

Background

Marriott Hotels recently opened a steakhouse in *New York Marriot Downtown*. Based on its success, the owners would be interested to open another steakhouse in one of its Chicago hotels.

Can we help to find a suitable location, based on similarity between hotels ?

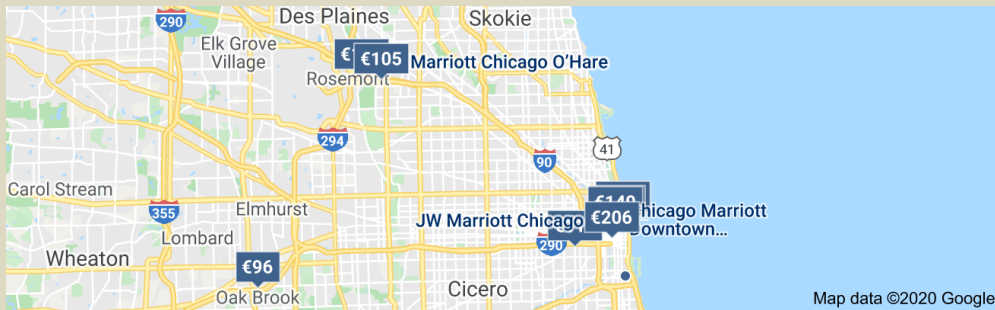


Marriott
INTERNATIONAL

Disclaimer: real names of the hotels were used for demonstration purposes only

Background

The company provided the list of candidate hotels located in Chicago for further consideration.



Which of the candidates is would have the most similar customer base to *New York Marriot Downtown* ?

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Background

The potential clientele can be divided into two main parts:

1) Hotel guests



2) City residents and tourists staying in other places



We should somehow address both of these factors !

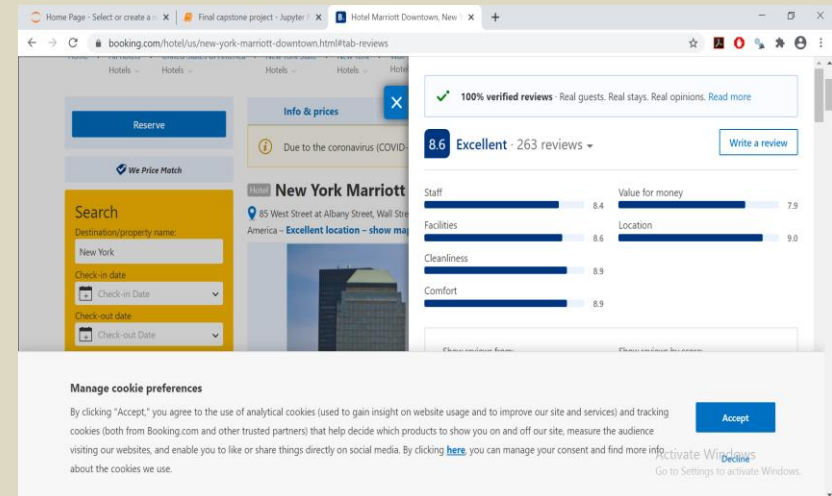
How can we do that using geolocation data provided by *FourSquare API* and some other publically available data ?

Data for evaluation of hotel guests similarity

Guests of the hotel might have similar attitudes when evaluating both hotel and eating establishments.

We used customer review data presented in www.bookings.com.

The collected data will serve as reviews profile of the hotel.

