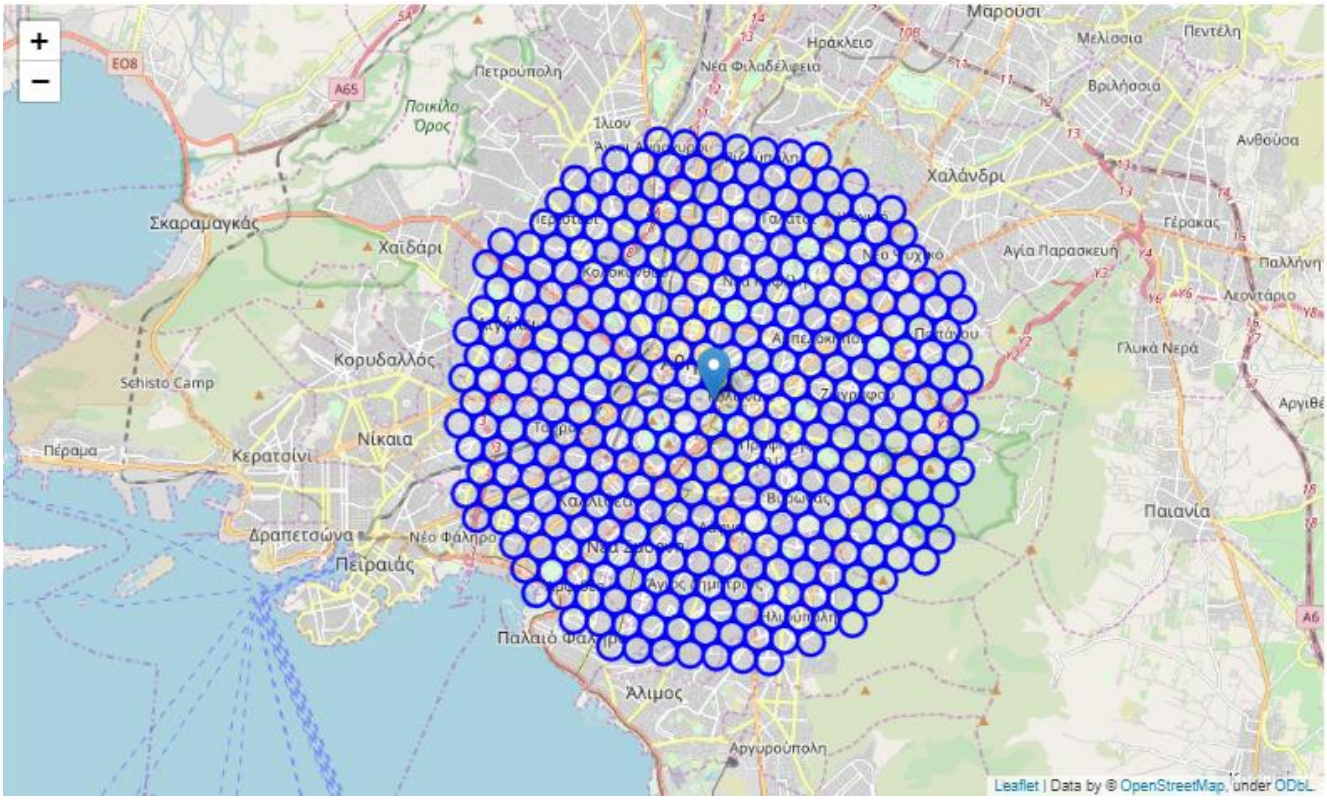
```
Coordinate transformation check
-------------------------------
Athens center longitude=23.7340008, latitude=37.9756512
Athens center UTM X=1267796.619876903, Y=4239281.004952287
Athens center longitude=23.734000799999997, latitude=37.975651199999994
```

As a next step will create a hexagonal grid of cells: we offset every other row, and adjust vertical row spacing so that every cell center is equally distant from all its neighbors. We do that to avoid the missed intermediate areas that circular grids would result in. Below is the code output:

```
364 neighborhood centers where formulated.
```

The 364 neighborhoods are a bit less than the 400 initially expected. This is normal due to the intermediate space that hexagonal grids help us to avoid. Let's visualize (Picture 1) the data we have extracted so far:

1. the city center location (Syntagma Square) and
2. the 364 neighborhood centers



Picture 1: Visualization of city center and created neighborhoods

As we can see we now have the coordinates of centers of neighborhoods to be evaluated. The area of each neighborhood is equally spaced (distance from every point to its neighbors is the same) and within ~6km from Syntagma Square, reaching as far as the seafront.

Next step is to use Google Maps API and reverse geocoding to approximately locate the addresses of those locations. Below is the code output:

```
Reverse geocoding check
-----------------------
Address of [37.9756512, 23.7340008] is: Pl. Sintagmatos 5, Athina 105 63, Gree
ce
```

Some examples of addresses are presented in the below table (Picture 2):

	Address	Latitude	Longitude	X	Y	Distance from center
0	Themidos 20, Paleo Faliro 175 63	37.926245	23.707684	1.265997e+06	4.233565e+06	5992.495307
1	Tsamadou 15, Paleo Faliro 175 63	37.925742	23.714432	1.266597e+06	4.233565e+06	5840.376700
2	Filostratou 6, Paleo Faliro 175 63	37.925238	23.721180	1.267197e+06	4.233565e+06	5747.173218
3	Rethimnis 76, Ag. Dimitrios 173 42	37.924734	23.727927	1.267797e+06	4.233565e+06	5715.767665
4	Papazachariou 15, Ag. Dimitrios 173 42	37.924229	23.734675	1.268397e+06	4.233565e+06	5747.173218
5	Char. Trikoupi 23, Alimos 174 56	37.923724	23.741422	1.268997e+06	4.233565e+06	5840.376700
6	Athinodorou 52, Ilioupoli 163 41	37.923219	23.748170	1.269597e+06	4.233565e+06	5992.495307
7	Niriidon 85, Paleo Faliro 175 61	37.931629	23.698111	1.265097e+06	4.234085e+06	5855.766389
8	Miltiadou 27, Paleo Faliro 175 63	37.931126	23.704860	1.265697e+06	4.234085e+06	5604.462508
9	Mark. Mpotsari 18, Paleo Faliro 175 63	37.930623	23.711608	1.266297e+06	4.234085e+06	5408.326913

Picture 2: Addresses of created neighborhoods

We have located 364 addresses.

