BUSINESS ANALYSIS FOR CREATIVE ORG

Prospective Gym Location Analysis

Opening New Gym/ Fitness Centres in Melbourne City Area

This study will help us to explore and identify best places to open New Gym/ Fitness Centres in Melbourne City Area through data analysis and machine learning techniques.

Section 1- Introduction/Business Problem

Creative Org is looking for opening a new segment of business in the fitness domain in Melbourne, Australia location where millions of people meetup socially or professionally. Therefore, they intend to do their preliminary research and analysis regarding opening new fitness centers from focusing on the existing gym businesses located in the neighborhoods.

Most traditional Gym businesses are primarily focused on physical exercise. Traditional gyms are not focusing how to treat body and mind together for optimal performance in people's daily busy life. People who generally are looking for mental relaxation or trying to improve concentration or meeting similar minded people to discuss health or fitness issues as a social gathering, they generally go to different places outside of the city fringe for retreat.

Creative Org's focus is organizing meet up like minded people in the city fringe who wants to improve their physical and emotional being staying connected with experts through meeting during lunch time break or after office hours even in the weekend.

Yoga is an art of managing life at highest form and helps to realize the universal meaning for self-realization. This is the highest form of exercise for improving the highest level of intelligence. Various studies have found recently that Yoga helps to improve health vitality, heal aces, fatigues or pains, improves blood circulation and emotional health while keep sickness away.

People can increase their vital energy into their right upper chest through breathing exercises such as asana, pranayama, meditation, chanting and various kriya (internal cleaning practices) for better performance not only in the muscle development, also improving energy flow in their spine which are very crucial for students, blue collar workers or professionals spend their most time in stress.

Accordingly to department of health (Australia Government), they have found in a survey in 2014/15 that 1 in 2 Australians (50%) suffer from one prominent (i.e. back pain, cancer, cardiovascular disease, diabetes, chronic obstructive pulmonary disease or mental health conditions) chronic diseases. Even though, there are quite few fitness franchises and local gyms available in the Melbourne city surroundings.

Creative Org is looking for a new areas either doing partnership with existing gym businesses where additional yoga and meditation retreat facilities will be added to the existing business model or opening few new centers in the city surrounding areas comprised of gym, yoga and meditation combined facilities. Therefore, people can incorporate regular exercise routine any time at their conveniences while meeting people socially.

Therefore, Creative Org has requested me to do research on Melbourne city neighborhoods to open few centers where new way of introducing fitness (physical + emotional) in Melbourne city (the second biggest capital city in Australia with roughly five million people).

The director of the Creative Org has asked me to do research on key areas to present a detailed report for location selection including people's preferences including below initial questions:

- What could be the best places in Melbourne city surroundings to open a Gym where lots of offices or residential are available?
- How to identify general and specific characteristics near the gym center?
- What kind of conveniences are generally existing gym providers look into in the nearby areas such as hotels, restaurants, social gathering, transport or distance from business hubs?
- Are there particular neighborhoods will be more preferred than others?
- Are there discriminant factors among Neighborhoods?
- Which locations are currently popular among gym goers in city surrounding? Can we explore which venues are most popular?

There are various key factors need to be researched and doing exploratory business case analysis to identify the particular location being the right fit for the Creative Org of opening new gym/fitness (physical + emotional)!

Section 2 – Data Extraction & Preliminary Analysis

As I am requested by the Director of the Creative Org to explore neighborhoods in the city before choosing location for future fitness/gym centers in Melbourne city areas, I have decided to explore locations and surrounding venues through third party data source provider FourSquare through their API for fetching data. Foursquare is a technology company that uses location intelligence to build meaningful consumer experiences and business solutions. They have app developers can install and they also provide more than 75 million short tips from local experts around the world.

As part of my preliminary analysis, I have extracted required data such as all gym's location, venues, longitude and latitude based in 5000 meters of Melbourne central business district which cover more than almost five million people movement throughout the year.

