

Capstone-Project -The Battle of Neighborhoods in Dubai

by Susan Sam

1. Introduction

1.1 Background

Dubai is the most populous city in the United Arab Emirates (UAE). Located in the eastern part of the Arabian Peninsula on the coast of the Persian Gulf, Dubai aims to be the business hub of Western Asia. It is also a major global transport hub for passengers and cargo. Oil revenue helped accelerate the development of the city, which was already a major mercantile hub.

A center for regional and international trade since the early 20th century, Dubai's economy relies on revenues from trade, tourism, aviation, real estate, and financial services. According to government data, the population of Dubai is estimated at around 3.39 million as of January 2020.

Dubai being the central hub for trade and host for upcoming Expo 2020 trade exhibition, the need for affordable residential community with easy access to shopping, restaurants, schools and hospitals is vital.

1.2 Business Problem

This project aims to locate the community where affordable residential locations are available in the city of Dubai with the following criteria:

- a. Residential type- Apartments
- b. Rental cap less than 40000 AED per annum.
- c. Neighborhood- Restaurants, Supermarkets
- d. Transportation- Bus stops
- e. Sporting Facilities- Playgrounds/Courts/Jogger Tracks/Gym

1.3 Targeted Audience

This project will benefit anyone who plans to move to Dubai and looking for a low cost apartment. It will help people to take smart and efficient decision on selecting a best residential area.

2. Data

2.1 Data Sources

To proceed with this project, following data is required:

- a. List of communities in Dubai along with its median housing rental value per annum from property finder:

<https://www.propertymonitor.ae/research/uae-communities-index/dubai-rental-index.html>

- b. Latitude and Longitude of each community using Geocoder class from Geopy of Python.
- c. Various type of venue names in each community from Foursquare API.

2.2 Data Wrangling

The downloaded data contains the community area, the type of residences, median housing rent per annum and the percentage of rental increase.

After downloading the data and converting it to panda dataframe, we removed the column with percentage of rental increase from the dataframe as we do not require this data in current scope.

2.3 Approach

- List of apartments for rent was consolidated from web-scraping real estate sites for Dubai.
- The geolocation (lat, long) data was retrieved using Nominatim from geocoder class.
- Folium map was the basis of mapping with various features to consolidate all data in ONE map where one can visualize the areas with low cost apartments.
- Using FourSquare API, identified the major venues for each community area.

3. Methodology

3.1 Data Science Tools used

- ✓ Web-scraping of sites is done to consolidate data-frame information.
- ✓ Geodata was obtained by coding a program to use [Nominatim](#) from [Geocoder](#) class to get latitude and longitude of venues of the shortlisted residential communities.

- ✓ **Seaborn graphics library** was used to general statistics on rental data as a box plot.
- ✓ **Matplotlib Library** was used to generate bar chart and scatter plot.
- ✓ Used **K-Means algorithm** from **Scikit-Learn Library** for clustering communities on generated data.
- ✓ **Folium Library** was used to create maps with popups labels to allow quick identification of location, price and feature, thus making the selection very easy.

3.2 Approach

a) Data extraction

Extracted the master data from the html file which contains Residential type, Median Annual Rent and the percentage of rental fluctuation (last column).

	CommunityType	Median Rent(AED/unit)	Lastmonth
Community			
Al Furjan	Apartment	72305	-3.58%
Al Furjan	Villa	133200	-1.37%
Al Habtoor City	Apartment	92193	-5.31%
Al Khail Heights	Apartment	42456	-1.52%
Arabian Ranches	Villa	104885	-0.35%
Arabian Ranches 2	Villa	132561	-0.40%
Barsha Heights (Tecom)	Apartment	70543	-0.62%
Business Bay	Apartment	85302	-1.79%
City Walk	Apartment	146510	-0.21%
Culture Village	Apartment	82038	-1.98%
Damac Hills (Akoya By Damac)	Apartment	66501	-1.83%
Damac Hills (Akoya By Damac)	Villa	152451	0.00%

b) Knowing the data

After data cleaning, there were 57 rows in the table. i.e., Median housing rent from 57 main residential areas of Dubai.

```
dfHousing.shape
```

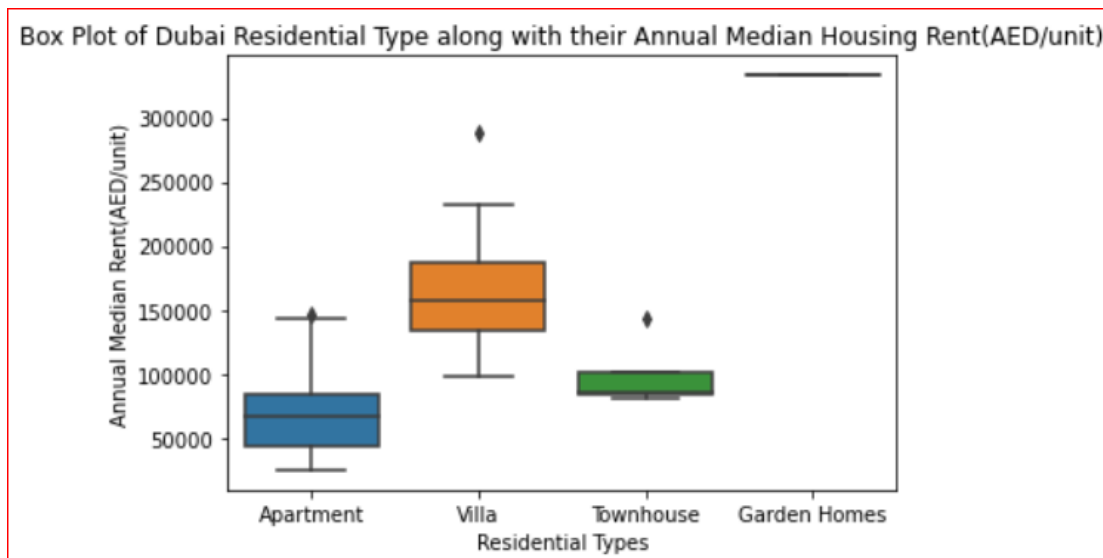
```
(57, 2)
```

The top 5 rows of the table is shown below:

Community	CommunityType	Median Rent(AED/unit)
Al Furjan	Apartment	72305
Al Furjan	Villa	133200
Al Habtoor City	Apartment	92193
Al Khail Heights	Apartment	42456
Arabian Ranches	Villa	104885

c) Data Analysis

Created the boxplot using the [Seaborn](#) library for different residential types.



