

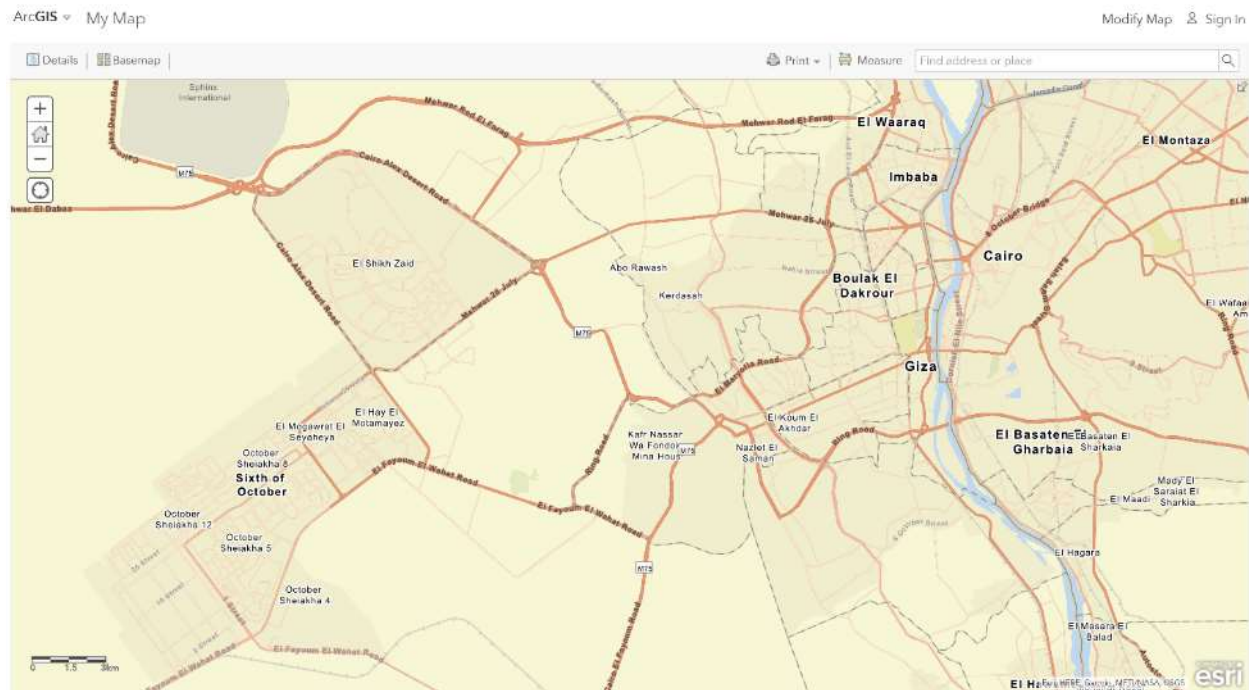


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1. Introduction

The aim of this project is to utilize the use of Data Science & Location Data to select the optimum location for establishing Sports Mall in Giza Governorate, Egypt to serve the existing sporting facilities in the selected governorate.



2. Intended Audience

The intended audience are as follows;

- 1- Investors
- 2- Municipalities
- 3- Real Estate Developers

3. Business Understanding

The target is to select the best location for opening a Sports Mall.

4. Data Requirements

The required data to fulfil the above business requirements are as follows;

1. Municipal divisions of Giza Governorate
2. Longitude & Latitude coordinates for Municipal Divisions
3. Characteristics of each municipal division for existing venues and its categories

5. Data Collection

The data sources which will be used to fulfil the above requirements are as follows;

1. Municipal divisions of Giza Governorate https://en.wikipedia.org/wiki/Giza_Governorate , the image below shows brief about the governorate and Municipal Divisions data that will be used.

Municipal divisions (en)

The governorate is divided into **municipal divisions**, with a total estimated population as of July 2017 of 6,900,000. In the case of Giza governorate, there are a number of **agoras** and **markaz**, with fully urban and rural parts. Sometimes a markaz and a town share a name.