I have used 'Gym' keyword in Melbourne to extract data about the Gym name, location, address, distance from central city, lat & log and all surrounding venues of each gym and tested to see are they populating on the map for clustering visualization purpose which I will be doing in my data exploration visualization exercise. According to my data extraction and preliminary analysis, I have received below 30 Gym's within 5 km of Melbourne CBD.

```
Arrow On Swanston - Gym, Pool & Sauna
QV1 Apartment Gym & Pool
Verve Milano Gym
City Point Gym, Pool & Tennis Court
Langham Hotel Gym
Triptych Apartment Gym
```

```
Melbourne Tower Gym
Melbourne Studio Gym
Gym - Southside Tower
Gym Room 3rd Floor, Mercure Hotel Melbourne
Dohertys 24/7 Gym
Watergate Apartments Gym
College Square Swanston Gym
Gym 3rd Floor, The Swaston Hotel, Grand Mercure
H1 Gym
Gym At The Medina Grand
250E Rooftop/Pool/Gym
Parkside Gym
Crown Metropol Gym
Gym at The Swanston Hotel, Grand Mecure
109 Gym
Gym
Melbourne Star Gym
Virgin Active Health Club
Ibis Styles Gym
Zen Harmony Gym
juggernaut Personal Training @Dohertys Gym CBD
Gym @ Abode 318
Intercontintal Melbourne Gym
Gym umah dhani
```

I have also found there are 110 distinct venue categories within 500 meters of each Gym location.

Section 3 – Methodology

A part of my methodology, I have used Foursquare API for this project analysis, identifying existing Gym names and their venues to investigate further the standard of living in Melbourne city neighbourhoods.

As the initial data was not clean, I had to do data aggregation, transformation and clean up for exploratory data analysis.

Then, I have used K-means clustering to organize existing Gyms' into 4 different clusters based on venue's categories similarity and frequencies within 500 meters from the Gym's location.

The K-means clustering will find similarities among Gym's in the same cluster and differences among Gym's different clusters. I have downloaded folium map to visually identify Gym in each cluster.

Thereafter, I have identifies the top 5 frequent values of each Gym in each cluster.

The analysis mainly applies the following Python libraries:

