

## Capstone Project – The Battle of Neighbourhoods

### Introduction and Business Problem

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A customer, George, has visited our headquarters with his business aspiration to open a Pizza Place in the geographical area of Athens, Greece. Athens is the capital of Greece with a population of around 5 million permanent citizens and a total of 47 municipalities. However George does not have any data of which is the most suitable municipality to open his business. Therefore, the customer asked us for our expertise in order to provide him with the best possible recommendation.

#### Scope

The scope of the problem is to propose to George the best municipality fit in the area of Athens in order to open his Pizza Place. In order to achieve this our company has to analyse data from the area of Athens using the Foursquare API and provide the best possible recommendation. As the customer defined in his business plan the most desirable customers in his Pizza Place will be students from Schools and Universities and office workers which either for lunch or for dinner after work will choose his restaurant.

#### Proposed Solution

The proposed solution is to create a scoring system for all the different municipalities of Athens based on how many schools, universities and offices this have. Furthermore, as our customer wants to choose a municipality with the lowest risk we will need to analyse also the potential competition. The scoring system it will be used it is shown on the below table:

Type of Venue	Score
Existing Pizza Place	-1
School	0.5
University	1
Office	2

In order to find the above data the Foursquare API will be used.

Furthermore, Wikipedia will be used to extract the municipalities of Athens from the following link: [Athens Prefecture](#)

The municipality with the highest score will be the one with the most possibilities of success for our customer.

#### Data

The methodology of the solution is the following:

- Extract all the different municipalities of Athens and find their geographic information (latitude and longitude).
- Using Foursquare API the total amount of Pizza Places and their location will be extracted. For Pizza places the Foursquare Category ID is: 4bf58dd8d48988d1ca941735

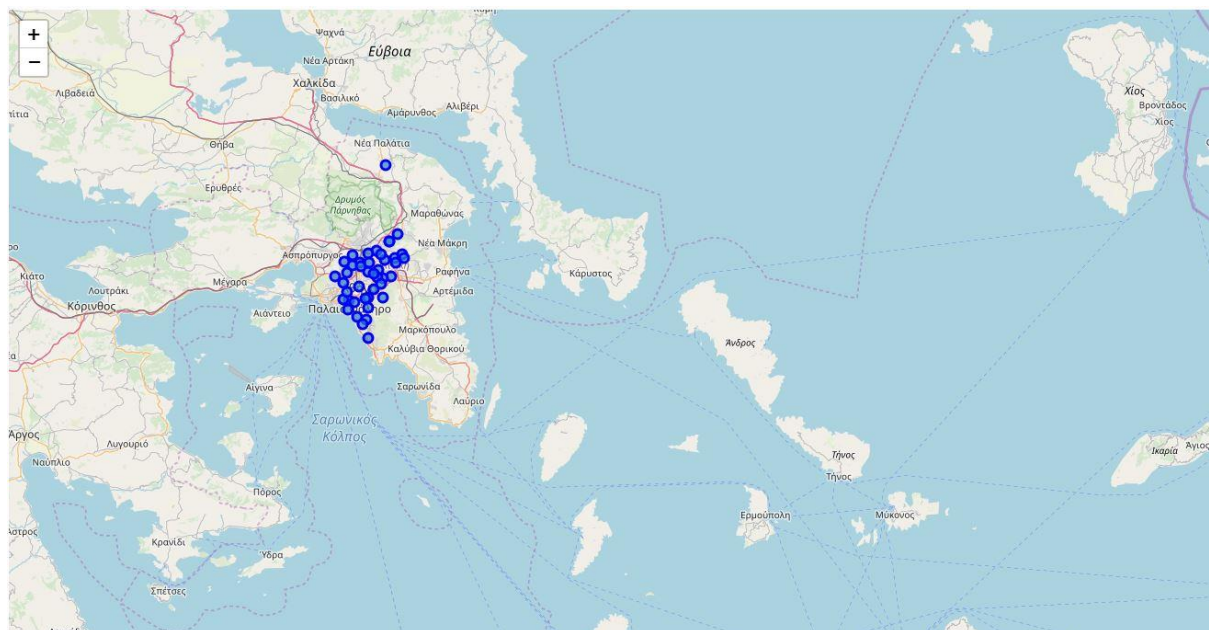
- Using Foursquare API collect the total number of schools and their locations. For schools the Foursquare Category ID is: 4bf58dd8d48988d13b941735
- Using Foursquare API collect the total number of Universities or Colleges and their locations. For universities and colleges the Foursquare Category ID is: 4d4b7105d754a06372d81259
- Using Foursquare API collect the total amount of offices and their locations. For offices the Foursquare Category ID is: 4bf58dd8d48988d124941735

Based on the scoring rules and the data collected from Foursquare API the final score of each municipality will be calculated. The one with the highest score will be proposed to the customer.