Data II - Locating Venues using Foursquare

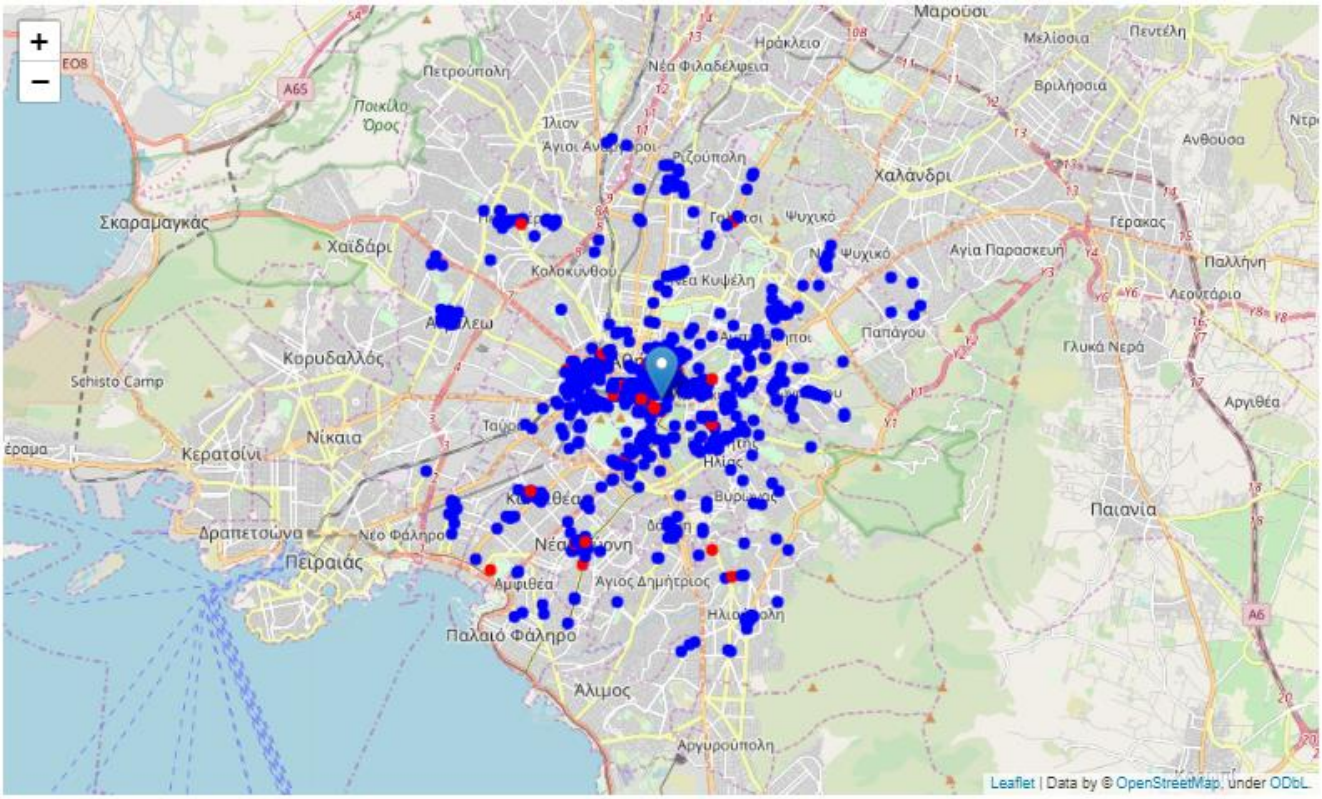
In the previous section we have located the candidate areas using Google Maps API. In this section we will use Foursquare API to get info of competitors in each neighborhood.

Competitors Definition

We are interested in venues belonging to Bars category in general. We will specifically highlight venues belonging to Wine Bars category since they are considered our direct competitors. Bistros and some types of restaurants could be considered competitors since they also serve wine. At the same time Wine Bars also serve some cold plates. Nevertheless, given the fact that these venues are not open late hours and do not have a bar profile will be excluded from our analysis and will not be considered wine bar competitors. Below is the code outcome identifying all bars in the area of interest:

```
Total number of bars: 794
Total number of Wine bars: 33
Percentage of Wine bars: 4.16%
Average number of bars in each neighborhood: 2.0384615384615383
```

Let's now see (Picture 3) all the collected bars (blue color) in our area of interest on map, and let's also show Wine bars in different color (red).



Picture 3: Bars location

Through the above process we have managed to locate and highlight all bars in Athens within 6km from Syntagma Square. Additionally, we have gathered which of them are categorized as Wine Bars. Finally, we have excluded every bar which is not in vicinity of each candidate neighborhood.

This concludes the data gathering phase. In the following section we will use the above data to locate and suggest the optimal locations for a new Wine Bar. Let's introduce first the methodology to be applied for this purpose.

Methodology

In the Data Section we have collected all the required data for our analysis. Specifically, the location and type (category) of every bar within 6km from Athens center (Syntagma Square). We have also identified all Wine Bars (according to Foursquare categorization).

In the following sections we will apply ways to detect areas of Athens that have low bar density, particularly those with low number of Wine Bars. We will limit our analysis to areas within ~6km around city center. These elements will be the backbone of our methodology.

Firstly we will calculate and explore the levels of bar density across different areas of Athens - we will use heatmaps to identify a few promising areas close to center with low number of bars in general (*and* no Wine Bars in vicinity) and focus our attention on those areas.

Secondly, we will focus on the most promising areas and create clusters of locations that meet some basic requirements. It is important these requirements to be selected and agreed in discussion with stakeholders. Given the fact that this is a non-requested analysis we will select some requirement that fit a regular request.

1. we will take into consideration locations with no more than two bars in radius of 250 meters
2. we will find locations without Wine Bars in radius of 400 meters.

We will present a map of all such locations.

Finally, we will create clusters (using k-means clustering) of those locations to identify generic zones / neighborhoods / addresses which would make sense as starting point for final 'street level' exploration and search for optimal venue location by stakeholders.

Analysis

Our first step in this section is to perform basic explanatory data analysis in order to get some additional info from our data. We will start by counting the number of bars in each of the 364 candidate areas. Below is the code outcome and some examples in Picture 4:

```
Average number of bars in every area with radius=300m: 2.0384615384615383
```

	Address	Latitude	Longitude	X	Y	Distance from center	Bars in area
0	Themidos 20, Paleo Faliro 175 63	37.926245	23.707684	1.265997e+06	4.233565e+06	5992.495307	0
1	Tsamadou 15, Paleo Faliro 175 63	37.925742	23.714432	1.266597e+06	4.233565e+06	5840.376700	0
2	Filostratou 6, Paleo Faliro 175 63	37.925238	23.721180	1.267197e+06	4.233565e+06	5747.173218	0
3	Rethimnis 76, Ag. Dimitrios 173 42	37.924734	23.727927	1.267797e+06	4.233565e+06	5715.767665	0
4	Papazachariou 15, Ag. Dimitrios 173 42	37.924229	23.734675	1.268397e+06	4.233565e+06	5747.173218	0
5	Char. Trikoupi 23, Alimos 174 56	37.923724	23.741422	1.268997e+06	4.233565e+06	5840.376700	2
6	Athinodorou 52, Ilioupoli 163 41	37.923219	23.748170	1.269597e+06	4.233565e+06	5992.495307	0
7	Niriidon 85, Paleo Faliro 175 61	37.931629	23.698111	1.265097e+06	4.234085e+06	5855.766389	2
8	Miltiadou 27, Paleo Faliro 175 63	37.931126	23.704860	1.265697e+06	4.234085e+06	5604.462508	1
9	Mark. Mpotsari 18, Paleo Faliro 175 63	37.930623	23.711608	1.266297e+06	4.234085e+06	5408.326913	1

Picture4: Number of bars per candidate location

We will continue by calculating the distance of the nearest Wine Bar from the center of each candidate area. We are interested in the nearest one even if it is outside of the 300m radius. We will use the distance of 10km as a limit.

In Picture 5 some examples are given:

	Address	Latitude	Longitude	X	Y	Distance from center	Bars in area	Distance to Wine Bar
0	Themidos 20, Paleo Faliro 175 63	37.926245	23.707684	1.265997e+06	4.233565e+06	5992.495307	0	1874.781463
1	Tsamadou 15, Paleo Faliro 175 63	37.925742	23.714432	1.266597e+06	4.233565e+06	5840.376700	0	1852.244328
2	Filostratou 6, Paleo Faliro 175 63	37.925238	23.721180	1.267197e+06	4.233565e+06	5747.173218	0	2016.633969
3	Rethimnis 76, Ag. Dimitrios 173 42	37.924734	23.727927	1.267797e+06	4.233565e+06	5715.767665	0	2328.694072
4	Papazachariou 15, Ag. Dimitrios 173 42	37.924229	23.734675	1.268397e+06	4.233565e+06	5747.173218	0	2346.452547
5	Char. Trikoupi 23, Alimos 174 56	37.923724	23.741422	1.268997e+06	4.233565e+06	5840.376700	2	2050.438662
6	Athinodorou 52, Ilioupoli 163 41	37.923219	23.748170	1.269597e+06	4.233565e+06	5992.495307	0	1903.354371
7	Niriidon 85, Paleo Faliro 175 61	37.931629	23.698111	1.265097e+06	4.234085e+06	5855.766389	2	1311.389334
8	Miltiadou 27, Paleo Faliro 175 63	37.931126	23.704860	1.265697e+06	4.234085e+06	5604.462508	1	1478.780991
9	Mark. Mpotsari 18, Paleo Faliro 175 63	37.930623	23.711608	1.266297e+06	4.234085e+06	5408.326913	1	1320.150270

