

# Finding the best region to establish a 5-star hotel in the historical city of Isfahan

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Mohammadreza Dorkhah, [mohammadreza\\_dorkhah@yahoo.com](mailto:mohammadreza_dorkhah@yahoo.com)



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## Introduction

- Isfahan, a major historical city in Iran with a population of approximately 2.0 million, was once one of the largest cities in the world. Isfahan has many historical buildings, monuments, paintings, and artifacts. The fame of Isfahan led to the Persian pun and proverb "Esfahān nesf-e- jahān ast": Isfahan is half (of) the world. The Naghsh-e Jahan Square in Isfahan is one of the largest city squares in the world. UNESCO has designated it a World Heritage Site.
- Many tourists from all over the world annually visit this city, especially to see the historic sites, and it's expected that the number of tourists increase in coming years. However, the city already lacks enough high quality hotels to host the tourists.
- Therefore, an enterprise group intend to establish a new 5 Star hotel in this city and they look for the best place for this project. Their intention is to select a region with lowest density of highly quality hotels and highest density of historic sites and tourism attractions, in order to ensure the maximum profitability.

## Data

- ❑ The main source of this project was the information gathered through FourSquare API. This provided the data about all the venues in the different regions of Isfahan city. I could find the location, category and rating of the accommodations and tourism attractions through FourSquare.
- ❑ I also extracted some information from wikipedia using web scraping techniques. These information include the official regions of Isfahan city as well as their geographic location and area.
- ❑ My Python Notebook could be reached here:

[https://github.com/mdorkhah/Coursera\\_Capstone/blob/master/Isfahan\\_Hotel.ipynb](https://github.com/mdorkhah/Coursera_Capstone/blob/master/Isfahan_Hotel.ipynb)

## Methodology

- ❑ At first I was looking only for historic sites but I found that many tourism attractions are categorized by FourSquare as mosque, church, bridge, museum, etc., so I included them as well.
- ❑ Some venues had no rating. After considering different options, I assigned 5 to them which is a low rating.
- ❑ I used KMeans clustering in order to cluster the regions into four different clusters as below:
  - ❑ High accommodation rating, High tourism attractions rating
  - ❑ High accommodation rating, Low tourism attractions rating
  - ❑ Low accommodation rating, High tourism attractions rating
  - ❑ Low accommodation rating, Low tourism attractions rating

## Results

- ❑ The density of the target venues including accommodations and tourism attraction is different in different regions of Isfahan. Rationally most of the hotels are located in close vicinity of historic sites.
- ❑ I found out that the official districts or regions in Isfahan have not same area, so I used the area information to find venues that are located within different regions.
- ❑ There are a lot of places with no rating, that shows Iranian people are not well familiarized with FourSquare.

## Information

- 311 different venues found in Isfahan city and then filtered to extract the accommodations and tourism attractions with their corresponding ratings.