From the above graph, it is clear that residence type “Apartment”(in blue) is the least cost residence type in Dubai.

Since the apartments are identified as least cost residence type, we have extracted the data solely for apartments from the table using [groupby](#) function.

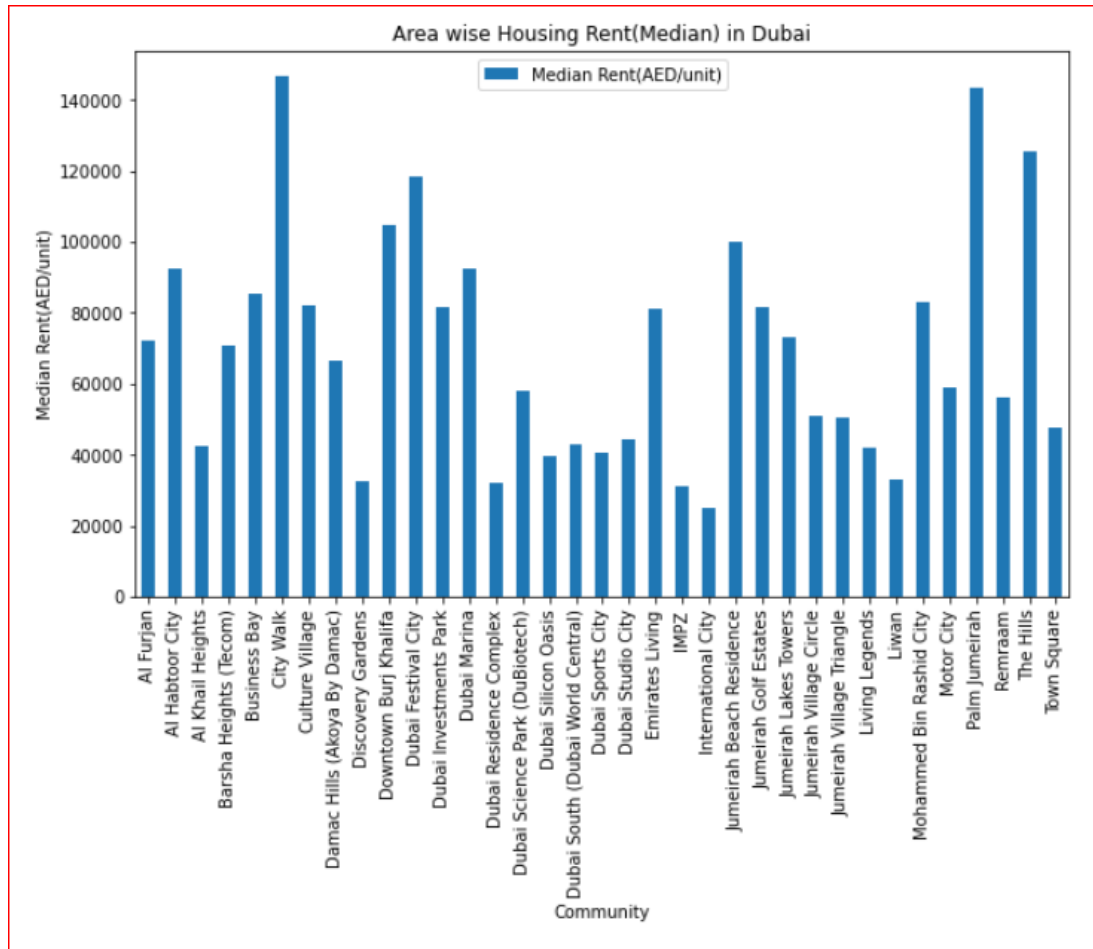
Community	Community type	Median Rent(AED/unit)
Al Furjan	Apartment	72305
Al Habtoor City	Apartment	92193
Al Khail Heights	Apartment	42456
Barsha Heights (Tecom)	Apartment	70543
Business Bay	Apartment	85302
City Walk	Apartment	146510
Culture Village	Apartment	82038
Damac Hills (Akoya By Damac)	Apartment	66501
Discovery Gardens	Apartment	32457
Downtown Burj Khalifa	Apartment	104876
Dubai Festival City	Apartment	118426

Statistical analysis of the data was done using the *describe* function.

## Data Analysis	
dfApartment.describe()	
Median Rent(AED/unit)	
count	35.000000
mean	69304.171429
std	32042.878438
min	24843.000000
25%	42668.000000
50%	66501.000000
75%	84201.500000
max	146510.000000

From the analysis as per the obtained data, the minimum median rent for apartment in Dubai is AED 24,843. Even though the average value is AED 69,304, the Standard deviation is AED 32,042. These analysis clearly shows that there are some residential apartments in Dubai having Median housing rent less than AED 40,000 which is one of our criteria.

Bar chart



We have extracted the data from data frame based on the preferred rent criteria which should be less than AED 40,000.

```
dflowcost = dfApartment[dfApartment['Median Rent(AED/unit)']<40000]
dflowcost
```

Community	CommunityType	Median Rent(AED/unit)
Discovery Gardens	Apartment	32457
Dubai Residence Complex	Apartment	31853
Dubai Silicon Oasis	Apartment	39525
IMPZ	Apartment	30972
International City	Apartment	24843
Liwan	Apartment	33035