Pandas, Numpy – Libraries for data storage, manipulation and array computing
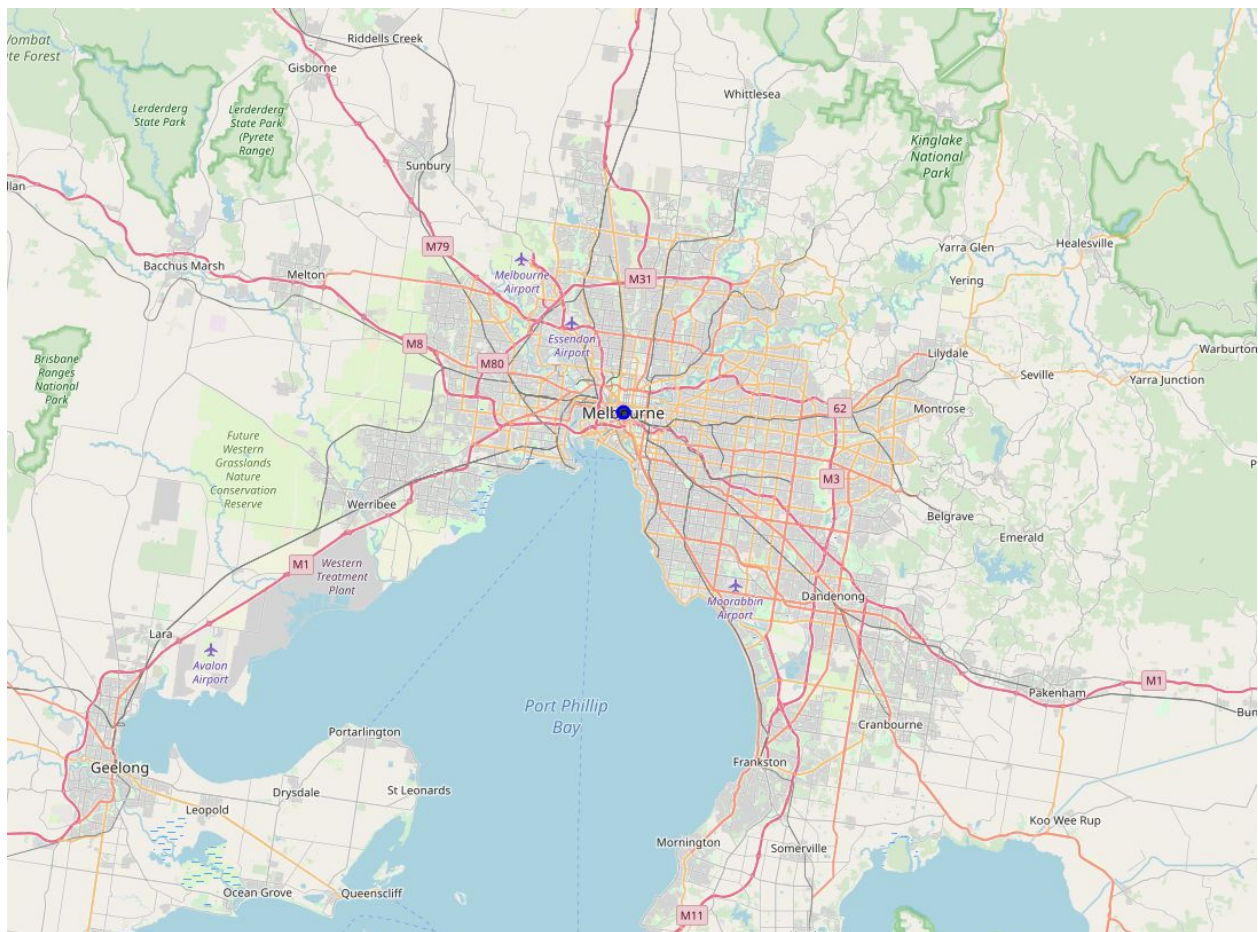
Geopy – Library to retrieve locational data

Matplotlib, Folium – Libraries for representing numeric and locational data

Requests, Urllib – Libraries to retrieve data and handle http exchange with the Foursquare API

Implementation

Importing Libraries

Showing position of Melbourne on the map

Gym Name	Gym Latitude	Gym Longitude	Venue
109 Gym	-37.816317	144.962099	30
250E Rooftop/Pool/Gym	-37.812581	144.963022	30
Zen Harmony Gym	-37.807314	144.960880	30
Watergate Apartments Gym	-37.819213	144.947835	30
Virgin Active Health Club	-37.812063	144.968810	30
Verve Milano Gym	-37.807697	144.962117	30
Triptych Apartment Gym	-37.822530	144.966846	30
QV1 Apartment Gym & Pool	-37.809903	144.966230	30
Parkside Gym	-37.831246	144.969199	30
Melbourne Tower Gym	-37.824768	144.962612	30
Melbourne Studio Gym	-37.807620	144.978290	30