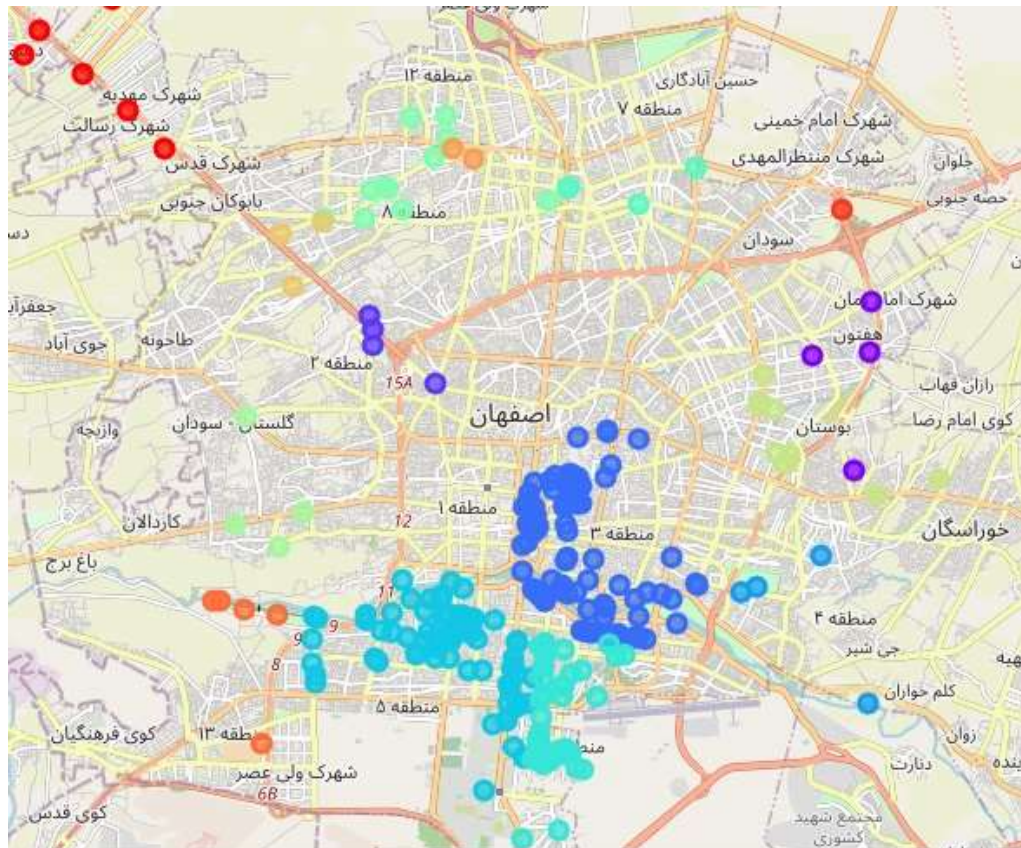
	Region	Region Latitude	Region Longitude	Venue	Venue ID	Venue Latitude	Venue Longitude	Venue Category
0	1	32.674274	51.738949	Kowsar Store   فروشگاه زنجیره‌ای کوثر	52b9b1b1498e74d5ee301622	32.680686	51.736004	Department Store
1	1	32.674274	51.738949	Khaneh Moallem Hostel   خانه معلم اصفهان	52ee7c81498efdf630e95d32	32.680174	51.724773	Hostel
2	1	32.674274	51.738949	Aftab Saloon	54c14ab7498e8530fdb260ac	32.661186	51.732885	Persian Restaurant
3	1	32.674274	51.738949	Tamadon Fish Market	5af6e22e32b61d002cb313bc	32.689170	51.736490	Fish Market
4	2	32.679096	51.631612	ورزشگاه ملت نوب آهن	563a3b50cd101fc97444c792	32.681897	51.637654	Football Stadium
...	...	...	...	...	...	...	...	...
307	15	32.728048	51.593674	بازار کوثر اصفهان	5a61a49260255e18e3b1b3da	32.720920	51.589530	Supermarket
308	15	32.728048	51.593674	Feren Harari Auto Clinic   کلینیک اتومبیل فرین	53eb6a4f498eded9dcbf5964	32.727006	51.580463	Auto Garage
309	15	32.728048	51.593674	Aria Complex	5a965c90270ee773ba36b771	32.739416	51.586471	Paper / Office Supplies Store
310	15	32.728048	51.593674	Ashayer Kebab House   کبابی و نرینی آشایر	598c3526345cbe1f605de379	32.734042	51.571990	Kebab Restaurant
311	15	32.728048	51.593674	موبایا هاندر	5a5ad1d2b6b04b446fda7efa	32.730057	51.568640	Mobile Phone Shop

- The table shows the average tourism attractions rating and average accommodations rating as well as their ratio for different regions.

	Cluster Labels	Region	Accommodations Rating	Tourism Attractions Rating	Ratio
3	2	5.0	6.4500	7.616667	1.180879
2	2	3.0	7.0875	8.143478	1.148992
1	1	2.0	5.0000	5.500000	1.100000
4	3	10.0	5.4500	5.000000	0.917431
0	3	1.0	5.6000	5.000000	0.892857
6	0	4.0	0.0000	0.000000	NaN
7	0	6.0	0.0000	0.000000	NaN
8	0	7.0	0.0000	0.000000	NaN
9	0	8.0	0.0000	0.000000	NaN
10	0	9.0	0.0000	0.000000	NaN
11	0	11.0	0.0000	0.000000	NaN
12	0	12.0	0.0000	0.000000	NaN
13	0	13.0	0.0000	0.000000	NaN
14	0	14.0	0.0000	0.000000	NaN
15	0	15.0	0.0000	0.000000	NaN

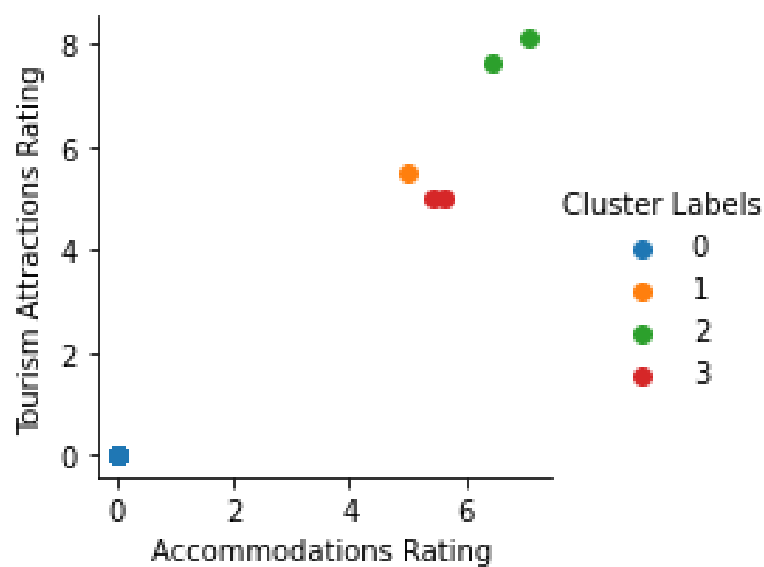
## Visualization

- The map and chart shows the dispersion of venues in different regions by different colours.