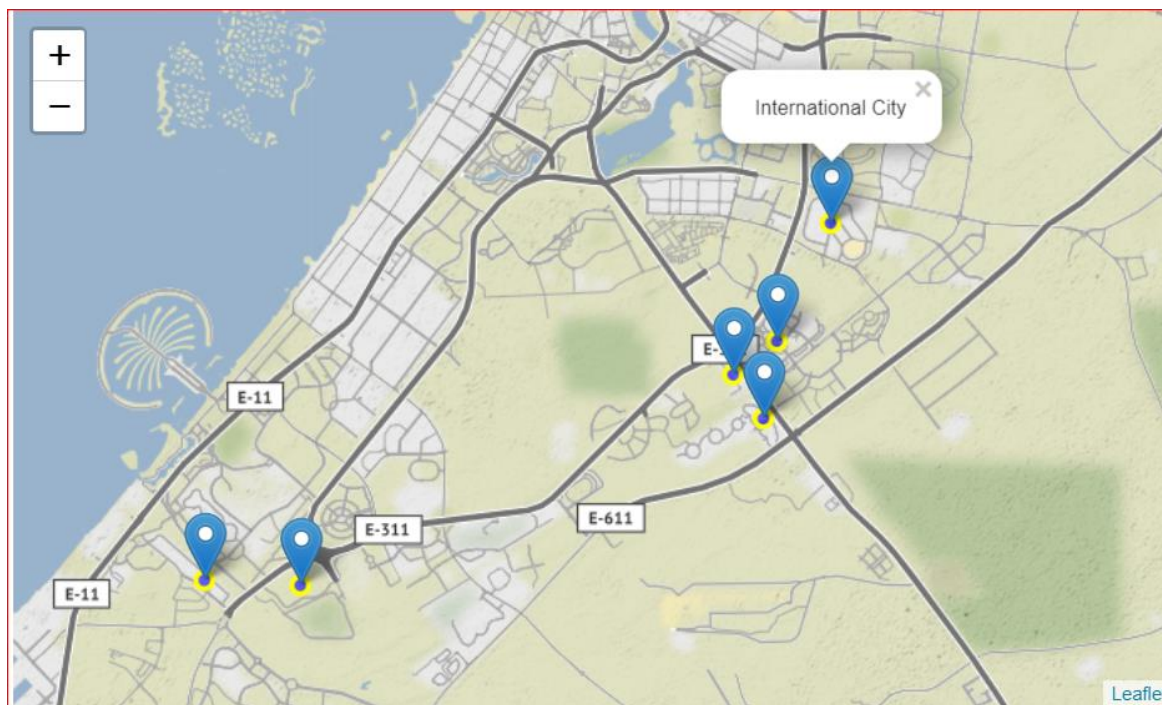
d) Map – Visualizing the data

Using Geocoder

The latitude and longitude of the shortlisted areas were retrieved using **Nominatim** from **Geocoder** class and added to the dataframe.

Community	Median Rent(AED/unit)	Latitude	Longitude
Discovery Gardens	32457	25.033867	55.151891
Dubai Residence Complex	31853	25.093545	55.379748
Dubai Silicon Oasis	39525	25.122194	55.385433
IMPZ	30972	25.031797	55.191002
International City	24843	25.166041	55.407730
Liwan	33035	25.110121	55.367699

A map was created superimposing the shortlisted community areas on it by using the python **folium** library to visualize the demographic details of Dubai and the low cost residential apartment areas.



e) Detailed analysis of community areas

Utilized the Foursquare API to explore the shortlisted areas. Radius is set to be 1000 meters for each area from their latitude and longitudes.

i) Discovery Gardens

The venue details of the community are listed to study the venues and the facilities available nearby as obtained from Foursquare API.

This list has 22 venues		dfdiscovery=getvenues(results, dataframe) dfdiscovery					
		venue.name	Venue	lat	lng	category	distance
0	Discovery Gardens Pool #11	Discovery Gardens Pool #11	25.029738	25.029738	55.154788	Pool	544
1	Discovery Pavilions	Discovery Pavilions	25.035228	25.035228	55.146861	Shopping Mall	529
2	Spinneys	Spinneys	25.025144	25.025144	55.152601	Supermarket	973
3	Al Furjan Pavilion	Al Furjan Pavilion	25.025050	25.025050	55.152890	Shopping Mall	986
4	Carrefour Market	Carrefour Market	25.034831	25.034831	55.147098	Supermarket	495
5	Oregano	Oregano	25.025471	25.025471	55.152869	Italian Restaurant	939
6	Jawharet Beirut (جوهرة بيروت)	Jawharet Beirut (جوهرة بيروت)	25.035331	25.035331	55.146815	Middle Eastern Restaurant	537
7	Discovery Gardens playground	Discovery Gardens playground	25.035880	25.035880	55.151270	Ice Cream Shop	232
8	Discovery Garden Court No. 8	Discovery Garden Court No. 8	25.035801	25.035801	55.150801	Pool	241
9	Discovery Garden Bus Stop 6	Discovery Garden Bus Stop 6	25.036801	25.036801	55.151270	Bus Station	332
10	Costa Coffee	Costa Coffee	25.025290	25.025290	55.152991	Coffee Shop	961
11	Arabian Grill						
12	Texas Chicken						
13	Bin Sina Pharmacy						
14	Gloria Jeans						
15	Papa Murphy's						
16	All Stir Fry						
17	Pronto						
18	POPEYES						
19	The GlassHouse						
20	Al Furjan Club						
21	Life Pharmacy						
Name: venue.name, dtype: object							

Fig. A lists unique category of venues as returned by Foursquare. Fig. B lists the venues after regrouping the venues to combine all the different types of same category venues eg: different types of restaurants like Middle Eastern restaurants, Asian Restaurants etc.

```
dfcat1=dfdiscovery['categorytype'].value_counts().rename_axis('unique_values').reset_index(name='counts')
dfcat1
```

	unique_values	counts
0	Pool	2
1	Middle Eastern Restaurant	2
2	Shopping Mall	2
3	Pharmacy	2
4	Fried Chicken Joint	2
5	Café	2
6	Supermarket	2
7	Asian Restaurant	1
8	Coffee Shop	1
9	Bus Station	1
10	Pizza Place	1
11	Italian Restaurant	1
12	Ice Cream Shop	1
13	Gym / Fitness Center	1