Melbourne Star Gym	-37.812047	144.961966	30
Langham Hotel Gym	-37.820750	144.965539	30
La Banque Apartments Gym	-37.812118	144.957530	30
Intercontintal Melbourne Gym	-37.818563	144.958055	30
Ibis Styles Gym	-37.814162	144.967314	30
H1 Gym	-37.813454	144.942398	30
Gym at The Swanston Hotel, Grand Mecure	-37.811750	144.960394	30
Gym Room 3rd Floor, Mercure Hotel Melbourne	-37.813289	144.965363	30
Gym At The Medina Grand	-37.814259	144.959943	30
Gym @ Blue Tower	-37.808273	144.966628	30
Gym 3rd Floor, The Swaston Hotel, Grand Mercure	-37.813295	144.965371	30
Gym - Southside Tower	-37.830116	144.965748	30
Gym	-37.813522	144.955423	30
Dohertys 24/7 Gym	-37.818856	144.962460	30
Crown Metropol Gym	-37.825509	144.957837	30
College Square Swanston Gym	-37.798081	144.965036	30
City Point Gym, Pool & Tennis Court	-37.815607	144.954050	30
Arrow On Swanston - Gym, Pool & Sauna	-37.805434	144.963754	30
juggernaut Personal Training @Dohertys Gym CBD	-37.818660	144.963209	30