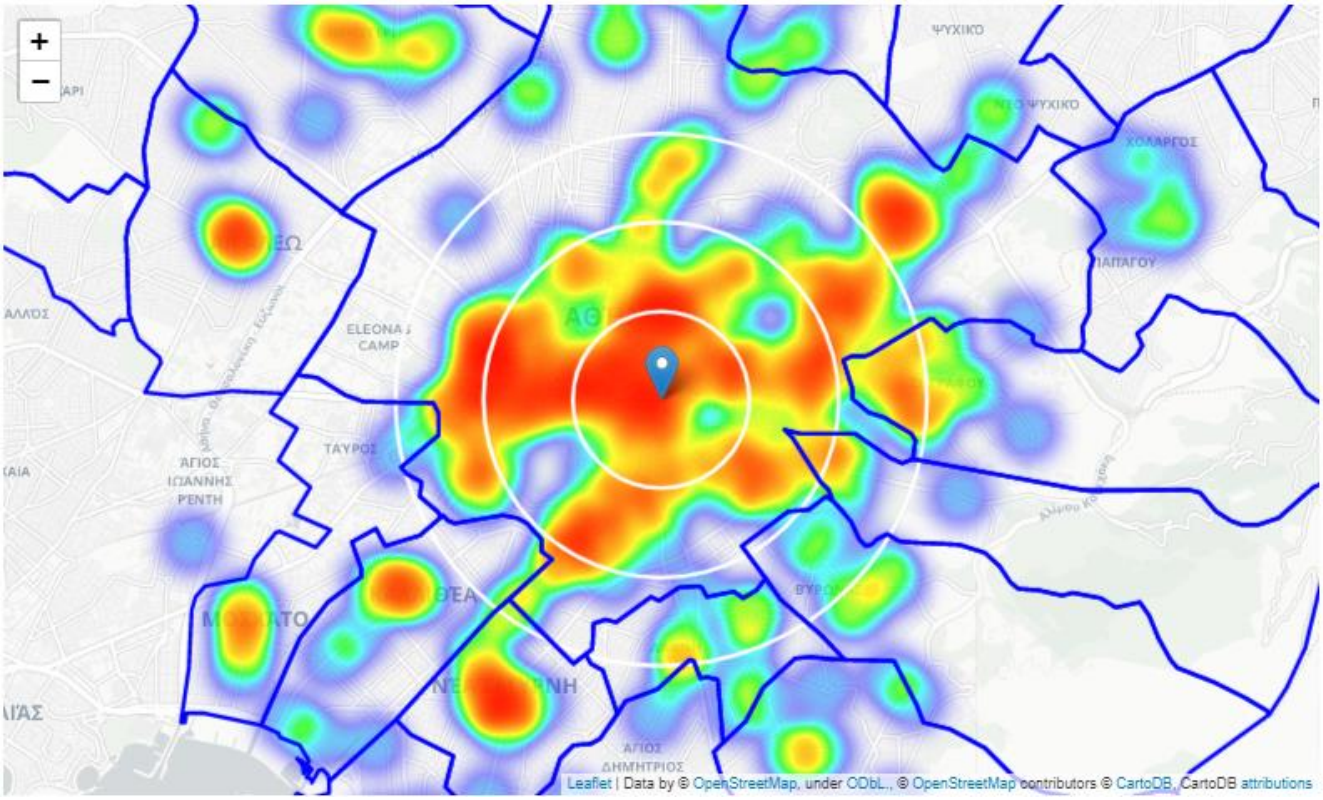
Picture 5: Distance of the nearest Wine Bar from the center of each candidate area

We will calculate the average distance. Below the code outcome:

```
The average distance to the closest Wine Bar from each area center is: 1590.53
```

So, this leads us to the conclusion that on average we could find a Wine Bar within ~1.6km from each candidate area center. That is neither close nor far. We should analyze areas carefully. Next, we will use a heat map to demonstrate the density of bars in order to extract some meaningful information. In the same map we will highlight the borders of Athens boroughs and three rings of a radius 1km, 2km and 3km indicating the distance from Syntagma Square.

In Picture 6 we can see the results.

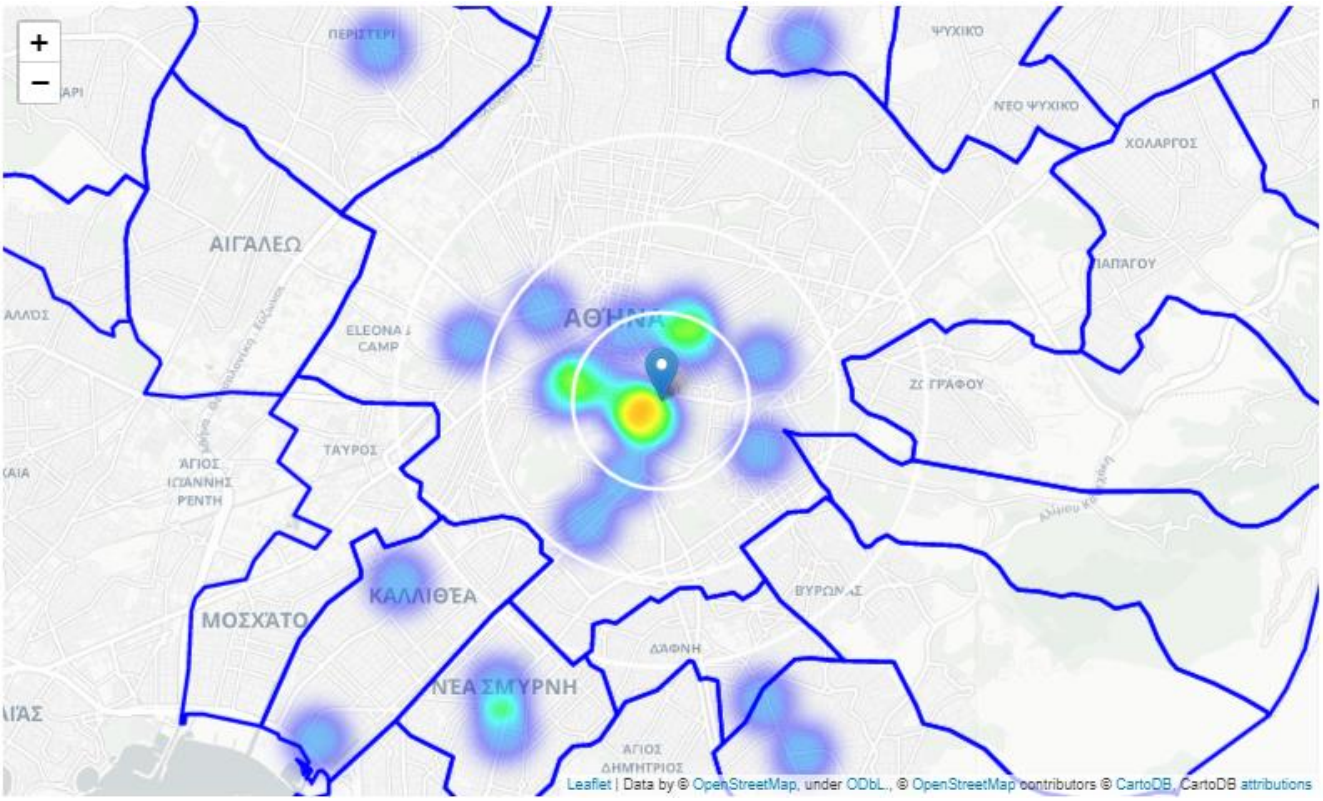


Picture 6: Density of bars around Athens center

It is obvious that within a 2km radius Athens are really populated with bars. Pockets of low bar density closest to city center can be found:

- in the third ring around Syntagma Square, especially in the south and north.
- in the second ring in the north close Omonoia Square and South-east in Neos Kosmos
- in the first ring is very crowded but still near omonoia there is some space
- Outside the third ring there are opportunities in the south-west

Let's create another heatmap map showing density of Wine Bars this time. Picture 7 illustrates the outcome:



Picture 7: Density of wine bars around Athens center

This map is not so 'hot'. This is to be expected given the fact that Wine Bars represent only the ~4.2% of all bars in Athens. Yet again it indicates higher density within the first ring. Outside the first ring there are many opportunities.
Based on this we will now focus our analysis on areas south-west, south-east and north from Athens center - we will move the center of our area of interest and focus in the following areas:

- Omonoia Square
- Koukaki & Petralona
- Neos Kosmos

Omonoia Square

Omonoia square is a controversial place. It was at one time quite beautiful and a centerpiece for the city. If you go downstairs into the metro station you can see old photos of it in the glory days. When Athens embraced the automobile, Omonoia was

one of the major casualties and the square became less people friendly and eventually it was not even automobile friendly as cars converged on it from all directions. Authorities have been trying to recapture the bygone days and have rebuilt the square several times in the last few years either to 'get it right'. It has gradually gained a bad reputation the last years due to the rising number of immigrants' population from Middle east and Asia. After several unsuccessful attempts another reconstruction of Omonoia Square is expected to be complete within 2020 and there is great expectation that the square will gain its former glory.

At the same time Omonoia square is full of hotels and there are plans to open even more new hotels in the area making it one of most populated areas with tourists of all ages. The potentials of the area and the low prices of residence have created high expectations for the near future. Many believe that a new golden era for the square is at the gates.

Koukaki & Petralona

The little neighborhood of Koukaki has been enjoying rave reviews since Airbnb included it in its 'Hot Districts' list a couple of years ago, and for good reason. This residential neighborhood, located at the foot of the Acropolis and the Filopappou Hill, is a combination of authenticity, convenience and entertainment. Join us on a walk through the lovely neighborhood of Koukaki, in central Athens. One of Koukaki's highlights is the blend of architectural styles it contains. With its mismatch of neoclassical houses, low-rise buildings dating from the 1930s and post-1970s apartment blocks, Koukaki includes small shops, traditional restaurants, art galleries, museums and colorful bars and cafes.

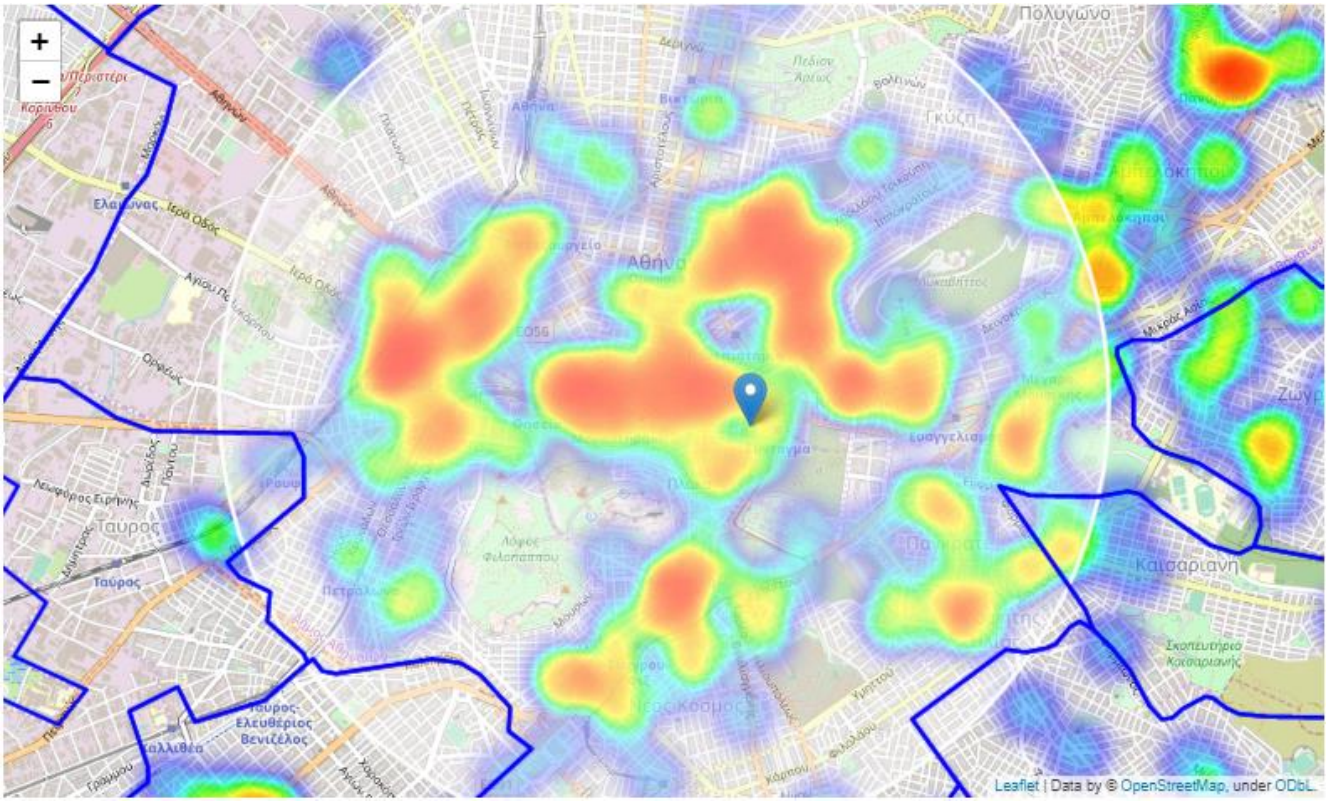
Petralona is the extension of Koukaki neighborhood going north. Close to Thiseio and the Acropolis but a far cry from their tourist traps, Petralona features a mix of old-world charm, creative types and stylish haunts. Regardless of Petralona's bipolar elements and while it is perhaps still in its infancy, it remains a key example of an emerging pack of Athenian neighborhoods offering style and quality.

Neos Kosmos

Located near the center of Athens, Neos Kosmos is an area that gain popularity the last ten years. Its proximity to the center of Athens and areas like Koukaki, Pagrati and Nea Smirni made Neos Kosmos an attractive alternative for residence and nightlife. Many Airbnb's are in this area and many famous Hotels like Intercontinental Athens.

Let's define new, narrower region of interest, which will include low-bar-count parts of Omonoia Square close to Syntagma Square and the otter area we are interested in. We will use a radius of 2.5km.

In Picture 8 we could see the outcome:



Picture 8: Density of bars around area of interest

The created zone covers all the pockets of low bar density in Omonoia, plus low-density areas in Koukaki and Neos Kosmos. We will create a new, denser grid of locations restricted to our new region of interest. For the purpose we will create candidate locations, 100m apart each. Below is the code outcome:

```
2261 candidate neighborhood centers generated.
```

We will proceed by calculating the two important key metrices for each location candidate: number of bars in vicinity (we'll use radius of 250 meters) and distance to closest Wine Bars.