## Methodology

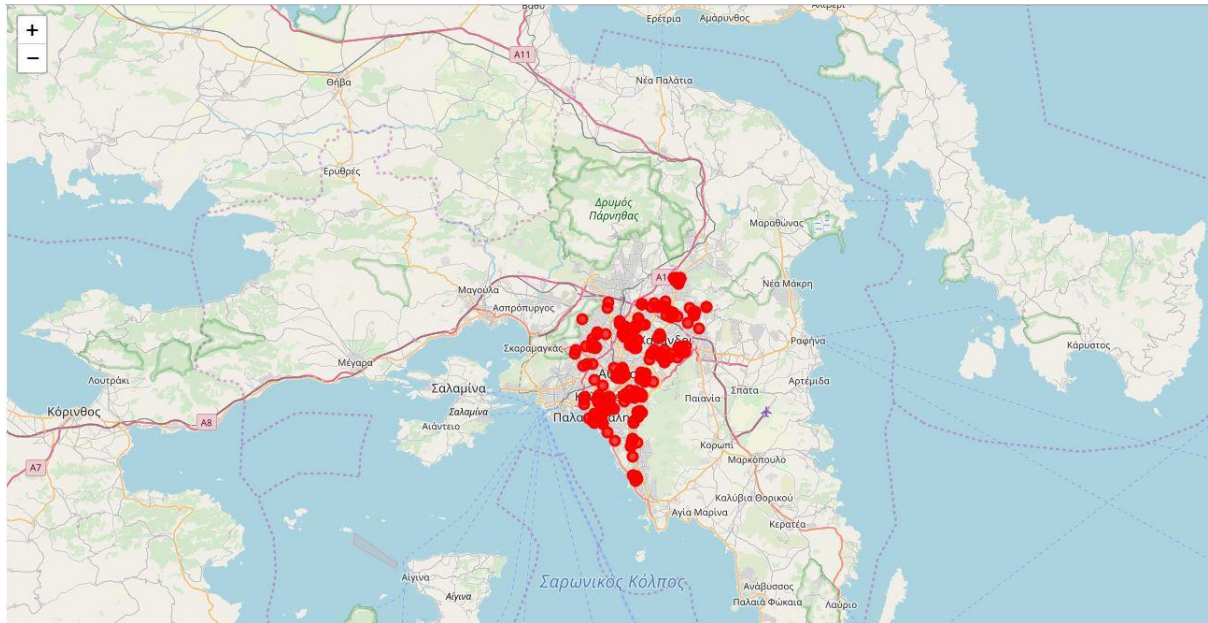
The first thing before starting using the Foursquare API is to organise the municipalities of Athens and retrieve their coordinates. Athens has a total of 47 municipalities. Once these are organised in a table a map can be created in order to give a better understanding to the customer.

(the table is not added in this report due to its size. For information about the municipalities of Athens can be retrieved from the following link from Wikipedia: : [Athens Prefecture](#))