Explore venue: Now Let's have a look at the existing venues around each gym in Melbourne within a radius of 500 meters

|	Gym Name	Gym Latitude	Gym Longitude	American Restaurant	Antique Shop	Aquarium	Arepa Restaurant	Art Gallery	Arts & Crafts Store	Asian Restaurant	...	Toy / Game Store	Tunnel	Turkish Restaurant	Vegetarian / Vegan Restaurant	Vietnamese Restaurant	Warehouse Store
0	109 Gym	-37.816317	144.962099	0.0	0.0	0.0	0.0	0.0	0.0	1.0	...	1.0	0.0	0.0	0.0	0.0	0.0
1	250E Rooftop/Pool/Gym	-37.812581	144.963022	0.0	0.0	0.0	0.0	1.0	0.0	0.0	...	1.0	0.0	0.0	0.0	0.0	0.0
2	Arrow On Swanston - Gym, Pool & Sauna	-37.805434	144.963754	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	1.0	0.0
3	City Point Gym, Pool & Tennis Court	-37.815607	144.954050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	1.0	0.0
4	College Square Swanston Gym	-37.798081	144.965036	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	1.0	0.0	0.0
5	Crown Metropol Gym	-37.825509	144.957837	1.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0
6	Dohertys 24/7 Gym	-37.818856	144.962460	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	1.0	0.0	0.0	0.0	0.0	0.0

Machine learning techniques:

As part of the machine learning technique, I have used the methodololgy k-means clustering.

We have run four clustering and distribution of clustering is below-

```
Cluster Labels
0     11
1      5
2     12
3      2
```
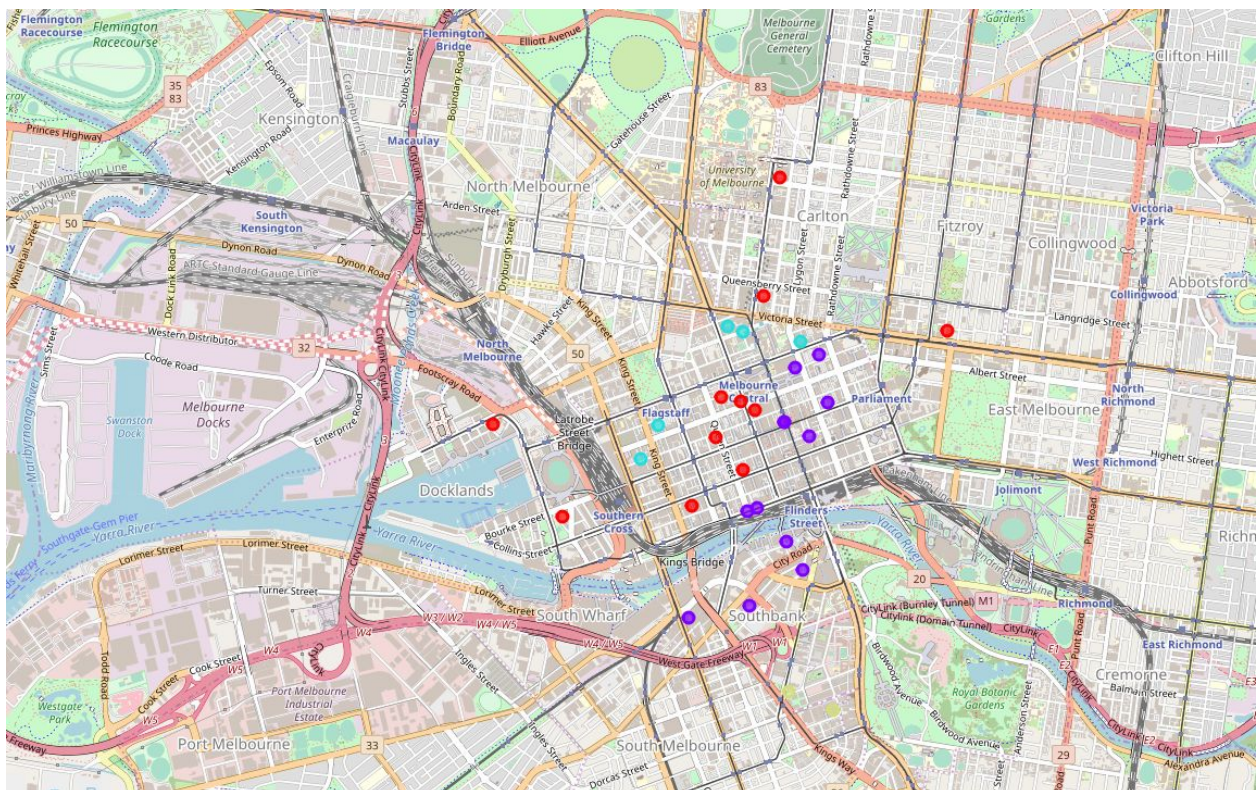
The map of the clustered locations show some geographical structure. You can double-click and zoom on the map.