In the following table (Picture 9) is the outcome (some examples):

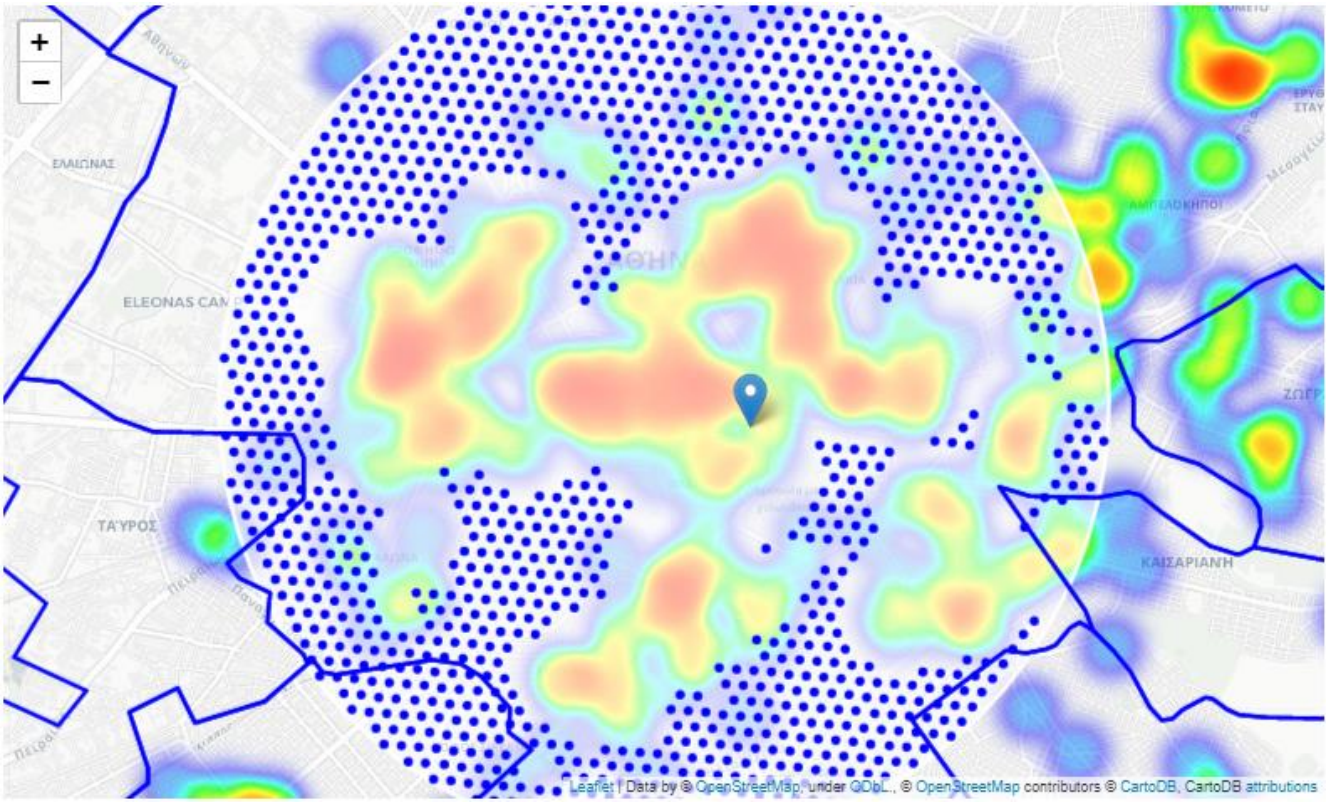
	Latitude	Longitude	X	Y	Bars nearby	Distance to Wine Bar
0	37.954734	23.725261	1.267247e+06	4.236881e+06	0	946.705221
1	37.954650	23.726386	1.267347e+06	4.236881e+06	0	970.728933
2	37.955968	23.719165	1.266697e+06	4.236968e+06	1	920.286442
3	37.955884	23.720290	1.266797e+06	4.236968e+06	0	884.867799
4	37.955800	23.721415	1.266897e+06	4.236968e+06	0	859.683027
5	37.955716	23.722540	1.266997e+06	4.236968e+06	0	845.646968
6	37.955632	23.723665	1.267097e+06	4.236968e+06	0	843.316477
7	37.955548	23.724790	1.267197e+06	4.236968e+06	0	852.787527
8	37.955464	23.725915	1.267297e+06	4.236968e+06	0	873.676400
9	37.955380	23.727041	1.267397e+06	4.236968e+06	0	905.192984

Picture 9: Distance to wine bars

We need to filter the exported locations since we're interested only in locations with no more than two bars in radius of 250 meters, and no Wine Bars in radius of 400 meters. Below is the code outcome:

```
Locations with no more than two bars nearby: 1302
Locations with no Wine Bars within 400m: 1599
Locations with both conditions met: 1193
```

We will move this outcome on a map (Picture 10):

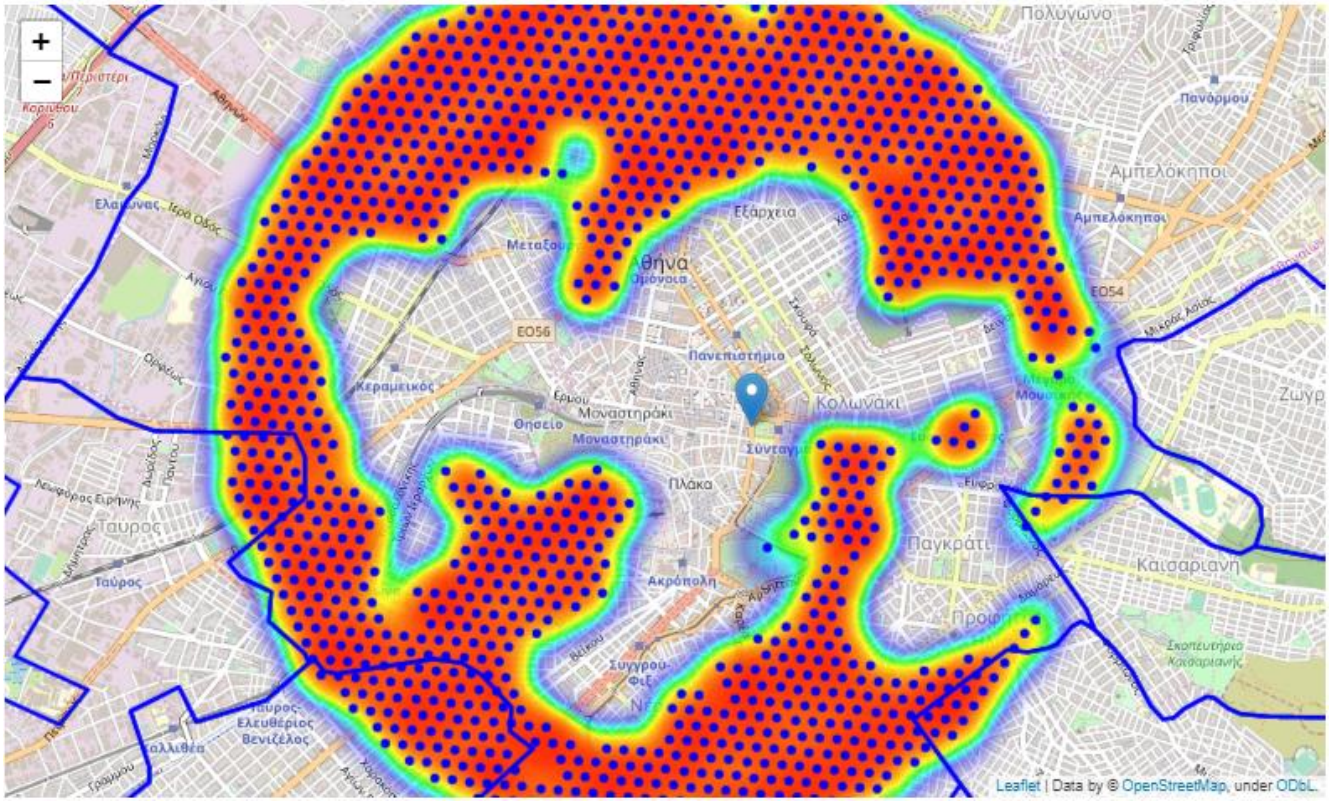


Picture 10: Candidate locations

As shown in the above map all the locations are close to the center of Athens and specifically our initial center point Syntagma Square. These locations are mostly located (as intended) in the north (Omonoia Square) and in the South (Koukaki, Petralona and Neos Kosmos).