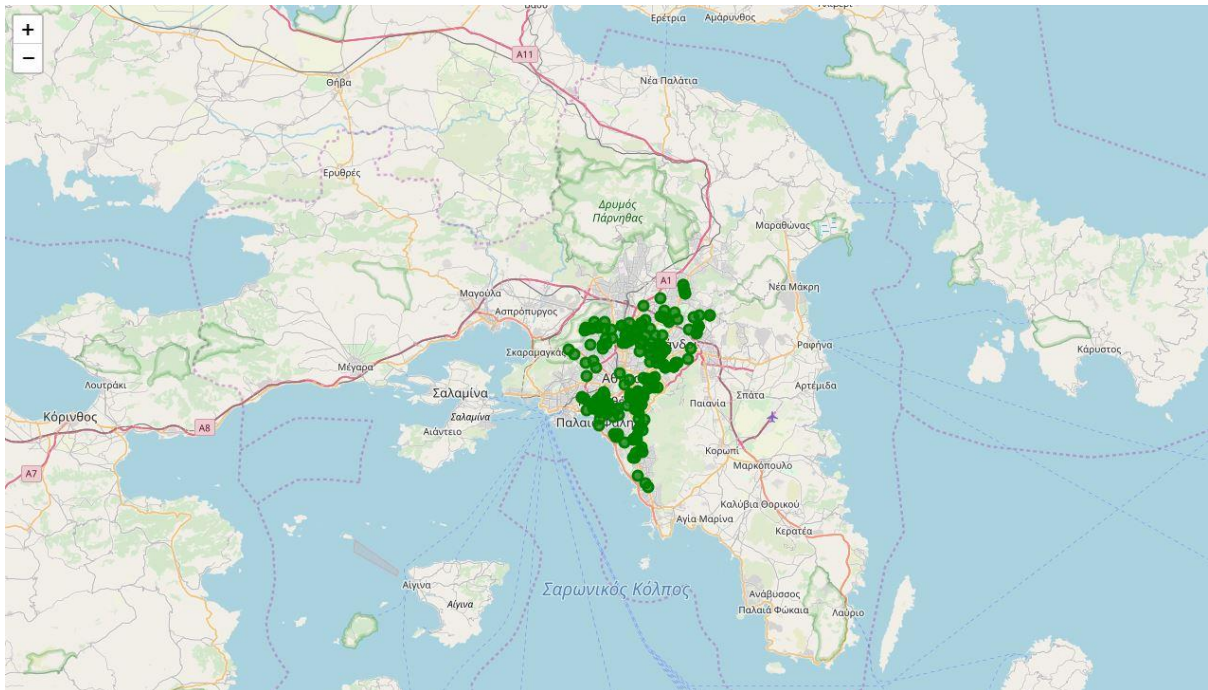
Knowing the coordinates of the centres of each municipality we can move on analysing via Foursquare the required data. Firstly we need to retrieve the data of how many Pizza places exist in each municipality. A sample of the retrieved table and their relevant position in the map can be seen below.

	Municipality	Municipality Latitude	Municipality Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Agia Paraskevi	38.006676	23.822694	King's Palace Pizza	38.006274	23.820784	Pizza Place
1	Agia Paraskevi	38.006676	23.822694	ΠΑΠΠΑΣ_Pizza Restaurant Cafe	38.012684	23.820571	Pizza Place
2	Agia Paraskevi	38.006676	23.822694	Solo Italiano	38.013209	23.821914	Italian Restaurant
3	Agia Paraskevi	38.006676	23.822694	Pizza Fan	38.012428	23.816986	Pizza Place
4	Agia Paraskevi	38.006676	23.822694	Domino's Pizza	38.012424	23.816482	Pizza Place



A total of 232 places have been identified from Foursquare API in all municipalities of Athens. The next step is to identify the high schools of Athens. A sample of the retrieved table and their relevant position in the map can be seen below. The total number of high schools in Athens is 231.

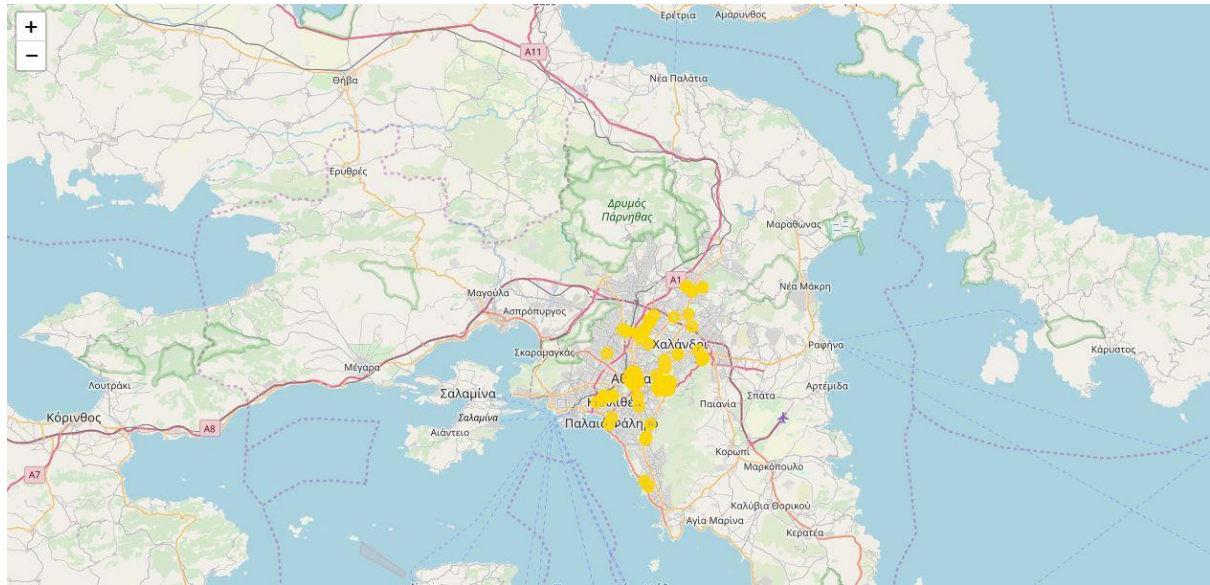
	Municipality	Municipality Latitude	Municipality Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Agia Paraskevi	38.006676	23.822694	1ο Λύκειο Αγίας Παρασκευής	38.003672	23.824362	High School
1	Agia Paraskevi	38.006676	23.822694	2ο Γενικό Λύκειο Αγ.Παρασκευής	38.015196	23.827691	High School
2	Agioi Anargyroi	38.040024	23.729675	Πειραματικό Λύκειο Αγίων Αναργύρων	38.041582	23.727904	High School
3	Agioi Anargyroi	38.040024	23.729675	2ο Λύκειο Νέας Φιλαδέλφειας	38.044414	23.738282	High School
4	Agioi Anargyroi	38.040024	23.729675	1ο Λύκειο Νέας Φιλαδέλφειας	38.036671	23.737306	High School