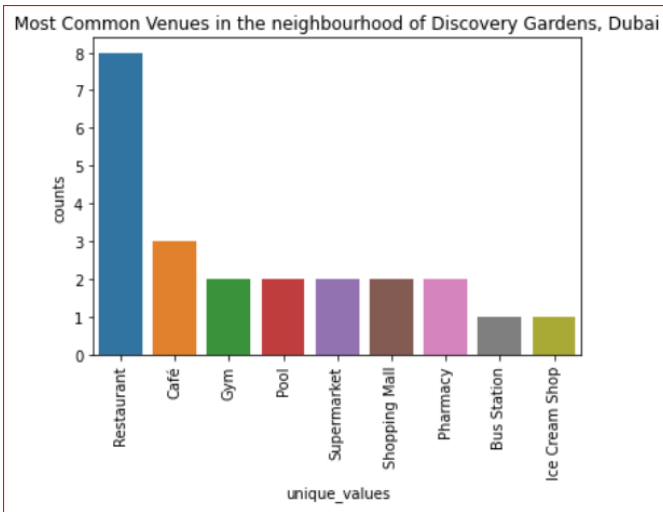
fig. A

	unique_values	counts
0	Restaurant	8
1	Café	3
2	Gym	2
3	Pool	2
4	Supermarket	2
5	Shopping Mall	2
6	Pharmacy	2
7	Bus Station	1
8	Ice Cream Shop	1

fig. B

The result doesn't mean that inquiry run for all the possible results in the neighbourhood of each area. Actually, it depends on given Latitude and Longitude information and here we just run single Latitude and Longitude pair for each community. We can increase the possibilities with Neighborhood information with more Latitude and Longitude information.

Here is the bar graph plotted using the venue details obtained for *Discovery Gardens*. From the details obtained, it's clear that this area has different types of facilities available nearby like restaurants, supermarkets, Pharmacy, Gym, Bus station etc.



One hot encoding was done and obtained the following table.

	Neighborhood	Bus Station	Café	Gym	Ice Cream Shop	Pharmacy	Pool	Restaurant	Shopping Mall	Supermarket
0	Discovery Gardens	0	0	0	0	0	1	0	0	0
1	Discovery Gardens	0	0	0	0	0	0	0	1	0
2	Discovery Gardens	0	0	0	0	0	0	0	0	1
3	Discovery Gardens	0	0	0	0	0	0	0	1	0
4	Discovery Gardens	0	0	0	0	0	0	0	0	1

ii) Dubai Silicon Oasis

The same procedure was carried out for '*Dubai Silicon Oasis*' and obtained the following data from Foursquare.

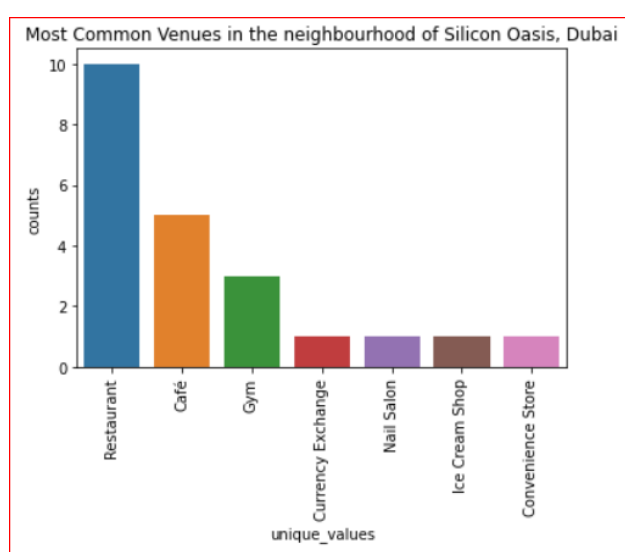
```

24 venues are returned by Foursquare
0      Fit GYM
1      Costa Coffee
2      Cha Cha Chai
3      Puranmal
4      The Snack House
5      Burger World
6      The Kebab shop
7      Tomato & Basilico
8      Subway
9      Tichinos
10     Costa Coffee
11     Baskin-Robbins
12     La Brioche
13     Sakura Nail Spa
14     Choithrams
15     Doner Kebab (German Doner Kebab)
16     Chapter One Floral Cafe
17     Dubai Silicon Oasis Jogger's Track
18     Cupagahwa
19     Al Nayali Building
20     Al Ansari Exchange
21     Gymnasium @ The palace tower
22     Cafe & Ristorante Nicola's
23     Binghatti Diamonds Gym
Name: venue.name, dtype: object

```

	venue.name	Venue	lat	lng	category	distance
0	Fit GYM	25.117833	25.117833	55.391169	Gym	754
1	Costa Coffee	25.114186	25.114186	55.380913	Coffee Shop	1001
2	Cha Cha Chai	25.118870	25.118870	55.394239	Café	961
3	Puranmal	25.117638	25.117638	55.390995	Indian Restaurant	756
4	The Snack House	25.118019	25.118019	55.390942	Comfort Food Restaurant	724
5	Burger World	25.117354	25.117354	55.390383	Burger Joint	734
6	The Kebab shop	25.117633	25.117633	55.390183	BBQ Joint	697
7	Tomato & Basilico	25.114933	25.114933	55.389806	Italian Restaurant	920
8	Subway	25.124616	25.124616	55.380732	Sandwich Place	545
9	Tichinos	25.124793	25.124793	55.381339	Italian Restaurant	503
10	Costa Coffee	25.124502	25.124502	55.380900	Coffee Shop	524
11	Baskin-Robbins	25.115117	25.115117	55.389650	Ice Cream Shop	895

	unique_values	counts
0	Restaurant	10
1	Café	5
2	Gym	3
3	Currency Exchange	1
4	Nail Salon	1
5	Ice Cream Shop	1
6	Convenience Store	1



iii) Dubai Production City/IMPZ

Only 9 venues found around the community as per the Foursquare data.