Each of the exported locations has no more than two bars in a radius of 250m, and no wine bars closer than 400m to each other. Eventually any of those locations is a potential candidate for a wine bar at least based on nearby competition.

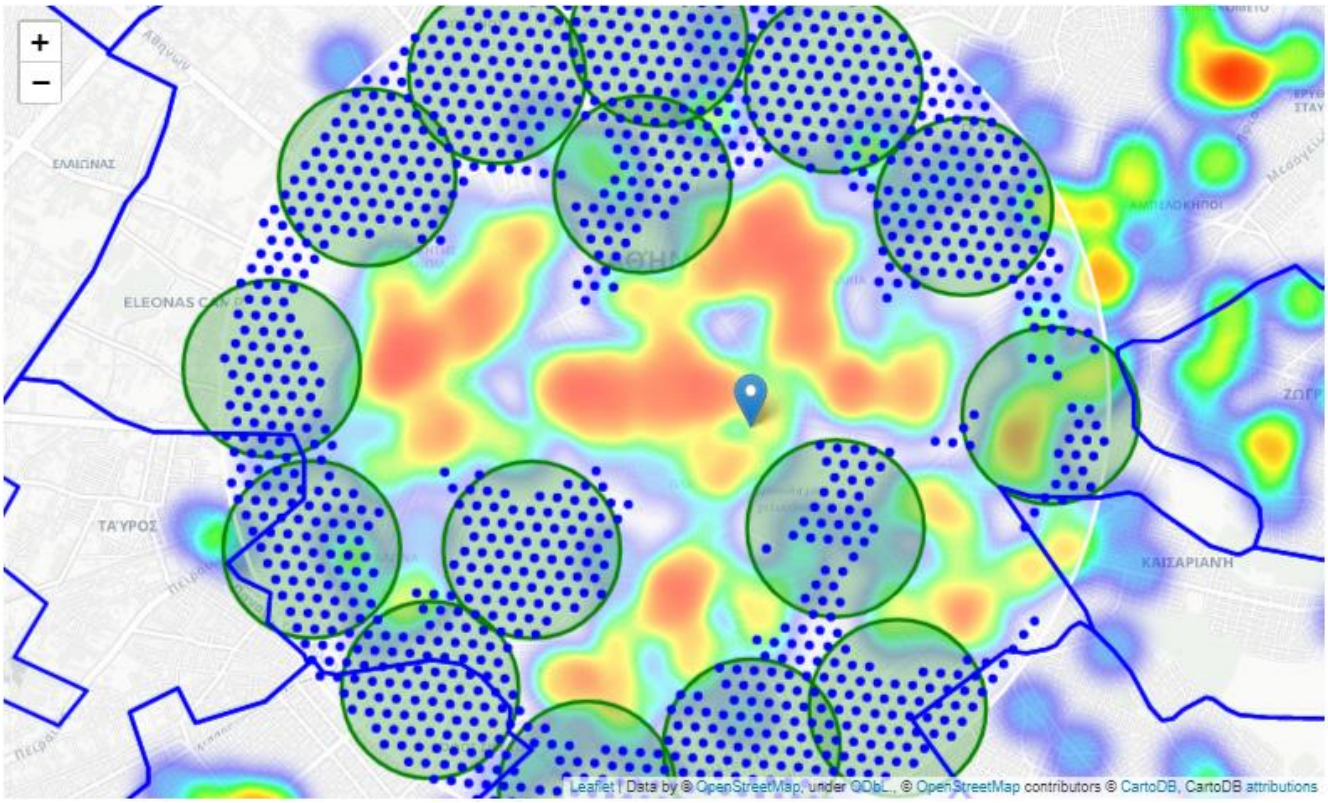
We will present these locations in a form of heatmap (Picture 11):



Picture 11: Candidate locations (Heatmap)

This graphic provides us with a clear indication of zones with low number of bars in vicinity, and *no* wine bars at all nearby. To complete our analysis, we will need to cluster all these locations to create centers of zones containing desired locations. We intend to provide a clear report to the stakeholders with a list of proposed zones, their centers and addresses. We will divide the above by creating 15 clusters. Each cluster zone will have a radius of 500m. This number covers fully the surface of candidate areas without to create too much overlapping.

Picture 12 presents the outcome:

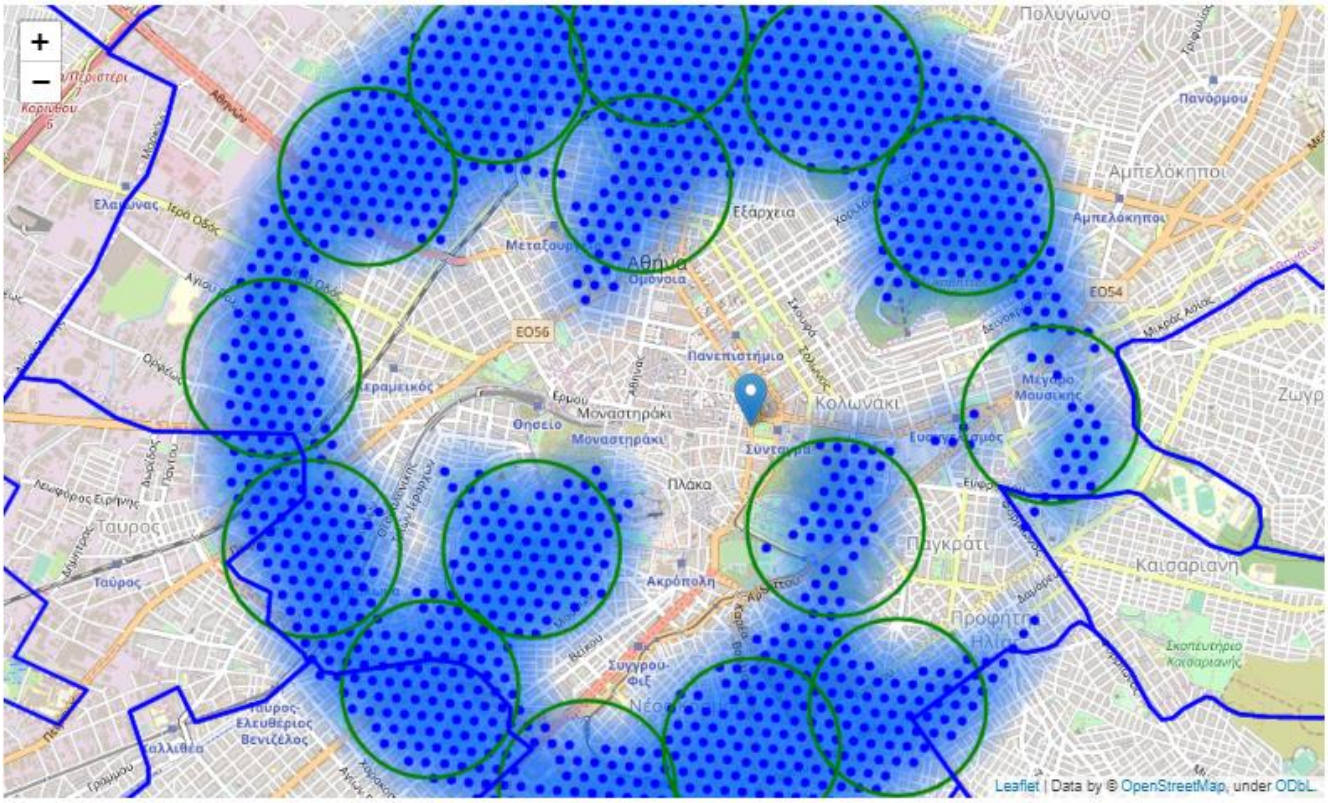


Picture 12: Candidate Clusters

The created clusters (zones) represent groups of addresses having a great number of candidate locations. Each cluster is created having a center point placed in the middle of the zone.

The address of those centers will be a good starting point for exploring the neighborhoods to find the best possible location to open a wine bar based on the metrics we have previously used.

