Coursera – Applied DataScience Capstone – "The Battle of Neighborhoods"

Final project report by Bettina Weber

Comparative analysis using location data via Foursquare

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Introduction / Business Problem

Due tom its central geographic location and welcoming climate in general, Dubai is known for its international atmosphere. "It is estimated that there will be 20 million visitors in 2020".[1]

In addition to its multi-cultural population and capital flows, Dubai is becoming well known as a destination of choice for great food.

The mission of this project is to use Foursquare location data and regional clustering of venue information to determine what might be the "best" neighbourhood in Dubai to open a restaurant.

A review of Foursquare venue data showed, there are zero Mexican Restaurants listed on the site.

The proposal is therefore an analysis of the neighborhoods in Dubai for the consideration of opening a new Mexican Restaurant. The objective is to have a location that is within one of the more reasonable rent zones, but also within a close enough range (5km) to a "high" rent zone. The assumption that proximity to high rent neighborhoods would provide residents an option to travel to our new restaurant easily.

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[1] https://en.wikipedia.org/wiki/Tourism_in_Dubai

Data Overview

The data that is used for this analysis is a combination of a CSV file (Dubai.csv[2]) and the location / venue information in Foursquare.

We will first determine the most likely neighborhoods for a restaurant based on average rental prices and relative distance to a high rent center. In the case of Dubai, the three highest rent averages can be found in Palm Jumeirah, Jumeirah and Zabeel. We will then consider the total number of venues and additional criteria as proximity to a shopping center or offices for midday traffic to make a final determination.

The first step is to establish the neighborhoods in Dubai and a summary of their average rental prices. The average rental index is published annually and can be referrenced by a number of different websites[3]. We then make a calculation of the "Z-score" to standardize the data and sort from lowest to highest average rent. Using Google, the latitude and longitude of each neighborhood is looked up and entered on data file. This information is used to calculate the distance of each neighborhood from the highest rent regions and will also be entered to the Foursquare database for venue query later.

| Neighborhood | Avg Rent Per Unit | Z-Score | Average Distance from High Rent Areas | | | Latitude | Longitude | Low Rent Avg |
			Distance from Palm	Distance from Zabeel	Distance from Jumeirah			
Discovery Gardens	44,672	-1.53	8.18	26.15	20.73	25.039	55.1445	
Dubai Silicon Oasis	54,417	-1.30	24.96	13.31	16.39	25.1279	55.3863	
Jumeirah Village Circle	60,068	-1.17	9.16	20.56	16.13	25.0602	55.2094	
Dubai Sports City	62,753	-1.10	11.36	22.32	18.28	25.0391	55.2176	
Remraam	67,284	-0.99	16.71	25.27	22.27	25.0014	55.2508	
Al Furjan	73,648	-0.84	9.70	27.28	22.02	25.0252	55.1459	
Jumeirah Village Triangle	82,014	-0.64	8.87	22.78	18.04	25.0473	55.19	
Motor City	83,876	-0.60	12.61	20.90	17.42	25.045	55.2397	
Damac Hills	94,630	-0.34	16.40	22.41	19.37	25.0275	55.2524	
Al Sufouh	95,804	-0.31	0.70	17.88	12.02	25.1134	55.1762	
DIFC	105,183	-0.09	17.86	3.02	3.57	25.2106	55.2794	
Business Bay	105,682	-0.08	15.61	5.55	3.45	25.1832	55.2729	
Jumeirah Lakes Towers	106,352	-0.06	4.80	23.80	18.03	25.0693	55.1417	
Barsha Heights	111,804	0.07	4.10	19.08	13.48	25.097	55.1776	
Emirates Living	114,422	0.13	7.82	23.43	18.36	25.0496	55.174	
Dubai Marina	115,236	0.15	3.55	23.02	17.12	25.0805	55.1403	
Dubai Investments Park	116,379	0.18	15.30	30.13	25.71	24.979	55.1762	
Jumeirah Beach Residence	143,520	0.83	3.97	23.75	17.82	25.0769	55.1341	
Dubai Festival City	151,341	1.02	25.23	5.60	11.81	25.2171	55.3614	
Downtown	153,546	1.07	16.77	4.19	3.41	25.195	55.2784	
Zabeel	176,213	1.61	20.84	0.00	6.57	25.2231	55.3061	
Jumeirah	180,180	1.71	14.59	6.57	0.00	25.2016	55.2453	
Palm Jumeirah	204,430	2.29	0.00	20.84	14.59	25.1124	55.139	High Rent Avg

