The battle of the neighborhoods

Finding the best location
to open a restaurant in Athens, Greece

IBM Coursera Data Science Capstone

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Chapter 1

Introduction

Athens is the capital and largest city in Greece. It is widely referred to as the cradle of Western civilization and the birthplace of democracy, largely because of its cultural and political impact on the European continents. In modern times, Athens is a large cosmopolitan metropolis and central to economic, financial, industrial, maritime, political and cultural life in Greece. Athens is a global city and one of the biggest economic centers in southeastern Europe.
The Municipality of Athens (also City of Athens), which actually constitutes a small administrative unit of the entire city, had a population of 664,046 (in 2011) within its official limits, and a land area of 38.96 km^2 . The Athens Urban Area (Greater Athens and Greater Piraeus) extends beyond its administrative municipal city limits, with a population of 3,090,508 (in 2011) over an area of 412 km^2 .According to Eurostat in 2011, the functional urban area (FUA) of Athens was the 9th most populous FUA in the European Union (the 6th most populous capital city of the EU), with a population of 3.8 million people. Athens is also the southernmost capital on the European mainland and the warmest major city in Europe.
Athens has a lot of business opportunities and business friendly environment. This means that the market is highly competitive and therefore any business venture in the country needs to be reviewed carefully and strategically in order to make the business as profitable as possible.

Chapter 2

Business Problem

The restaurant "ABC" is interested in opening a new restaurant in Athens. Considering that the choice of location (i.e. neighborhood) is very important, the owner of the restaurant has addressed our data science team.
The main objective is to locate and recommend to the management which neighborhood could be the best choice to start off the particular business. The management also expects to figure out the rationale of these recommendations.

Chapter 3

Data

The data used for the purpose of the project comes from the following locations:

- Foursquare: It is a local search-and-discovery service which provides information on different types of entertainment, drinking and dining venues. Foursquare has an API that can be used to query their database and find information related to the venues, such as location, category, reviews and tips.
- Athens neighborhood names available on https://www.google.com/maps
- Athens geographic coordinates available on https://www.gps-coordinates.net

Chapter 4

Methodology

1. We have collected the data from the above sources.
2. We get the latitude and longitude values of Athens.
The geographical coordinates of Athens are 37.9839412, 23.7283052.
3. We find all venues for each neighborhood using Foursquare API.

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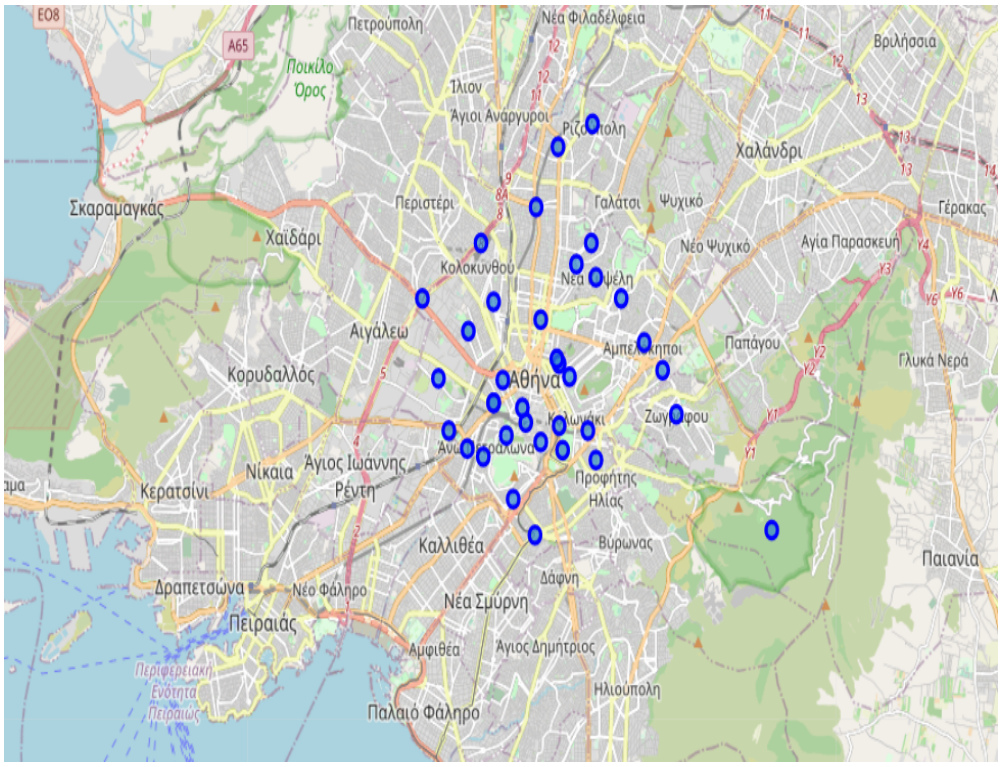
	Neighborhood	Latitude	Longitude
0	Akademia Platonos	37.991368	23.708381
1	Ampelokipoi	37.989403	23.761144
2	Ano Kypseli	38.005780	23.745380
3	Ano Petralona	37.970467	23.712938
4	Exarcheia	37.985992	23.735541
5	Gazi	37.974813	23.702751
6	Goudi	37.984773	23.766414
7	Gyzi	37.979450	23.716220
8	Historic Triangle	37.979450	23.716220
9	Ilissia	37.974863	23.744353