We will now change the city map by removing the heat element and keep only shaded areas to indicate our clusters. Picture 13 presents the outcome:

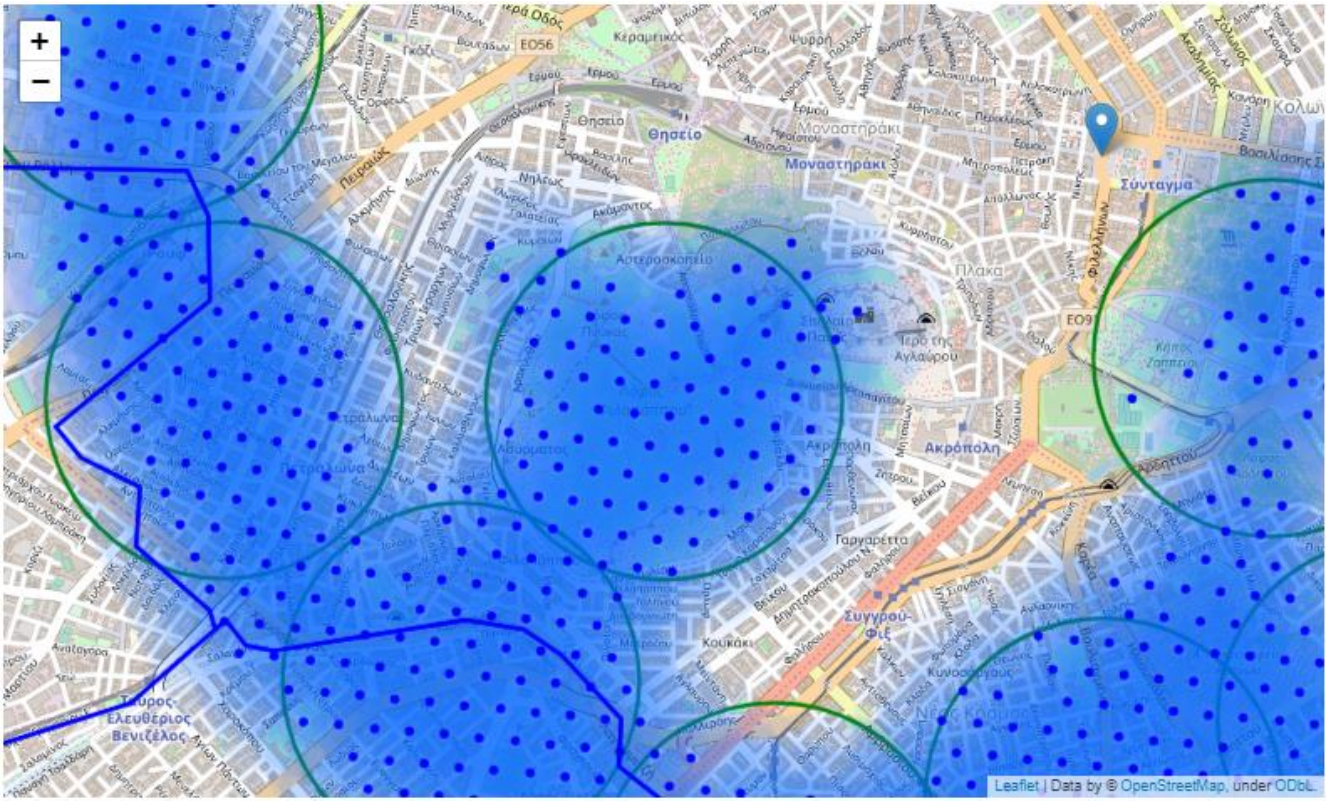


Picture 13: Candidate Clusters

Let's zoom in on candidate areas in Omonoia Square and a bit north (Picture 14):

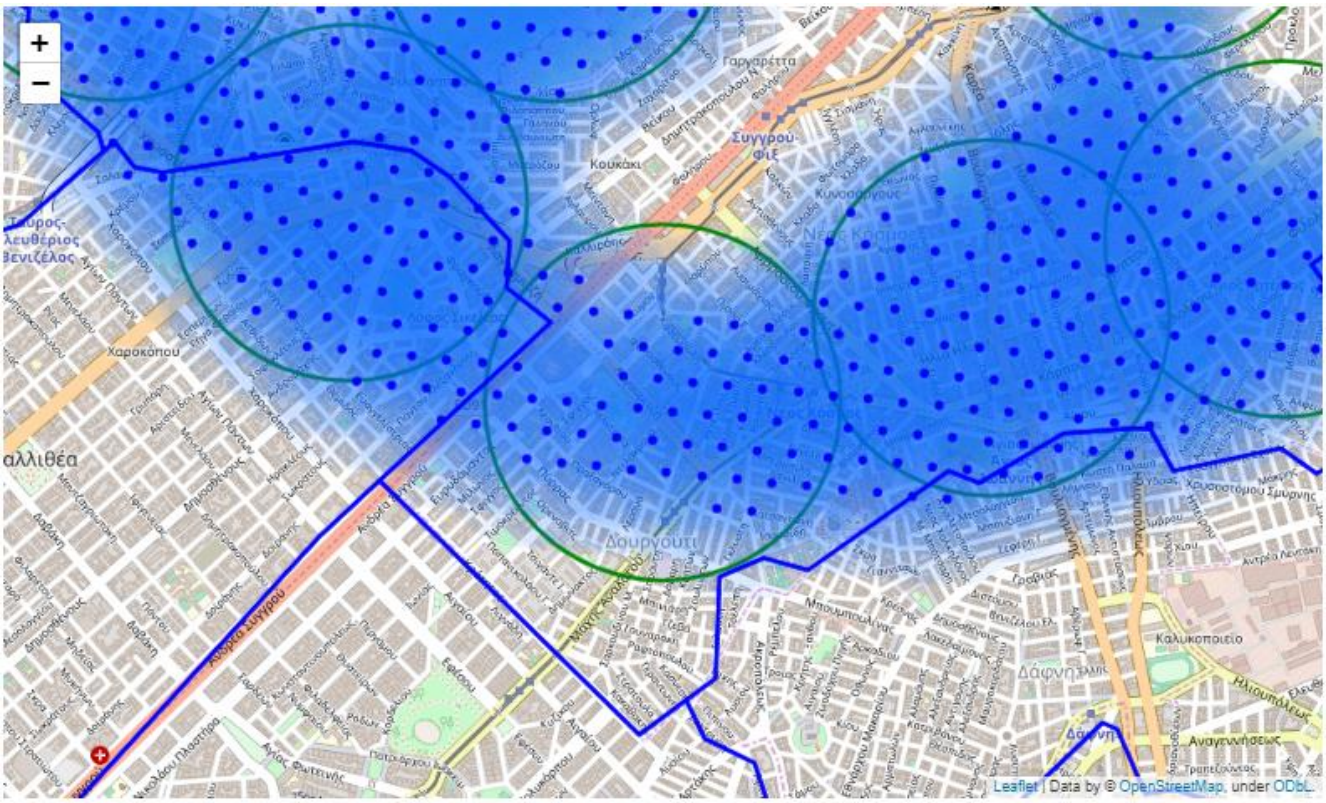
Picture 14: Candidate Clusters around Omonoia

Also zoom in Koukaki and Petralona areas (Picture 15):



Picture 15: Candidate Clusters in Koukaki and Petralona

And finally zoom in Neos Kosmos (Picture 16):



Picture 16: Candidate Clusters in Neos Kosmos

As a last step we will use reverse geocode to get the addresses of those candidate area centers. These addresses are what we are going to present to stakeholders for further analysis and discussion.