Target = Neighborhood with reasonable rent and close proximity to high rent area: Zabeel, Jumeirah or Palm Jumeirah

Using clustering techniques developed in prior exercises of the Capstone project, we will examine the most common venues by neighbourhood listed in Foursquare. When we cluster the data together and rank by most common, it appears that Mexican venues not registered in any of the neighborhoods, so it is safe to assume there would be minimum competition.

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[2] https://github.com/bettyweb/Coursera_Capstone/blob/master/Dubai.csv
[3] https://www.propertymonitor.ae/research/uae-communities-index/dubai-rental-index.html

Map of Dubai neighborhoods using Folium

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Business Bay	Restaurant	Middle Eastern Restaurant	Italian Restaurant	Tapas Restaurant	Chinese Restaurant
1	Deira	Asian Restaurant	Indian Restaurant	Vietnamese Restaurant	Japanese Restaurant	Brazilian Restaurant
2	Downtown	Middle Eastern Restaurant	American Restaurant	Restaurant	Asian Restaurant	Turkish Restaurant
3	Dubai Marina	Middle Eastern Restaurant	Italian Restaurant	Asian Restaurant	Restaurant	French Restaurant
4	Jebel Ali	Italian Restaurant	Seafood Restaurant	Ethiopian Restaurant	Indonesian Restaurant	Indian Restaurant
5	Jumeirah Beach	Restaurant	Thai Restaurant	Sushi Restaurant	Moroccan Restaurant	English Restaurant
6	Jumeirah Lake Towers	Italian Restaurant	Vietnamese Restaurant	Modern European Restaurant	Greek Restaurant	Indian Restaurant
7	Media City	Middle Eastern Restaurant	Italian Restaurant	French Restaurant	Fast Food Restaurant	Indonesian Restaurant
8	Old Dubai	Middle Eastern Restaurant	Vietnamese Restaurant	Fast Food Restaurant	Indonesian Restaurant	Indian Restaurant
9	Palm Jumeirah	Restaurant	Seafood Restaurant	Indian Restaurant	Brazilian Restaurant	English Restaurant

The remaining steps in the Capstone project will be to evaluate which neighbourhood is most suited using the criteria shown above: the rent index of the neighbourhood is close to the mean average rent in Dubai, the neighbourhood is located close to a high rent neighbourhood, the general restaurant in the neighbourhood is reasonable, and proximity to "other" venues such as business centers or malls is maximized.

Data Exploration

As shown above, a quick sort of average rent by neighborhood and geographic proximity to the high rent regions narrows our search to a few neighborhoods. Although other neighborhoods could be selected due to low rent, they may be too far away from an area that would have more propensity for residents to dine out. The regions shown in green are also high traffic areas for tourists due to their proximity to shopping senters and high density of hotel accomodation.

Therefore further analysis will focus on six neighborhoods: **Al Sufouh, DIFC, Business Bay, Jumeirah Lake Towers, Barsha Heights, and Dubai Marina.** Each is within 5km of a high rent district but is in

the middle of the Dubai rent index. Travel to the restaurant would give families an opportunity to go out without going too far, and delivery is also an option.

So then the question becomes, which of the neighborhoods is preferred? Aside from proximity to a high rent neighbourhood, we also want to take into consideration the amount of commercial activity in the selected neighbourhood, tourist traffic and relative competition from other restaurants. We have already established that there would not be many Mexican restaurants available, but we also do not want to enter a region that is over-crowded with options.