As University students are a target audience of our customer similar procedure is followed for them in order to retrieve the required information. The total number of Universities and Colleges in Athens is 106 and their data can be seen below.

	Municipality	Municipality Latitude	Municipality Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Agia Paraskevi	38.006676	23.822694	Thesis Γιάννου	38.013151	23.823419	University
1	Agia Paraskevi	38.006676	23.822694	DEREE - The American College of Greece	38.004380	23.832586	University
2	Agia Paraskevi	38.006676	23.822694	Pierce College Infirmary	38.002606	23.829795	University
3	Agioi Anargyroi	38.040024	23.729675	ΤΕΙ Προσχολικής Αγωγής	38.035264	23.721923	University
4	Agioi Anargyroi	38.040024	23.729675	Χαλκηδονιο Ωδείο	38.032433	23.737056	University



Finally the same approach is followed in order to retrieve the same data for the office locations. Foursquare returned a total number of 1981 offices in Athens which makes their representation in the map difficult. However, you can see below a sample of their table.

	Municipality	Municipality Latitude	Municipality Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Agia Varvara	38.267466	23.808256	Άγια Βαρβάρα	38.263999	23.797480	Church
1	Agia Paraskevi	38.006676	23.822694	Λουλουδοτοπος	38.007153	23.823200	Elementary School
2	Agia Paraskevi	38.006676	23.822694	ΕΚΕΦΕ Δημόκριτος	37.999226	23.819748	Office
3	Agia Paraskevi	38.006676	23.822694	Δημόκριτος - Εθνικό Κέντρο Έρευνας Φυσικών Επι...	37.999078	23.819168	Government Building
4	Agia Paraskevi	38.006676	23.822694	Χαρά Παρασκευοπούλου-Οδοντιατρείο	38.004814	23.822758	Medical Center

All the tables that have retrieved has to be organised in one single table which will make the data more easy understandable. A sample of the table can be seen in the below table.

	Municipality	Latitude	Longitude	Pizza Places	High Schools	Universities	Offices
0	Agia Varvara	38.267466	23.808256	0.0	0.0	0.0	1.0
1	Agia Paraskevi	38.006676	23.822694	11.0	2.0	3.0	49.0
2	Agioi Anargyroi	38.040024	23.729675	7.0	4.0	2.0	49.0
3	Aigaleo	37.992796	23.681590	3.0	4.0	0.0	49.0
4	Alimos	37.910937	23.721497	2.0	6.0	0.0	48.0
5	Marousi	38.045574	23.805270	8.0	3.0	2.0	50.0
6	Argyroupoli	37.905995	23.750387	6.0	8.0	2.0	48.0
7	Athens	37.984149	23.727984	14.0	3.0	34.0	50.0
8	Chaidari	38.007066	23.656315	2.0	2.0	0.0	46.0
9	Cholargos	38.001805	23.798258	8.0	6.0	1.0	50.0
10	Ekali	38.106839	23.842594	0.0	0.0	0.0	26.0
11	Elliniko	37.893805	23.739850	2.0	3.0	0.0	49.0
12	Filothai	38.022135	23.784871	4.0	16.0	0.0	50.0
13	Galatsi	38.017772	23.754216	9.0	3.0	1.0	50.0
14	Glyfada	37.861597	23.754590	7.0	3.0	2.0	50.0
15	Ilio, Greece	38.031966	23.707879	3.0	5.0	1.0	46.0
16	Ilioupoli	37.932515	23.755589	9.0	6.0	1.0	49.0
17	Kaisariani	37.958186	23.799005	0.0	0.0	0.0	3.0
18	Kallithea	37.950573	23.696677	7.0	15.0	0.0	50.0
19	Kamatero	38.055887	23.707659	2.0	1.0	0.0	45.0
20	Kifisia	38.088161	23.818290	8.0	3.0	5.0	49.0
21	Lykovrysi	38.068149	23.780302	3.0	1.0	0.0	47.0
22	Malakasa	38.040186	23.825765	6.0	6.0	0.0	49.0