4. Then we create a map of Athens using latitude and longitude values .



5. By using a custom function, calling the 'explore' endpoint, we create a dataset with the top 100 venues within 500 radius of the center of each neighborhood. .

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Akademia Platonos	37.991368	23.708381	Τα Σκαλάκια	37.989256	23.709045	Greek Restaurant
1	Akademia Platonos	37.991368	23.708381	Αρχαιολογικό Πάρκο Ακαδημίας Πλάτωνος	37.992353	23.708943	Park
2	Akademia Platonos	37.991368	23.708381	Το Καφενείο Στην Ακαδημία Πλάτωνος	37.993886	23.707794	Kafenio
3	Akademia Platonos	37.991368	23.708381	ΔΙΟΤΙΜΑ Γλυκίσματα	37.989742	23.712603	Dessert Shop
4	Akademia Platonos	37.991368	23.708381	Γρηγόρης	37.987474	23.707624	Snack Place

6. Then we count how many venues were returned for each neighborhood. .

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Akademia Platonos	20	20	20	20	20	20
Ampelokipoi	74	74	74	74	74	74
Ano Kypseli	16	16	16	16	16	16
Ano Petralona	31	31	31	31	31	31
Exarcheia	63	63	63	63	63	63
Gazi	24	24	24	24	24	24
Goudi	93	93	93	93	93	93
Gyzi	87	87	87	87	87	87
Historic Triangle	87	87	87	87	87	87
Ilissia	65	65	65	65	65	65
Kaissariani	3	3	3	3	3	3
Kato Patissia	39	39	39	39	39	39
Kato Petralona	41	41	41	41	41	41
Kolokynthou	8	8	8	8	8	8
Kolonaki	53	53	53	53	53	53
Kolonos-Liossion-Lenorman	24	24	24	24	24	24
Koukaki	61	61	61	61	61	61

7. We check the unique categories. In our cases are 206 unique categories.

8. We analyze each neighborhood and find the top 5 most common venues. For instance, we take the below table for 'Ampelokipoi' area. .

----Ampelokipoi----

	venue	freq
0	Café	0.14
1	Coffee Shop	0.09
2	Bakery	0.07
3	Dance Studio	0.05
4	Greek Restaurant	0.05