Anglicized name	Native name	Arabic transliteration	Population July 2017 (est.)	Type
El-Dokki	الدقي	Al-Dokki	71,781	Urban (fully urban)
Pyramids	الهرم	Al-Haram	887,478	Urban (fully urban)
Agiza	العجزة	Al-Ajiza	278,600	Urban (fully urban)
El Ayni	عين شمس	Al-Ayni	894,548	Markaz

Giza Governorate in the area of Egypt
Coordinates: 30°0′N 30°0′E﻿•﻿30°0′N 30°0′E

Country: Egypt

State: Giza Governorate

Government ◂ Governor: Ahmed Nashed Moustafa Adel

Area ◂ Total: 81,333 km² (31,403 sq mi)

Population (January 2018)
◂ Total: 6,900,000

Time zone: UTC+2 (EET)

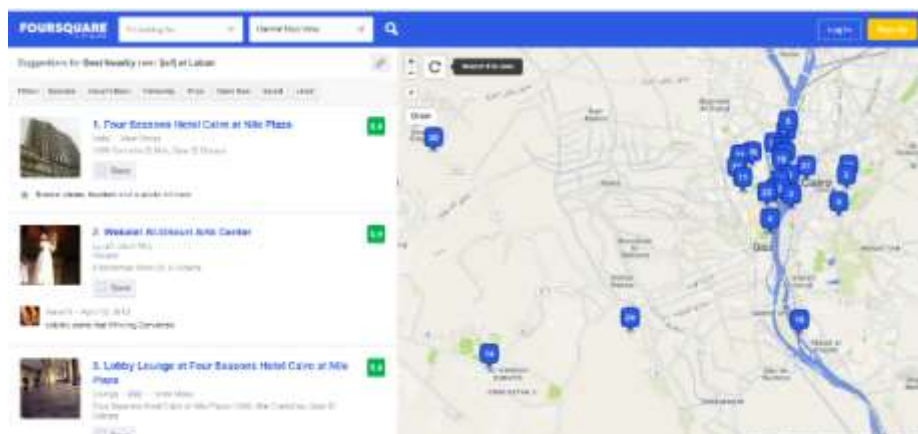
ISO 3166-2: EG-16

Website: <http://www.giza.gov.eg/>

2. Geocoding Services of ArcGIS <https://geocode.arcgis.com/arcgis/> for getting the longitude & latitude coordinates for Municipal Divisions



3. FourSquare API to get the existing venues and its categories that will be used for classifying and clustering the different Municipal Divisions <https://foursquare.com/explore?mode=url&ne=30.111276%2C31.307774&sw=29.927267%2C31.020069>



The following section illustrates the methodology used to achieve the business requirements. The main factors that will be used for selection of the best location are:

- 1- Density of venues in the cluster, higher density means high potential
- 2- Density of Sports Facilities in each cluster, higher density means high potential
- 3- The existence of Sports Mall in cluster, lower density means high potential

This includes scraping the wiki page to get the municipal divisions, selecting subset from the data that represents the urban areas only. The below steps shows action taken for data preparation.

[illegible]

	Neighborhood	Ar/Name	Ar/Name	Population	Category
0	Beitah	بيت الحارث	Al-Baytah	71,781	Major City center
1	Panama	البنك	Al-Banaka	681,075	Major City center
2	Aqaba	عقبة	Al-Aqaba	275,403	Major City center
3	Gaza	غزة	Al-Ghaza	206,693	Major City center
4	Al-Bayraqat	بيت البراق	Al-Bayraqat	587,271	Major City center
5	Sheikh Zayed City	مدينة زايد	Sheikh Zayed City	36,907	Major City center
6	Bilad	بلد	Bilad / Bilad	962,201	Major City center
7	Irbid	إربد	Irbid	636,880	Major City center
8	City of October City (C)	مدينة أكتوبر	Madinet Nasr / October 2	1,073,019	Major City center
9	Shubra El-Khayma	شبراخية	Shubra El-Khayma / Shubra	122,893	Major City center

Neighborhood	ArName	ArTrans	Population	Category
0	Doiti	دم القلي	31,161	Kem (Jully urban)
1	Piyemith	الم ابيهم	681,478	Kem (Jully urban)
2	Aqozza	الم العزازة	278,400	Kem (Jully urban)
3	Olza	الم العزا	206,668	Kem (Jully urban)
4	El Onasary	الم العنصرية	367,274	Kem (Jully urban)
5	Sheikh Zayed City	مدينة الشيخ زايد	90,097	Kem (Jully urban)
6	Bahig	المعادي	593,261	Kem (Jully urban)
7	Imbaba	المعادي	634,686	Kem (Jully urban)
8	Seth of October	ميدان أكتوبر	152,969	Kem (Jully urban)

	Neighborhood	ArName	ArTrans	Population	Category	Latitude	Longitude
0	Qada	قدا	Ad-Qadd	71,161	Kiwi (fully urban)	30.03212	31.21268
1	Pyramids	القوام	Al-Azham	667,478	Kiwi (fully urban)	30.00024	31.12200
2	Ain-Helwan	العين	Al-Ayn	279,460	Kiwi (fully urban)	30.03061	31.21050
3	Qiza	قزا	Al-Qiza	266,968	Kiwi (fully urban)	30.03956	31.21381
4	El-Dokki	الدقي	Al-Dokkiyah	367,274	Kiwi (fully urban)	30.00243	31.20188
5	Sheikh Zayed City	مدينة الشيخ زايد	Madinat E-Saikh Zayed	50,967	Kiwi (fully urban)	30.05338	31.09164
6	Helwan	الحي	Helwan El-Dokki	983,201	Kiwi (fully urban)	30.03976	31.19943
7	Imbaba	إمبابة	Imbaba	634,668	Kiwi (fully urban)	30.07622	31.29866
8	Barth el October	مدينة أكتوبر	Barth of October	152,959	Kiwi (fully urban)	29.99333	30.93333