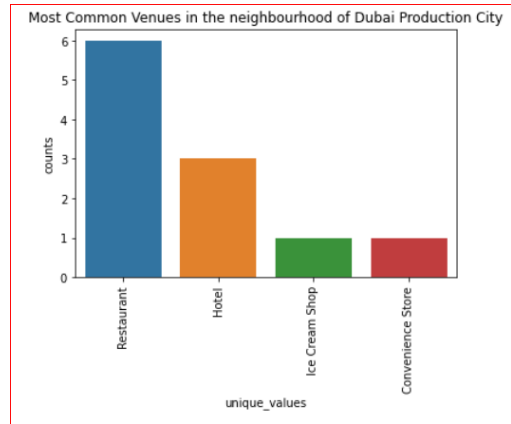
```

10 venues are returned by Foursquare
0      Aloft Me'aisam, Dubai
1      McDonald's
2      Big Wok
3      Texas Chicken
4      Wadi Express
5      Pizza Hut
6      Puranmal
7      Baskin-Robbins
8      Zoom
9      Occidental Hotel
Name: venue.name, dtype: object

```

	venue.name	Venue	lat	lng	category	distance	categorytype
0	Aloft Me'aisam, Dubai	25.037870	25.037870	55.197183	Hotel	919	Hotel
1	McDonald's	25.038489	25.038489	55.185745	Fast Food Restaurant	914	Restaurant
2	Big Wok	25.028309	25.028309	55.186833	Asian Restaurant	572	Restaurant
3	Texas Chicken	25.038361	25.038361	55.185555	Fast Food Restaurant	914	Restaurant
4	Wadi Express	25.038198	25.038198	55.185917	Lebanese Restaurant	878	Restaurant
5	Pizza Hut	25.038301	25.038301	55.185830	Pizza Place	892	Restaurant
6	Puranmal	25.038254	25.038254	55.185739	Indian Restaurant	893	Restaurant
7	Baskin-Robbins	25.038166	25.038166	55.185482	Ice Cream Shop	901	Ice Cream Shop
8	Zoom	25.038301	25.038301	55.185448	Convenience Store	915	Convenience Store
9	Occidental Hotel	25.037198	25.037198	55.184017	Hotel	926	Hotel

	unique_values	counts
0	Restaurant	6
1	Hotel	3
2	Ice Cream Shop	1
3	Convenience Store	1



iv) International City

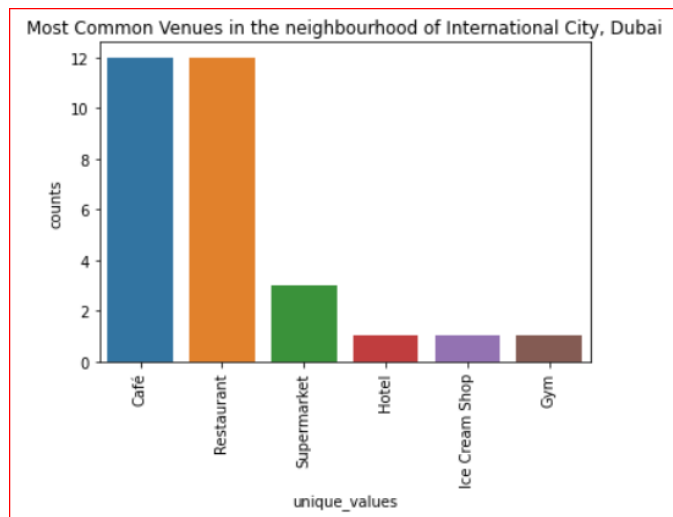
As per the Foursquare data, downloaded the venue details of 30 venues around the International city residential area.

30 venues are returned by Foursquare

0	Dyar Alsham Restaurant
1	Papa John's
2	SunTour
3	Lan Zhou Noodle Restaurant
4	Nine Squares Restaurant 九宫格
5	Wenzhou Supermarket
6	Bab Al Shams Desert Resort & Spa
7	Baskin-Robbins
8	Quan Ju De Roasted Duck
9	Subway
10	Shisha Time
11	Arabyata Cafe
12	Al Kabab Al Afghani
13	Le Jardin
14	Hush Burger
15	Chef Express
16	Indulgence Cafe
17	Union Cooperative Hypermarket
18	Location Cafe & Restaurant
19	London Fish & Chips
20	Le Jardin Cafe
21	Mayar Coffee Shop
22	Sham Cafe
23	Valley Cafe
24	Fitness 360 International City
25	Warsan Mandi Restaurant
26	Kazablo Restaurant and Cafe (كازابلو)
27	Marhaiva Restaurant & Cafe

	venue.name	Venue	lat	lng	category	distance
0	Dyar Alsham Restaurant	25.170463	25.170463	55.403724	Middle Eastern Restaurant	636
1	Papa John's	25.165242	25.165242	55.405851	Pizza Place	209
2	SunTour	25.169769	25.169769	55.411420	Chinese Restaurant	557
3	Lan Zhou Noodle Restaurant	25.168455	25.168455	55.412277	Chinese Restaurant	531
4	Nine Squares Restaurant 九宫格	25.161701	25.161701	55.400949	Chinese Restaurant	836
5	Wenzhou Supermarket	25.170138	25.170138	55.411315	Supermarket	581
6	Bab Al Shams Desert Resort & Spa	25.162123	25.162123	55.406952	Hotel	443
7	Baskin-Robbins	25.164163	25.164163	55.401827	Ice Cream Shop	630
8	Quan Ju De Roasted Duck	25.164242	25.164242	55.414812	Chinese Restaurant	741
9	Subway	25.165242	25.165242	55.405851	Sandwich Place	209
10	Shisha Time	25.161407	25.161407	55.407792	Café	515
11	Arabyata Cafe	25.160665	25.160665	55.401547	Café	863
12	Al Kabab Al Afghani	25.165696	25.165696	55.405152	Afghan Restaurant	262

	unique_values	counts
0	Restaurant	8
1	Café	3
2	Gym	2
3	Pool	2
4	Supermarket	2
5	Shopping Mall	2
6	Pharmacy	2
7	Bus Station	1
8	Ice Cream Shop	1



v) Dubai Residence Complex

Only 10 venues around in the neighbourhood of Dubai Residence Complex.