	Venue
Region	
3	94
5	82
6	46
8	11
10	9
15	6
13	5
1	4
2	4
4	4
7	4
9	4
11	3
12	2
14	1

- The scatter plot shows the four clusters of regions based on their average tourism attractions rating and their average accommodations rating.



## Discussion

- Regions in cluster 0 have no tourism attraction rating and consequently no accommodation rating. Clearly, they are not good locations for a new hotel.
- Region in cluster 1 has higher tourism attraction rating than accommodation rating. It may seem suitable at first glance, but when we consider the tourism attraction rating, it is very low. Therefore it could not be an attractive place for tourists, and so it doesn't worth to establish a high quality hotel in this location.
- Regions in cluster 3 have higher accommodation rating than tourism attraction rating. It means that they have enough hotels to serve the tourists with regard to their tourism attractions.
- Regions in cluster 2 have high tourism attraction rating and high accommodation rating. However, their tourism attraction ratings are higher than their accommodation ratings, so they are good choices of location for a new high quality hotel.

## Conclusion

- Regions 3 and 5 are the best locations to be introduced to the enterprise group.
- However, Region 5 is the best choice because it has the highest ratio of Tourism Attractions Rating to Accommodations Rating.





## Appendix

- ❑ The 15 regions of Isfahan city with their geographic location and area extracted by web scraping from wikipedia.

1	Name	Persian Name	Legal Urban Area	Total Area of jurisdictional limit	Population	Population Density	Location within Isfahan	Farsi	Persian
2	District 1	منطقه ۱ – Mantaqe ye Yek	8.10	8.10 km2	79091	9,764.3/km2	NaN	منطقه ۱	Mantaqe ye Yek
3	District 2	منطقه ۲ – Mantaqe ye Do	10.31	21.45 km2	69120	3,222.4/km2	NaN	منطقه ۲	Mantaqe ye Do
4	District 3	منطقه ۳ – Mantaqe ye Se	11.52	11.52 km2	110368	9,580.5/km2	NaN	منطقه ۳	Mantaqe ye Se
5	District 4	منطقه ۴ – Mantaqe ye Čahār	11.35	75.02 km2	133731	1,782.6/km2	NaN	منطقه ۴	Mantaqe ye Čahār
6	District 5	منطقه ۵ – Mantaqe ye Panj	17.02	60.02 km2	150885	2,513.6/km2	NaN	منطقه ۵	Mantaqe ye Panj
7	District 6	منطقه ۶ – Mantaqe ye Šeš	12.55	67.07 km2	112129	1,671.2/km2	NaN	منطقه ۶	Mantaqe ye Šeš
8	District 7	منطقه ۷ – Mantaqe ye Haft	13.57	28.57 km2	168732	5,905.6/km2	NaN	منطقه ۷	Mantaqe ye Haft
9	District 8	منطقه ۸ – Mantaqe ye Hašt	20.39	20.39 km2	239756	11,758.5/km2	NaN	منطقه ۸	Mantaqe ye Hašt
10	District 9	منطقه ۹ – Mantaqe ye Noh	10.54	20.25 km2	75168	3,712.0/km2	NaN	منطقه ۹	Mantaqe ye Noh
11	District 10	منطقه ۱۰ – Mantaqe ye Dah	16.27	21.46 km2	207803	9,683.3/km2	NaN	منطقه ۱۰	Mantaqe ye Dah
12	Rehnan (District 11)	منطقه ۱۱ – Mantaqe ye Yazdah رهنان - Rehnān	7.80	10.97 km2	58841	5,363.8/km2	NaN	منطقه ۱۱	Mantaqe ye Yazdah رهنان - Rehnān
13	District 12	منطقه ۱۲ – Mantaqe ye Davāzdah	14.78	82.23 km2	136376	1,658.5/km2	NaN	منطقه ۱۲	Mantaqe ye Davāzdah
14	District 13	منطقه ۱۳ – Mantaqe ye Sizdah	20.10	35.24 km2	132469	3,759.1/km2	NaN	منطقه ۱۳	Mantaqe ye Sizdah
15	District 14	منطقه ۱۴ – Mantaqe ye Čahārdah	9.40	19.38 km2	164850	8,506.2/km2	NaN	منطقه ۱۴	Mantaqe ye Čahārdah
16	Khorasgan (District 15)	منطقه ۱۵ – Mantaqe ye Pānzdah خراسگان - Xorāsgān	16.64	69.05 km2	121961	1,766.3/km2	NaN	منطقه ۱۵	Mantaqe ye Pānzdah خراسگان - Xorāsgān