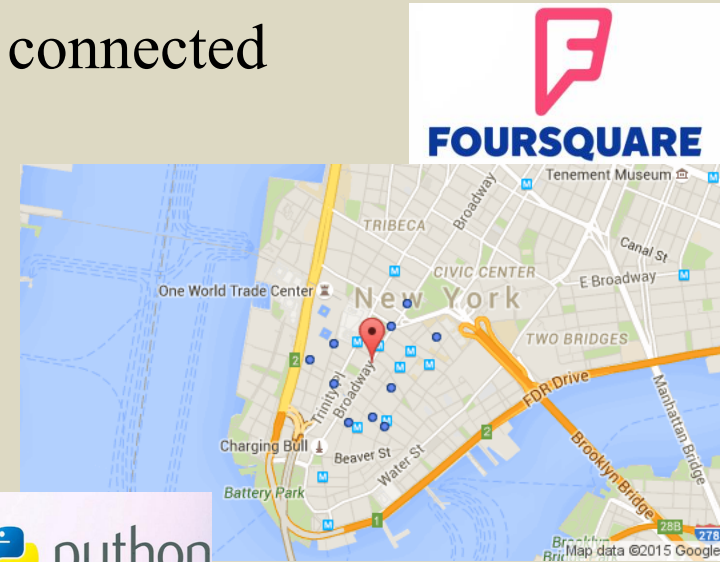
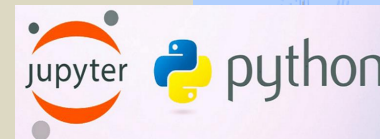


Name	Staff	Facilities	Cleanliness	Comfort	Value for money	Location
New York Marriott Downtown	8.4	8.6	8.9	8.9	7.9	9

Data for evaluation of neighborhoods similarity

Types of venues located nearby might be connected to the foot traffic of possible clientele.

We used *FourSquare API* to extract data about the types of venues located around the hotels.



The collected data will serve as neighborhood profile of the hotel.

Name	Sites	Shops	Foods	Restaurants	Steakhouses	Other
New York Marriott Downtown	0.280	0.290	0.210	0.070	0.010	0.140

Evaluation of features similarity

How similar are the reviews and/or neighborhood profiles of two different hotels ?

Name	Staff	Facilities	Cleanliness	Comfort	Value for money	Location
New York Marriott Downtown	8.4	8.6	8.9	8.9	7.9	9

Name	Staff	Facilities	Cleanliness	Comfort	Value for money	Location
Chicago Marriott Midway	8.3	8.3	9	8.8	7.6	8.6

To measure dissimilarity between profile vectors, we will estimate Euclidian distances:

$$d = \sqrt{(8.3 - 8.4)^2 + (8.3 - 8.6)^2 + \dots + (9 - 8.6)^2} = 20.28$$

Two types of analysis will be performed based on these measures:

- 1) Rank analysis (separate and combined)
- 2) Cluster analysis (k -nearest neighbors method)

Results: similarity of reviews profiles

Name	Distance	Rank
Chicago Marriott Southwest at Burr Ridge	20.5873	4
Chicago Marriott at Medical District/UIC	21.4152	7
JW Marriott Chicago	20.5117	3
Chicago Marriott Downtown Magnificent Mile	21.0884	6
Marriott Marquis Chicago	21.4551	8
Chicago Marriott Midway	20.2765	2
Marriott Chicago O'Hare	19.5790	1
Chicago Marriott Suites O'Hare	21.5638	9
Chicago Marriott Oak Brook	20.9445	5

Thus, based on customer reviews, the following three hotels are the most similar to the *New York Marriott Downtown*:

- 1) Marriott Chicago O'Hare
- 2) Chicago Marriott Midway
- 3) JW Marriott Chicago.

Results: similarity of neighborhood profiles

Name	Distance	Rank
Chicago Marriott Southwest at Burr Ridge	0.4264	8
Chicago Marriott at Medical District/UIC	0.3633	6
JW Marriott Chicago	0.2994	2
Chicago Marriott Downtown Magnificent Mile	0.3499	3
Marriott Marquis Chicago	0.3600	4.5
Chicago Marriott Midway	0.4315	9
Marriott Chicago O'Hare	0.4040	7
Chicago Marriott Suites O'Hare	0.2113	1
Chicago Marriott Oak Brook	0.3600	4.5

Thus, based on reviews profiles, the following three hotels are the most similar to the *New York Marriott Downtown*:

- 1) Chicago Marriott Suites O'Hare
- 2) JW Marriott Chicago.
- 3) Chicago Marriott Downtown Magnificent Mile