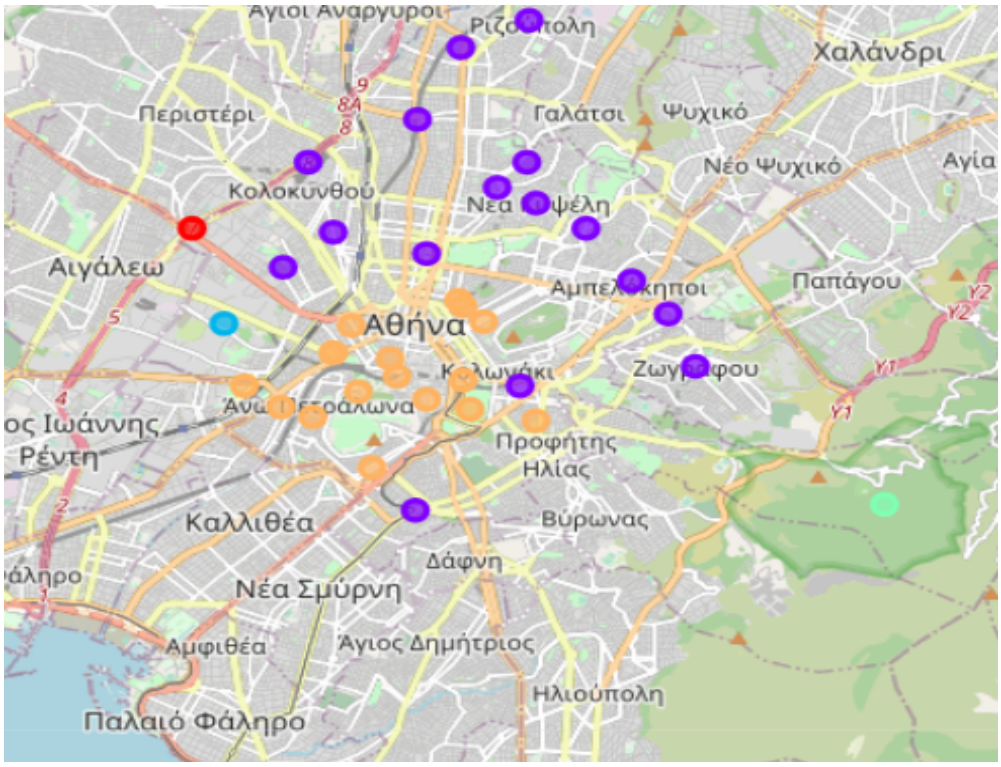
9.We create a new dataframe which displays the top 10 venues for each neighborhood. vspace5mm .

	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	Akademia Platonos	Coffee Shop	Snack Place	Greek Restaurant	Supermarket	Bus Stop	Fast Food Restaurant	Kafenio	Toy / Game Store	Café	Hardware Store
1	Ampelokipoi	Café	Coffee Shop	Bakery	Dance Studio	Greek Restaurant	Mobile Phone Shop	Supermarket	Movie Theater	Gym	Snack Place
2	Ano Kypseli	Supermarket	Bar	Fast Food Restaurant	Mobile Phone Shop	Souvlaki Shop	Mountain	Greek Restaurant	Snack Place	Bakery	Soccer Field
3	Ano Petralona	Café	Bar	Cocktail Bar	Kafenio	Meze Restaurant	Coffee Shop	Cupcake Shop	Supermarket	Pub	Cretan Restaurant
4	Exarcheia	Bar	Dessert Shop	Café	Coffee Shop	Theater	Greek Restaurant	Bookstore	Magirio	Vegetarian / Vegan Restaurant	Hotel

10. We run k-means method to cluster the neighborhood into 5 clusters. The general merged table is the below: .

	Neighborhood	Latitude	Longitude	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	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Akademia Platonos	37.991368	23.708381	1	Coffee Shop	Snack Place	Greek Restaurant	Supermarket	Bus Stop	Fast Food Restaurant	Kafenio	Toy / Game Store	Café	Hardware Store
1	Ampelokipoi	37.989403	23.761144	1	Café	Coffee Shop	Bakery	Dance Studio	Greek Restaurant	Mobile Phone Shop	Supermarket	Movie Theater	Gym	Snack Place
2	Ano Kypseli	38.005780	23.745380	1	Supermarket	Bar	Fast Food Restaurant	Mobile Phone Shop	Souvlaki Shop	Mountain	Greek Restaurant	Snack Place	Bakery	Soccer Field
3	Ano Petralona	37.970467	23.712938	4	Café	Bar	Cocktail Bar	Kafenio	Meze Restaurant	Coffee Shop	Cupcake Shop	Supermarket	Pub	Cretan Restaurant
4	Exarcheia	37.985992	23.735541	4	Bar	Dessert Shop	Café	Coffee Shop	Theater	Greek Restaurant	Bookstore	Magirio	Vegetarian / Vegan Restaurant	Hotel

11.We visualize the results and create a map .



12. Lastly, we examine the 5 clusters

Chapter 5

Discussion

After analyzing the data and the various clusters produced by the machine learning algorithm, the ideal solution is the cluster with the number 2. We observe that people prefer these neighborhoods for entertainment and we suggest opening the specific restaurant there in order to make the business profitable.

Chapter 6

Conclusion

We were able to determine a good set of ten options in order to suggest opening a new restaurant, considering the variables described in the previous sections. For upcoming projects with similar characteristics, we could examine other characteristics such as the population and the income and also other clustering algorithms.