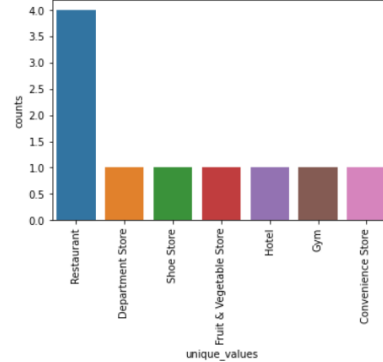
10 venues are returned by Foursquare

```
0 Abidos Hotel Apartments Dubailand
1 The Monk
2 Thomsun's
3 Pudumadam
4 Eat & Drink restaurant
5 800 Pizza
6 Key Pee Supermarket
7 Madina Supermarket
8 Vincci
9 Skycourt Tower B Gym
Name: venue.name, dtype: object
```

	venue.name	Venue	lat	lng	category	distance	categorytype
0	Abidos Hotel Apartments Dubailand	25.089309	25.089309	55.379377	Hotel	473	Hotel
1	The Monk	25.099492	25.099492	55.374084	Chinese Restaurant	874	Restaurant
2	Thomsun's	25.090557	25.090557	55.385461	Convenience Store	665	Convenience Store
3	Pudumadam	25.091632	25.091632	55.384711	Indian Restaurant	543	Restaurant
4	Eat & Drink restaurant	25.097200	25.097200	55.379800	Diner	406	Restaurant
5	800 Pizza	25.089456	25.089456	55.379503	Pizza Place	455	Restaurant
6	Key Pee Supermarket	25.089271	25.089271	55.379326	Department Store	477	Department Store
7	Madina Supermarket	25.092450	25.092450	55.385473	Fruit & Vegetable Store	589	Fruit & Vegetable Store
8	Vincci	25.091270	25.091270	55.386056	Shoe Store	684	Shoe Store
9	Skycourt Tower B Gym	25.091273	25.091273	55.386200	Gym / Fitness Center	697	Gym

	unique_values	counts
0	Restaurant	4
1	Department Store	1
2	Shoe Store	1
3	Fruit & Vegetable Store	1
4	Hotel	1
5	Gym	1
6	Convenience Store	1

Most Common Venues in the neighbourhood of Dubai Residence Complex



vi) Liwan

This residence also has very few venues around as per the Foursquare data.

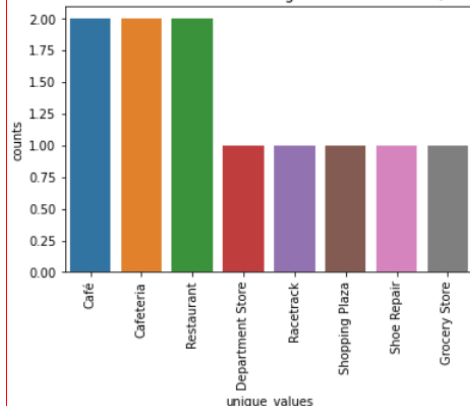
11 venues are returned by Foursquare

```
0 Shakespeare and Co. شمسیر آند کو
1 Kaffa Beans Specialty Coffee
2 Mirdif City Centre
3 Dubai Camel Racecourse
4 grills & more
5 Abdullah Omar Cafeteria كافيتريا عبدالله عمر
6 Abdulla Omar Cafeteria
7 Little Bangkok
8 Green park supermarket ASB tower
9 Thomson Supermarket
10 City Walk Dubai
Name: venue.name, dtype: object
```

	venue.name	Venue	lat	lng	category	distance	categorytype
0	Shakespeare and Co. شمسیر آند کو	25.114215	25.114215	55.372102	Café	636	Café
1	Kaffa Beans Specialty Coffee	25.114296	25.114296	55.372037	Coffee Shop	638	Café
2	Mirdif City Centre	25.107990	25.107990	55.361202	Shoe Repair	696	Shoe Repair
3	Dubai Camel Racecourse	25.116046	25.116046	55.368163	Racetrack	661	Racetrack
4	grills & more	25.110243	25.110243	55.377247	Asian Restaurant	962	Restaurant
5	Abdullah Omar Cafeteria كافيتريا عبدالله عمر	25.109344	25.109344	55.374965	Cafeteria	737	Cafeteria
6	Abdulla Omar Cafeteria	25.109253	25.109253	55.374989	Cafeteria	741	Cafeteria
7	Little Bangkok	25.116536	25.116536	55.372217	Thai Restaurant	846	Restaurant
8	Green park supermarket ASB tower	25.110146	25.110146	55.377187	Grocery Store	956	Grocery Store
9	Thomson Supermarket	25.118578	25.118578	55.365791	Department Store	960	Department Store
10	City Walk Dubai	25.106513	25.106513	55.376732	Shopping Plaza	995	Shopping Plaza

	unique_values	counts
0	Café	2
1	Cafeteria	2
2	Restaurant	2
3	Department Store	1
4	Racetrack	1
5	Shopping Plaza	1
6	Shoe Repair	1
7	Grocery Store	1

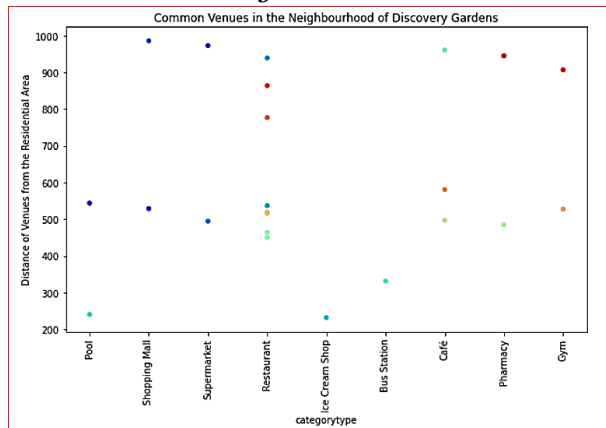
Most Common Venues in the neighbourhood of Liwan, Dubai