Based on this table and the table of our scores we have to calculate the final score of each municipality. From this table we will be able to define which one is the best option for the customer to open his business but also to provide him with the best alternatives. A sample of the table can be seen below.

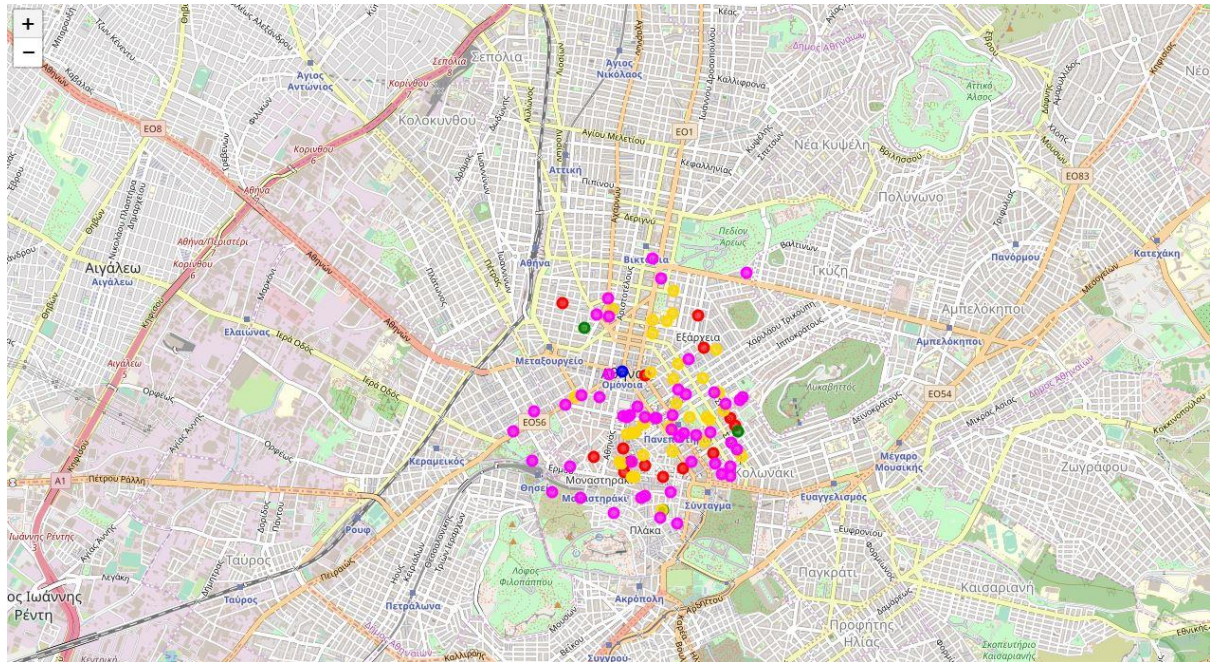
	Municipality	Score
7	Athens	121.5
42	Zografou	117.0
37	Psychiko	105.5
24	Moschato	104.5
12	Filothai	104.0
38	Tavros	103.0
25	Nea Chalkidona	101.0
18	Kallithea	100.5
39	Vrilissia	100.0



## Results

Following the above mentioned methodology we were able to calculate the scores of each municipality of Athens based on their attractiveness for opening Pizza restaurants. Based on the results the best place to open a Pizza place is Athens which is the actual city centre following the municipality of Zografou and Psychiko.

The map below shows all points of interest (existing pizza places, high schools, universities and offices) in the municipality of Athens . Based on this map, the customer can define in which street of Athens he might have the best return on his investment taking the minimum risk.



## Conclusion and Further Research

To conclude the best municipality for our customer to open a Pizza Place is the municipality of Athens. This analysis showed that this area gives the better chances for success in the customer's investment.

Further research can be done in defining the actual distance between the relevant points of interest so they can give to the customer a more precise result. Furthermore, the same code with minimum alterations can be used for researches for different cities and/or different points of interest.