Cluster 0 is deep red (predominantly situated in the central Melbourne however spread throughout East, North & South Melbourne areas), Cluster 1 is purple colour(they are predominantly in the city, however few Gyms are in the South Melbourne), Cluster 2 is light blue (predominantly in the central Melbourne, few are in the North Side of the Melbourne) and Cluster 3, light yellow (predominantly in the south Melbourne).

I have also identified top ten common venues areound each Gym.

	Gym Name	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	109 Gym	Café	Bar	Cluster Labels	Thai Restaurant	Comic Shop	Dessert Shop	Italian Restaurant	Paper / Office Supplies Store	Asian Restaurant	Wine Bar
1	250E Rooftop/Pool/Gym	Café	Bar	Dessert Shop	Cluster Labels	Japanese Restaurant	Coffee Shop	Burger Joint	Boutique	Cocktail Bar	Shopping Plaza
2	Arrow On Swanston - Gym, Pool & Sauna	Café	Cluster Labels	Korean Restaurant	Coffee Shop	Ice Cream Shop	Italian Restaurant	Vietnamese Restaurant	Soup Place	Gastropub	Fish & Chips Shop
3	City Point Gym, Pool & Tennis Court	Korean Restaurant	Coffee Shop	Café	Japanese Restaurant	Burger Joint	Cluster Labels	Supermarket	Indonesian Restaurant	Gym / Fitness Center	Lebanese Restaurant
4	College Square Swanston Gym	Café	Italian Restaurant	Coffee Shop	Gourmet Shop	Burger Joint	Cluster Labels	Indie Movie Theater	Bookstore	Vegetarian / Vegan Restaurant	Indie Theater
5	Crown Metropol Gym	Hotel	Bar	Japanese Restaurant	Australian Restaurant	Casino	Italian Restaurant	Pet Store	Performing Arts Venue	Movie Theater	Molecular Gastronomy Restaurant
6	Dohertys 24/7 Gym	Bar	Italian Restaurant	Burger Joint	Ice Cream Shop	Scenic Lookout	Sandwich Place	Cocktail Bar	Road	River	Coffee Shop
7	Gym	Korean Restaurant	Café	Coffee Shop	Japanese Restaurant	Cluster Labels	Tapas Restaurant	Indian Restaurant	Indonesian Restaurant	Lebanese Restaurant	Mini Golf
8	Gym - Southside Tower	Café	Cluster Labels	Pub	Supermarket	Japanese Restaurant	Thai Restaurant	Restaurant	Modern European Restaurant	Middle Eastern Restaurant	Malay Restaurant
9	Gym 3rd Floor, The Swaston Hotel, Grand Mercure	Bar	Cocktail Bar	Café	Shopping Mall	Sushi Restaurant	Coffee Shop	Dessert Shop	Movie Theater	Burger Joint	Shopping Plaza
10	Gym @ Blue Tower	Café	Coffee Shop	Cluster Labels	Whisky Bar	Korean Restaurant	Greek Restaurant	Bar	Bubble Tea Shop	General Entertainment	Ramen Restaurant
11	Gym At The Medina Grand	Café	Dessert Shop	Cluster Labels	Bar	Coffee Shop	Italian Restaurant	Vietnamese Restaurant	BBQ Joint	Creperie	Pizza Place
12	Gym Room 3rd Floor, Mercure Hotel Melbourne	Bar	Cocktail Bar	Café	Shopping Mall	Sushi Restaurant	Coffee Shop	Dessert Shop	Movie Theater	Burger Joint	Shopping Plaza
13	Gym at The Swanston Hotel, Grand Mecure	Café	Cluster Labels	Korean Restaurant	Japanese Restaurant	Coffee Shop	Dessert Shop	Cocktail Bar	Boutique	Comedy Club	Creperie
14	H1 Gym	Middle Eastern Restaurant	Cluster Labels	Restaurant	Asian Restaurant	Café	Chinese Restaurant	Dessert Shop	Hotel	Italian Restaurant	Juice Bar
15	Ibis Styles Gym	Hotel	Cocktail Bar	Café	Coffee Shop	Theater	Dumpling Restaurant	Middle Eastern Restaurant	Burger Joint	Lounge	Boutique
16	Intercontintal Melbourne Gym	Café	Japanese Restaurant	Cluster Labels	Korean Restaurant	Cocktail Bar	Coffee Shop	Burger Joint	Candy Store	Chaat Place	Bar
17	La Banque Apartments Gym	Café	Korean Restaurant	Coffee Shop	Cluster Labels	Scandinavian Restaurant	Antique Shop	Bar	Dessert Shop	Donut Shop	Hobby Shop
18	Langham Hotel Gym	Bar	Italian Restaurant	Performing Arts Venue	Grocery Store	Concert Hall	Seafood Restaurant	Scenic Lookout	Cocktail Bar	Road	River
19	Melbourne Star Gym	Café	Japanese Restaurant	Cluster Labels	Coffee Shop	Shopping Mall	Dessert Shop	Donut Shop	Jazz Club	Indonesian Restaurant	Hobby Shop
20	Melbourne Studio Gym	Café	Australian Restaurant	Bar	Japanese Restaurant	Cluster Labels	Wine Bar	Asian Restaurant	Arts & Crafts Store	Record Shop	Chinese Restaurant

We have done a detailed analysis for each cluster to see the top most frequent venues categories for each Gym under each cluster.