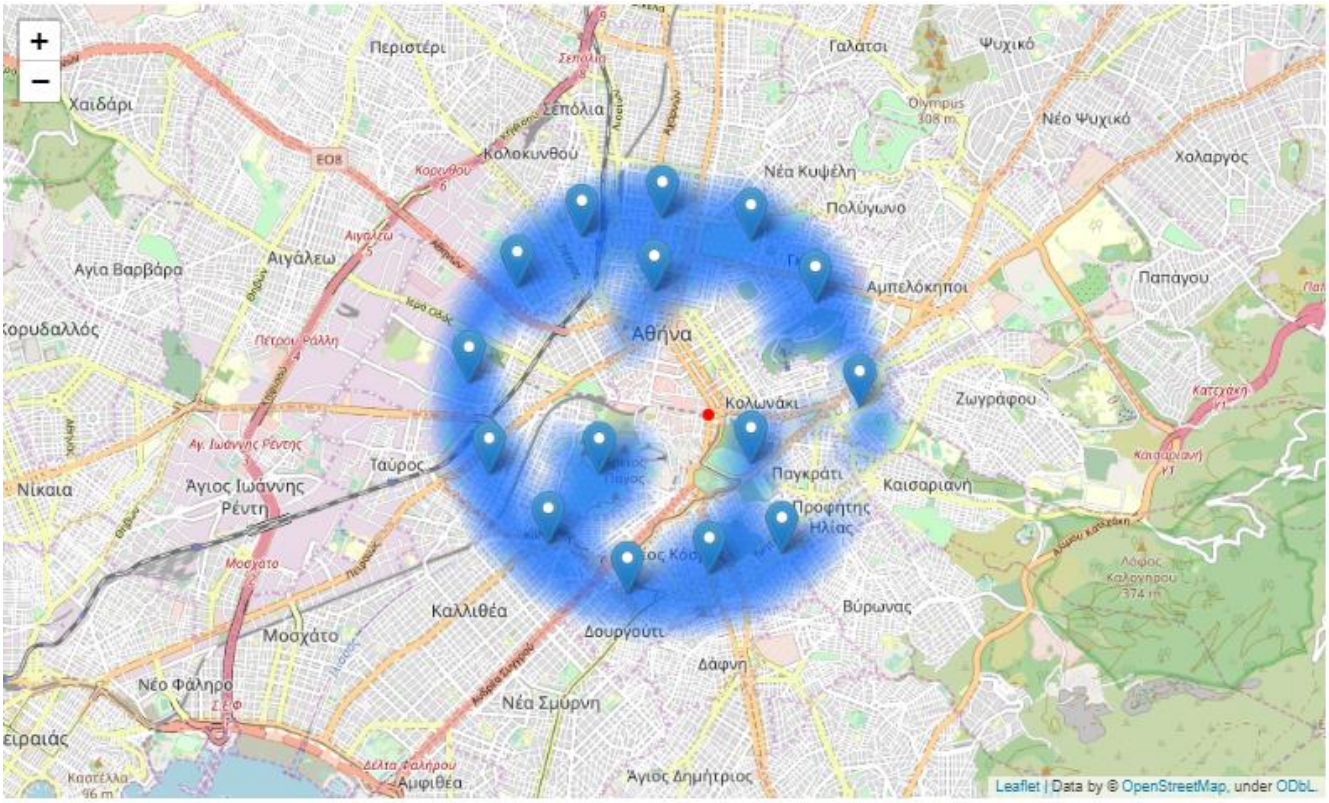
Below the code outcome (Picture 17):

```
============================================================
Addresses of centers of areas recommended for further analysis
============================================================
Derigni 62, Athina 104 34                          => 2.3km from Syntagma Square
Unnamed Road, Athina 117 41                        => 1.4km from Syntagma Square
Argous 125, Athina 104 41                          => 2.6km from Syntagma Square
Irodou Attikou 23, Athina 105 57                   => 0.7km from Syntagma Square
Leof. Vouliagmenis 86, Athina 117 43               => 1.8km from Syntagma Square
Kozanis 34, Athina 118 55                          => 2.7km from Syntagma Square
Maronias 32, Athina 104 44                         => 2.5km from Syntagma Square
Mpousgou 21, Athina 114 73                         => 2.0km from Syntagma Square
Sarantaporou 15, Kallithea 176 71                  => 2.3km from Syntagma Square
Fanarioton 31, Athina 114 71                       => 1.7km from Syntagma Square
Filolaou 188A, Athina 116 32                       => 1.8km from Syntagma Square
Alopis 45, Athina 118 53                           => 2.6km from Syntagma Square
Michalakopoulou 41, Athina 115 28                  => 1.7km from Syntagma Square
Stournari 73, Athina 104 32                        => 1.5km from Syntagma Square
Lagoumitzi 51, Athina 117 45                       => 2.2km from Syntagma Square
```

Picture 17: Candidate Centers

We have finally located and extracted 15 addresses representing the centers of zones containing locations with a low number of bars and no Wine Bars nearby. All zones are close to city center being less than ~2.5km away from Syntagma Square. About half of those are even less than 2km away from Syntagma Square. At this point we need to highlight that although the zones are presented on map having a radius of ~500m (green circles), their actual shape is very irregular and their centers/addresses should be considered only as a starting point for exploring area neighborhoods in search for potential bar locations. Most of the zones are located around Omonoia , Koukaki, Petralona and Neos Kosmos areas, which we have identified as interesting due to being popular with tourists, fairly close to city center and having great prospects for the future. Nevertheless, some additional areas located east, and west could be also presented for discussion to the stakeholders although less attractive.

In Picture 18 we have placed these addresses on the map.



Picture 18: Candidate Addresses

Results and Discussion

Our analysis shows that although there is a great number of bars in Athens (794 in our initial area of interest which was covering an area of ~113km2km2 centered around Syntagma Square), there are pockets of low bar density close to city center.

Highest concentration of bars was detected east of Syntagma Square in the closest ring zone we have created, so we focused our attention to areas south, south-east, corresponding to boroughs Petralona, Koukaki and Petralona and north in the surrounding area of Omonoia Square. Other boroughs were identified as potentially interesting, but our attention was focused on areas offering a combination of popularity among tourists, closeness to city center, strong future dynamics *and* several pockets of low bar density.

After directing our attention to this more narrow area of interest we first created a dense grid of location candidates (spaced 100m apart); those locations were then filtered in order to exclude areas with more than two bars in radius of 250m and a wine bar closer than 400m.

The remaining locations were then clustered to create zones of interest which contain the greatest number of location candidates possible. Addresses of centers of those zones were also generated using reverse geocoding to be used as markers/starting points for more detailed local analysis based on other factors. We have chosen the analysis to end up in 15 clusters since this was the optimal number that covered the whole prospect areas. Eventually we have created 15 zones containing the largest number of potential new wine bar locations based on number of and distance to existing venues - both bars in general and wine bars particularly.

We need to stress on the fact that our analysis has some limitations. For example, it does not guarantee that the final proposed zones are optimal locations for a new wine bar! The purpose of the current analysis is to reveal areas close to Athens center but not crowded with existing bars (particularly Wine Bars). It is possible that factors not explored and covered by the current analysis create circumstances and reasons that justify the small number of bars in any of those areas. These reasons could make the

proposed areas unsuitable for a new wine bar regardless of lack of competition in the area.

Recommended zones should therefore be considered only as a starting point for a more detailed analysis which could eventually result in proposed locations which have additional features apart from low bar competition.

Conclusion

Purpose of this project was to identify Athens' areas closer to the center with low number of bars (particularly Wine Bars) in order to aid stakeholders in narrowing down the search for optimal location for a new Wine Bar. By calculating bar density distribution from Foursquare data, we have first identified general boroughs that justify further analysis (Omonoia, Koukaki, Petralona, Neos Kosmos), and then generated extensive collection of locations which satisfy some basic requirements regarding existing nearby bars. Clustering of those locations was then performed in order to create major zones of interest (containing greatest number of potential locations) and addresses of those zone centers were created to be used as starting points for final exploration by stakeholders.

Final decision on optimal wine bar location will be made by stakeholders based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location (proximity to park or water), levels of noise / proximity to major roads, proximity to public transport, real estate availability, prices, social and economic dynamics of every neighborhood etc.