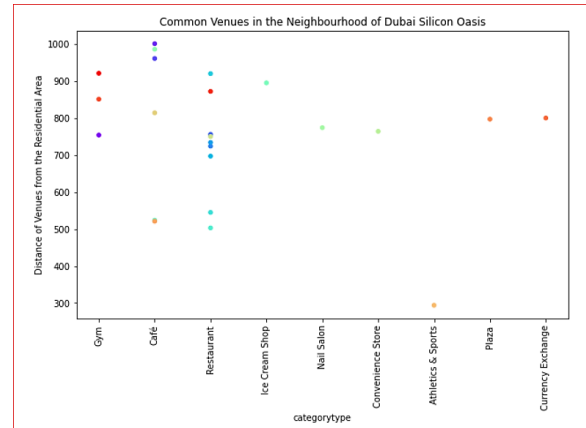
f) Comparing the data

Scatter Plot for these communities

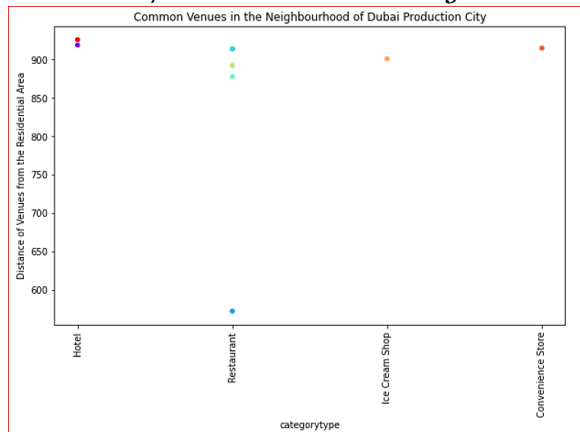
Discovery Gardens



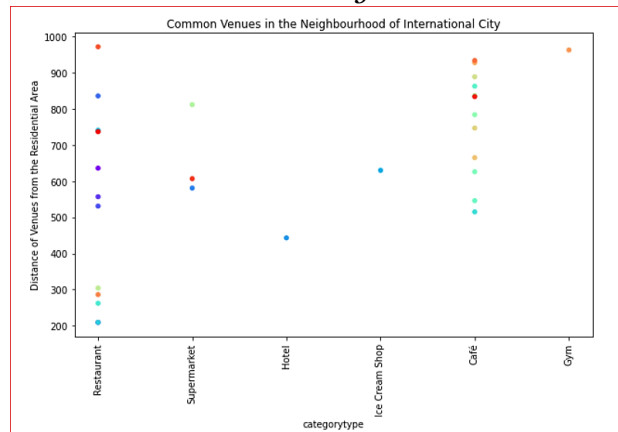
Dubai Silicon Oasis



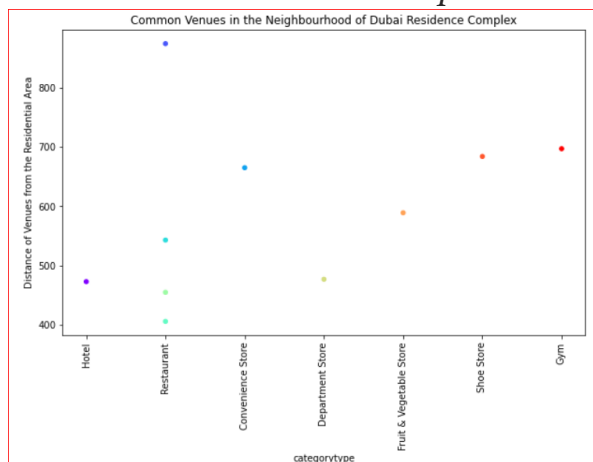
IMPZ/Dubai Production City



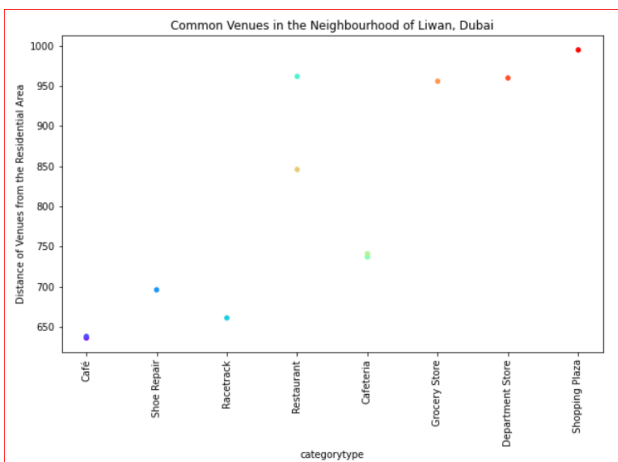
International City



Dubai Residence Complex



Liwan



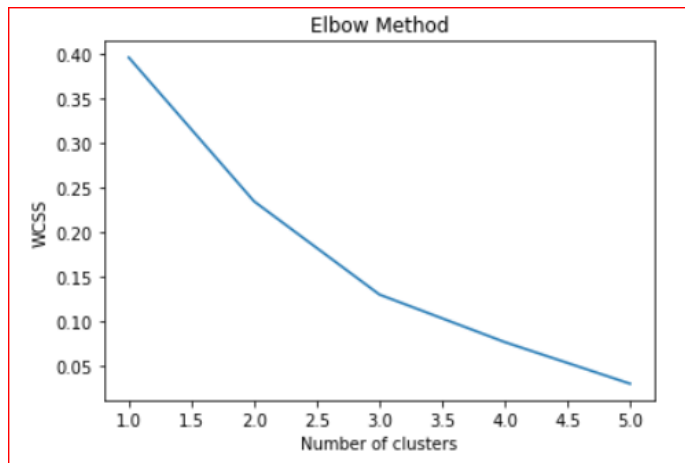
Here is the table with the list of top 10 most common venues for each community.

	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	Discovery Gardens	Restaurant	Café	Supermarket	Shopping Mall	Pool	Pharmacy	Gym	Ice Cream Shop	Bus Station	Athletics & Sports
1	Dubai Production City	Restaurant	Hotel	Convenience Store	Ice Cream Shop	Bus Station	Café	Gym	Pharmacy	Pool	Shopping Mall
2	Dubai Silicon Oasis	Restaurant	Café	Gym	Plaza	Nail Salon	Currency Exchange	Convenience Store	Athletics & Sports	Ice Cream Shop	Bus Station
3	International City	Restaurant	Café	Supermarket	Hotel	Ice Cream Shop	Gym	Bus Station	Pharmacy	Pool	Shopping Mall

g) Using K-means algorithm

We have some common venue categories in the residential communities. In this reason I used unsupervised learning **K-means algorithm** to cluster the boroughs. K-Means algorithm is one of the most common cluster method of unsupervised learning.