Section 4 – Results

Cluster 0
```
----109 Gym----
              venue  freq
0             Café   4.0
1              Bar   3.0
2  Italian Restaurant  2.0
3       Comic Shop   2.0
4      Dessert Shop  2.0


----250E Rooftop/Pool/Gym----
              venue  freq
0             Café   4.0
1      Dessert Shop  3.0
2              Bar   3.0
3       Coffee Shop  2.0
4  Japanese Restaurant  2.0


----Arrow On Swanston - Gym, Pool & Sauna----
```

```
                  venue  freq
0                  Café   6.0
1        Ice Cream Shop   2.0
2           Coffee Shop   2.0
3     Italian Restaurant  2.0
4     Korean Restaurant   2.0


----College Square Swanston Gym----
                  venue  freq
0                  Café   5.0
1     Italian Restaurant  3.0
2           Coffee Shop   3.0
3          Burger Joint   2.0
4          Gourmet Shop   2.0


----Gym At The Medina Grand----
                  venue  freq
0                  Café   6.0
1          Dessert Shop   3.0
2     Italian Restaurant  2.0
3                   Bar   2.0
4           Coffee Shop   2.0


----Gym at The Swanston Hotel, Grand Mecure----
                  venue  freq
0                  Café   6.0
1           Coffee Shop   2.0
2     Korean Restaurant   2.0
3    Japanese Restaurant  2.0
4          Dessert Shop   2.0


----H1 Gym----
                      venue  freq
0  Middle Eastern Restaurant  3.0
1         Italian Restaurant  2.0
2               Dessert Shop  2.0
3        Chinese Restaurant   2.0
4                       Café  2.0


----Intercontintal Melbourne Gym----
                  venue  freq
0                  Café   5.0
1    Japanese Restaurant  3.0
2     Korean Restaurant   2.0
3          Cocktail Bar   2.0
4           Coffee Shop   2.0


----Melbourne Star Gym----
                  venue  freq
0                  Café   6.0
1    Japanese Restaurant  3.0
2           Coffee Shop   2.0
3          Shopping Mall  2.0
```

```
4        Dessert Shop   2.0


----Melbourne Studio Gym----
                   venue  freq
0                    Café   5.0
1  Australian Restaurant   3.0
2                     Bar   3.0
3    Japanese Restaurant   2.0
4               Wine Bar   2.0


----Watergate Apartments Gym----
                   venue  freq
0                    Café   8.0
1    Italian Restaurant   2.0
2           Coffee Shop   2.0
3                    Bar   2.0
4       Thai Restaurant   1.0
```

Cluster 1

```
Clust----Crown Metropol Gym----
                   venue  freq
0                   Hotel   4.0
1                     Bar   3.0
2                  Casino   2.0
3  Australian Restaurant   2.0
4    Japanese Restaurant   2.0


----Dohertys 24/7 Gym----
                   venue  freq
0                     Bar   6.0
1    Italian Restaurant   2.0
2          Burger Joint   2.0
3        Scenic Lookout   1.0
4        Ice Cream Shop   1.0


----Gym 3rd Floor, The Swaston Hotel, Grand Mercure----
                venue  freq
0                 Bar   6.0
1       Cocktail Bar   4.0
2                Café   3.0
3      Shopping Mall   2.0
4    Sushi Restaurant   2.0


----Gym @ Abode 318----
                venue  freq
0                 Bar   3.0
1                Café   2.0
2       Cocktail Bar   2.0
```

```
3       Whisky Bar   2.0
4  Greek Restaurant   2.0
```

----Gym Room 3rd Floor, Mercure Hotel Melbourne----

	venue	freq
0	Bar	6.0
1	Cocktail Bar	4.0
2	Café	3.0
3	Shopping Mall	2.0
4	Sushi Restaurant	2.0

----Ibis Styles Gym----

	venue	freq
0	Hotel	3.0
1	Cocktail Bar	3.0
2	Coffee Shop	2.0
3	Theater	2.0
4	Café	2.0

----Langham Hotel Gym----

	venue	freq
0	Bar	5.0
1	Italian Restaurant	2.0
2	Performing Arts Venue	2.0
3	Greek Restaurant	1.0
4	Grocery Store	1.0

----Melbourne Tower Gym----

	venue	freq
0	Italian Restaurant	3.0
1	Hotel	3.0
2	Performing Arts Venue	2.0
3	Bar	2.0
4	Japanese Restaurant	2.0

----QV1 Apartment Gym & Pool----

	venue	freq
0	Bar	4.0
1	Café	3.0
2	Coffee Shop	2.0
3	Greek Restaurant	2.0
4	Whisky Bar	2.0

----Triptych Apartment Gym----

	venue	freq
0	Bar	4.0
1	Theater	4.0
2	Performing Arts Venue	3.0
3	Italian Restaurant	2.0
4	Exhibit	1.0

----Virgin Active Health Club----

```
                venue  freq
0        Cocktail Bar    4.0
1         Coffee Shop    2.0
2          Whisky Bar    2.0
3    Asian Restaurant    2.0
4  Japanese Restaurant   2.0
```