Exploring the existing venues in each municipal division. The parameters used are searching radius of 5000 meter and limit of 500. The below images shows venues table and map of municipal locations.



Exploring the sports facilities in each municipal division. The below images shows the list of sports facilities and map for sports facilities locations.



6.2 Analysis

The resulted data is grouped and taking the mean of the frequency of occurrence of each category. The top 10 most common venues are selected.

(9, 11)

Out[31]:

	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	Agouza	Cafe	Hotel	Italian Restaurant	Restaurant	Sports Club	Spa/Wellness	Bar	Hotel	Burger Joint	Quick Restaurant
1	Bulaq	Cafe	Spa/Wellness	Gym / Fitness Center	Desert Shop	Hotel	Italian Restaurant	Hotel	Spa/Wellness	Spa/Wellness	Spa/Wellness
2	Dokki	Cafe	Hotel	Restaurant	Hotel Restaurant	Sports Club	Hotel Bar	Gym / Fitness Center	Lounge	Lounge	Hotel Bar
3	El-Dokki	Cafe	Hotel Bar	Italian Restaurant	Hotel	Restaurant	Gym / Fitness Center	Hotel Bar	Hotel Bar	Hotel Bar	Hotel Bar
4	El-Dokki	Cafe	Hotel	Hotel Bar	Desert Shop	Italian Restaurant	Lounge	Hotel Bar	Gym / Fitness Center	Hotel Bar	Hotel Bar
5	El-Dokki	Cafe	Hotel	Italian Restaurant	Sports Restaurant	Hotel	Spa/Wellness	Spa/Wellness	Spa/Wellness	Spa/Wellness	Spa/Wellness
6	Pyramids	Cafe	Hotel Bar	Hotel	Hotel Restaurant	Hotel Restaurant	Hotel Restaurant	Hotel Restaurant	Hotel Restaurant	Hotel Restaurant	Hotel Restaurant
7	Sharm El-Sheikh	Cafe	Shopping Mall	Coffee Shop	Food Court	Sports Club	Hotel Bar	Burger Joint	Hotel Bar	Hotel Bar	Hotel Bar
8	Sharm El-Sheikh	Cafe	Spa/Wellness	Spa/Wellness	Fast Food Restaurant	Sports Club	Coffee Shop	Shopping Mall	Supermarket	Hotel Bar	Restaurant

The data will be clustered into 3 clusters and examining the result of each cluster.

Out[37]:

	ArName	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
8	مركز الشيخ زايد	30.05339	31.00194	0	Cafe	Shopping Mall	Coffee Shop	Food Court	Sports Club	Bakery	Burger Joint	Middle Eastern Restaurant	Gym / Fitness Center	Convenience Store
9	مركز الشيخ زايد	29.98630	30.93950	0	Cafe	Syrian Restaurant	Middle Eastern Restaurant	Fast Food Restaurant	Sports Club	Coffee Shop	Shopping Mall	Supermarket	Kebab Restaurant	Restaurant

Out[39]:

	ArName	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
1	مركز الشيخ زايد	30.00836	31.122	2	Cafe	Historic Site	Hotel	Falafel Restaurant	Convenience Store	Restaurant	559k6	History Museum	Scenic Lookout	Burger Joint

7. Results

The map shows 3 cluster as follows;

- Cluster (0) - Cyan; shows low number of venues
- Cluster (1) - Purple; show high number of venues
- Cluster (2) - Red; shows moderate number of venues



8. Discussion

As per the above and the results generated from the analysis, the map shows that Cluster (1) is showing higher density of venues which is considered high potential as per the main factors that will be used for selection of the best location ***“Density of venues in the cluster, higher density means high potential”*** while the other clusters show lower density.

In addition to, most of the sporting facilities are concentrated in Cluster (1).

The above 2 factors are considered traffic generator and potential for opening a new sports mall in Cluster (1).



9. Conclusion

Cluster 2 is the best location to establish a sports mall as it contains all potentials from existing sports facilities and other attractions as cafes & restaurants which will generate crowd in the cluster.

Observation

Cluster 2 is the selected Cluster for the existence of most of sports facilities and varieties of venues.