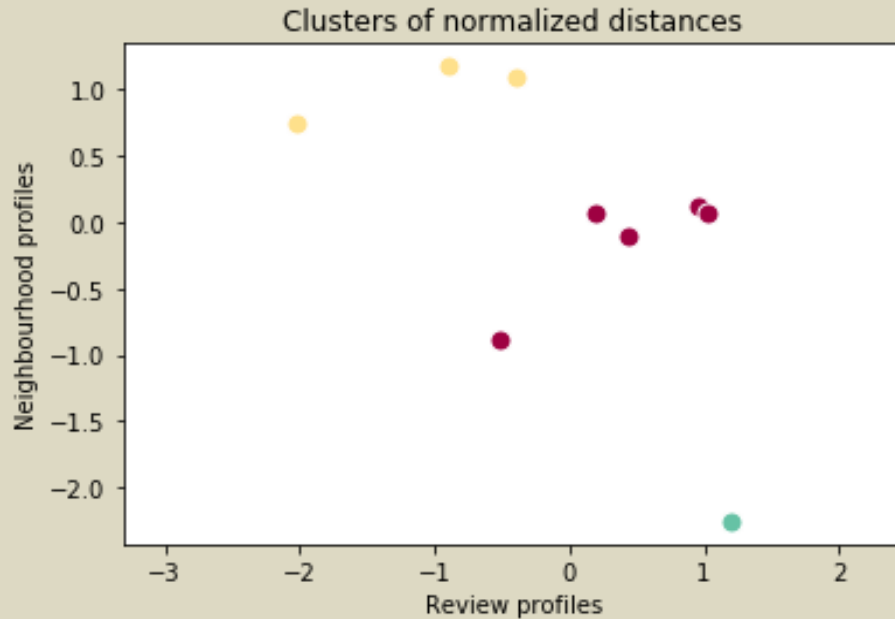
Results: combined similarity

Name	Reviews	Neighbourhood	Sum of ranks
Chicago Marriott Southwest at Burr Ridge	4	8	12
Chicago Marriott at Medical District/UIC	7	6	13
JW Marriott Chicago	3	2	5
Chicago Marriott Downtown Magnificent Mile	6	3	9
Marriott Marquis Chicago	8	4.5	12.5
Chicago Marriott Midway	2	9	11
Marriott Chicago O'Hare	1	7	8
Chicago Marriott Suites O'Hare	9	1	10
Chicago Marriott Oak Brook	5	4.5	9.5

Thus, *JW Marriot Chicago* is most similar to *New York Marriott Downtown*, based on the combined similarity measure (5):

- 1) 3rd most similar based on reviews;
- 2) 2nd most similar based on neighborhood similarity.

Results: cluster analysis



Cluster	Distance (reviews)	Distance (neighbourhood)
0	21.08	0.3465
1	20.15	0.4206
2	21.56	0.2113

Cluster analysis revealed three types of Chicago hotels based on similarity to New York Marriott Downtown:

- 1) average reviews similarity, average neighborhood similarity
- 2) higher reviews similarity, lower neighborhood similarity
- 3) lower reviews similarity, higher neighborhood similarity.

Results: cluster analysis

Name	Distance (reviews)	Distance (neighborhoods)	Cluster label
Chicago Marriott Southwest at Burr Ridge	20.5873	0.4264	1
Chicago Marriott at Medical District/UIC	21.4152	0.3633	0
JW Marriott Chicago	20.5117	0.2994	0
Chicago Marriott Downtown Magnificent Mile	21.0884	0.3499	0
Marriott Marquis Chicago	21.4551	0.3600	0
Chicago Marriott Midway	20.2765	0.4315	1
Marriott Chicago O'Hare	19.5790	0.4040	1
Chicago Marriott Suites O'Hare	21.5638	0.2113	2
Chicago Marriott Oak Brook	20.9445	0.3600	0

JW Marriot Chicago stands out among members of the ‘compromise’ Cluster 0, because it exhibits the closest similarity to *New York Marriott Downtown* based on both measures.

Conclusion

JW Marriot Chicago hotel can be viewed as the most similar hotel to the *New York Marriott Downtown*, based on combined evaluation of customer reviews and the types of venues located around the hotel.



Further considerations

Our preliminary analysis could be enhanced by using non public data or better access to *Foursquare API*:

- 1) Customer review data of locations around the hotel
- 2) Data about guests of the hotel (e.g., age, visiting duration, prices of rented rooms etc.)