----juggernaut Personal Training @Dohertys Gym CBD----
```
              venue  freq
0               Bar   4.0
1   Pedestrian Plaza  1.0
2        Comic Shop   1.0
3          Creperie   1.0
4      Cupcake Shop   1.0
```
er 3

----Gym - Southside Tower----
```
                 venue  freq
0                 Café  11.0
1        Cluster Labels  3.0
2  Japanese Restaurant   2.0
3                  Pub   2.0
4          Supermarket   2.0
```

----Parkside Gym----
```
                 venue  freq
0                 Café  11.0
1        Cluster Labels  3.0
2  Japanese Restaurant   2.0
3          Coffee Shop   2.0
4          Supermarket   2.0
```

Cluster 2

----City Point Gym, Pool & Tennis Court----
```
                venue  freq
0    Korean Restaurant   5.0
1          Coffee Shop   5.0
2                 Café   4.0
3  Japanese Restaurant   3.0
4         Burger Joint   3.0
```

----Gym----
```
                venue  freq
0    Korean Restaurant   6.0
1                 Café   6.0
2          Coffee Shop   4.0
3  Japanese Restaurant   2.0
4        Cluster Labels  2.0
```

----Gym @ Blue Tower----
```
            venue  freq
0            Café   5.0
```

```
1        Coffee Shop   3.0
2   Greek Restaurant   2.0
3    Bubble Tea Shop   2.0
4               Bar    2.0


----Verve Milano Gym----
                venue  freq
0          Coffee Shop  3.0
1    Korean Restaurant  3.0
2       Cluster Labels  2.0
3                 Café  2.0
4   Chinese Restaurant  2.0


----Zen Harmony Gym----
                venue  freq
0    Korean Restaurant  5.0
1                 Café  3.0
2         Burger Joint  2.0
3   Chinese Restaurant  2.0
4           Donut Shop  2.0
```

Cluster 3

```
----Gym - Southside Tower----
                venue  freq
0                 Café 11.0
1       Cluster Labels  3.0
2   Japanese Restaurant 2.0
3                  Pub  2.0
4          Supermarket  2.0


----Parkside Gym----
                venue  freq
0                 Café 11.0
1       Cluster Labels  3.0
2   Japanese Restaurant 2.0
3          Coffee Shop  2.0
4          Supermarket  2.0
```

Section 5 – Discussion and Recommendation

Cluster 0 is deep red (predominantly situated in the central Melbourne however spreaded throughout East, North & South Melbourne areas). General most frequest venues are café, bar, desserts shop and Australian/Italian/Japanese/Korean restaurants.

Cluster 1 is purple colour(they are predominantly in the city, however few Gyms are in the South Melbourne). General most frequent venues are hotel,bar,casino, sushi Restaurant, shopping malls, theatres,performing arts venue and restaurants.

Cluster 2 is light blue (predominantly in the central Melbourne, few are in the North Side of the Melbourne). General most frequent venues are Korean restaurant,coffee shop,café,Chinese restaurant,Burger Joint,Japanese restaurant and bars.

Cluster 3 is light yellow (predominantly situated in the south Melbourne region).General most frequent venues are Café, Japanese restaurant, pub, coffee shop and supermarkets.

We can see café, bars,restaurants,desserts shop,shopping malls,theatres and supermarkets are most popular among these clusters due to location is based in predominantly city areas.

We can target the Cluster 1 from the above venues analysis. The reason of targeting Cluster 1 is the this cluster is spreaded only two areas which are melbourne city and South Melbourne where mix categories of hotels, bars, restaurants, performing arts, shopping malls where all types of prospects will be attracted to come for fitness purpose or for short retreat.

Section 6 – Conclusion

This project illustrates the data science approach to support a systematic analysis of neighborhoods with the help of FourSquare API data sources and analysis methods. This analysis will help Creative Org to choose the right location for future Gym/fitness centres in the Melbourne City and surrounding areas based on venue categories that is better to have around to make a healthy lifestyle image in the prospects mind.

Thank you!