To begin this analysis, fist a master data frame of all venues in consideration is made, and then flagged any that had the word "restaurant" or "Hotel" as Venue type, dropping remaining.
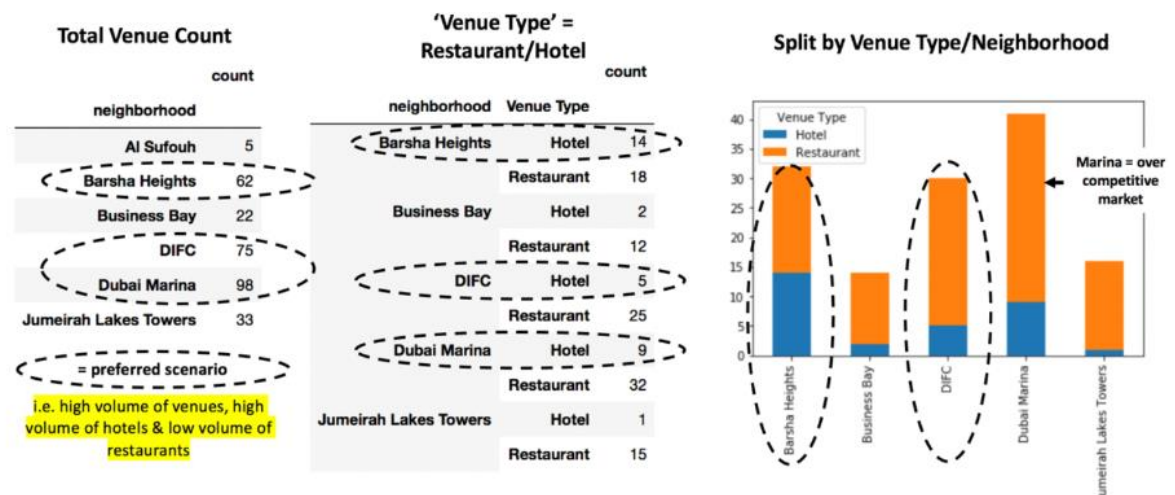
The outcome is to consider Barsha Heights or DIFC as a final consideration for launch of a new Mexican restaurant. Both list "Hotel" as the most common venue. Dubai Marian is a close third, given the volume of venues and hotels, but the number of restaurants is already very high.

	neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Barsha Heights	Hotel	Middle Eastern Restaurant	Italian Restaurant	Thai Restaurant	Hotel Bar
1	Business Bay	Restaurant	Italian Restaurant	Middle Eastern Restaurant	Hotel	Tapas Restaurant
2	DIFC	Hotel	Italian Restaurant	Restaurant	Indian Restaurant	Asian Restaurant
3	Dubai Marina	Hotel	Middle Eastern Restaurant	Italian Restaurant	Asian Restaurant	Restaurant
4	Jumeirah Lakes Towers	Italian Restaurant	Vietnamese Restaurant	Theme Restaurant	Modern European Restaurant	American Restaurant

Final Recommendation

At first glance, Barsha Heights seems preferable due to the fact it is one of the top three neighborhoods for volume of venues, and the ratio of restaurants to hotels is relatively less. However, after further consideration, Barsha Heights is only close to one high rent center, while DIFC has the added benefit of being close to three high rent centers.

In terms of relative popularity, **DIFC** would be the preferred location. The acronym stands for "Dubai International Finance Center". It is well know as the financial capital of the Middle East, attracting investors from al, across the region looking to impress clients. It is also home to Emirates Towers, which is known to be the location of the office of the ruler of Dubai and Vice President of the UAE.

Finally, in terms of culinary reputation, DIFC is known for some f Dubai's most prestigious restaurants. There is also a popular gallery section for art collectors.

Conclusion

In the end, DIFC would be the best choice considering all the factors: medium rental index, relative high volume of things to do for tourists and locals, it is a business center, it is close in proximity to other high rent neighborhoods, and the ratio of hotels to restaurants is not too high. Other neighborhoods that were considered were Barsha Heights and the Dubai Marina. Although Barsha Heights seems preferable given the low ratio of hotel venues to restaurants, it is not a particularly well known neighbourhood and people would likely not travel there specifically to eat. It is also only close to one of the high rent neighborhoods. Finally, Dubai Marina was not a preference as it is already saturated with restaurants.