I decided to create 3 clusters as I got the optimum degree 3 for the value of k when I analyse K-means with elbow method.



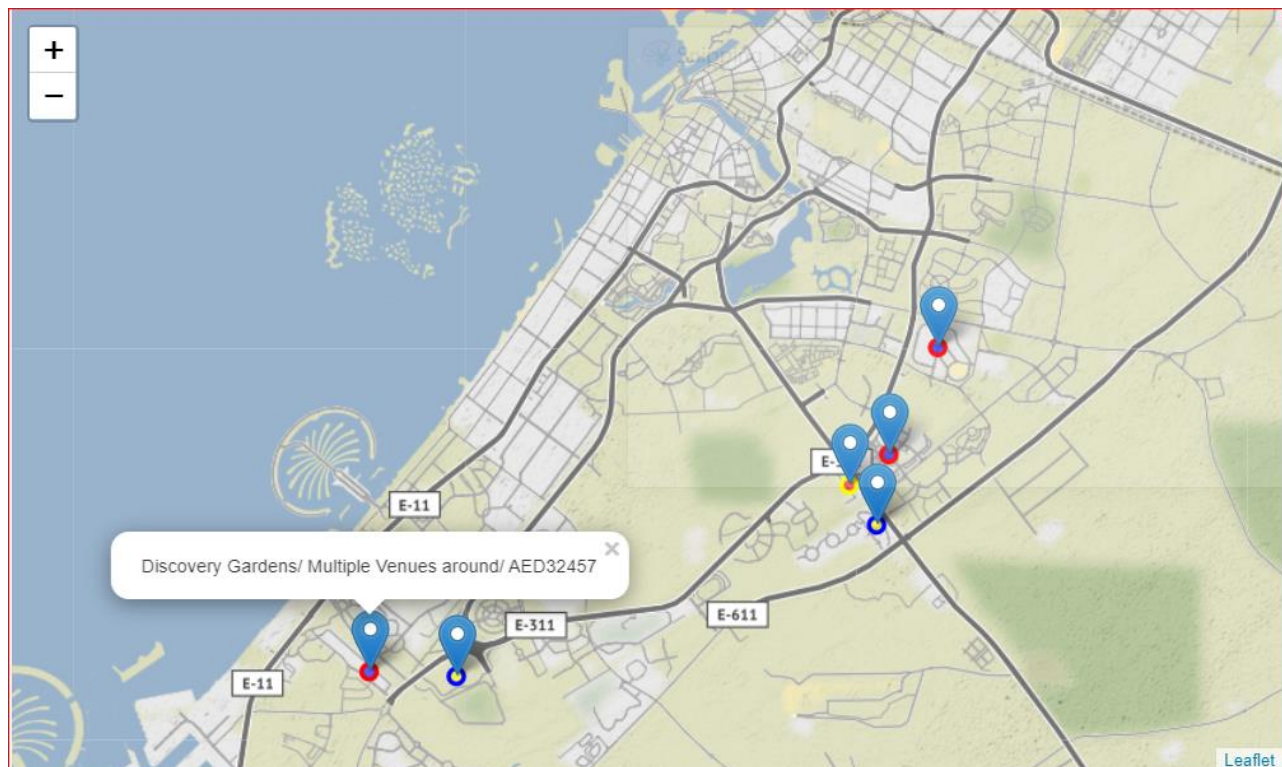
4. Results

Here is the merged table of cluster information details with the master table.

Community	Median Rent(AED/unit)	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
Discovery Gardens	32457	25.033867	55.151891	0	Restaurant	Café	Supermarket	Shopping Mall	Pool	Pharmacy	Tennis Court	Park	Gym	Convenience Store
Dubai Residence Complex	31853	25.093545	55.379748	1	Restaurant	Shoe Store	Fruit & Vegetable Store	Department Store	Hotel	Gym	Convenience Store	Basketball Court	Bus Station	Café
Dubai Silicon Oasis	39525	25.122194	55.385433	0	Restaurant	Café	Gym	Nail Salon	Ice Cream Shop	Currency Exchange	Convenience Store	Basketball Court	Bus Station	Pharmacy
IMPZ	30972	25.031797	55.191002	1	Restaurant	Hotel	Ice Cream Shop	Convenience Store	Basketball Court	Bus Station	Café	Gym	Park	Pharmacy
International City	24843	25.166041	55.407730	0	Restaurant	Café	Supermarket	Hotel	Ice Cream Shop	Gym	Basketball Court	Bus Station	Convenience Store	Pharmacy
Liwan	33035	25.110121	55.367699	2	Cafeteria	Restaurant	Café	Shopping Plaza	Shoe Repair	Racetrack	Grocery Store	Department Store	Basketball Court	Bus Station

The clustered map of Dubai is created which has the below information for each community:

- Name of the Community
- Cluster Names as per the cluster label.
 - Cluster 0: Multiple venues around (marked in red)
 - Cluster 1: Medium venues around (marked in blue)
 - Cluster 2: Minimum venues around (marked in yellow)
- Annual Median Housing Rent (AED/unit)



5. Discussion

We got a glimpse of different Residential Communities in Dubai and were able to get some interesting insights which might be useful for people looking out for residential apartments in Dubai.

Let's summarize our findings:

- As per the criteria of our search, we have identified six low cost residential communities in Dubai.
- Discovery Gardens, Silicon Oasis and International City has been identified having economical residences with multiple venues around (Cluster 0) in which ***International City is the least cost residential community.***
- Dubai Residence Complex and IMPZ (Dubai Production City) has been identified having the economical residences with medium number of venues around (Cluster 1).
- Even though Liwan residence is economical, there are very few venues identified around this community.

6. Conclusion

The data for this project has been extracted after web scraping the Dubai property websites. The data has been parsed to extract the information available and got details about Community name, Community type and Median Housing Rent per annum. Based on these information, we have done the analysis to find the least cost residential apartments in conjunction with the venues in the neighbourhood.

This information is beneficial for people looking out for low cost residential apartments in Dubai.