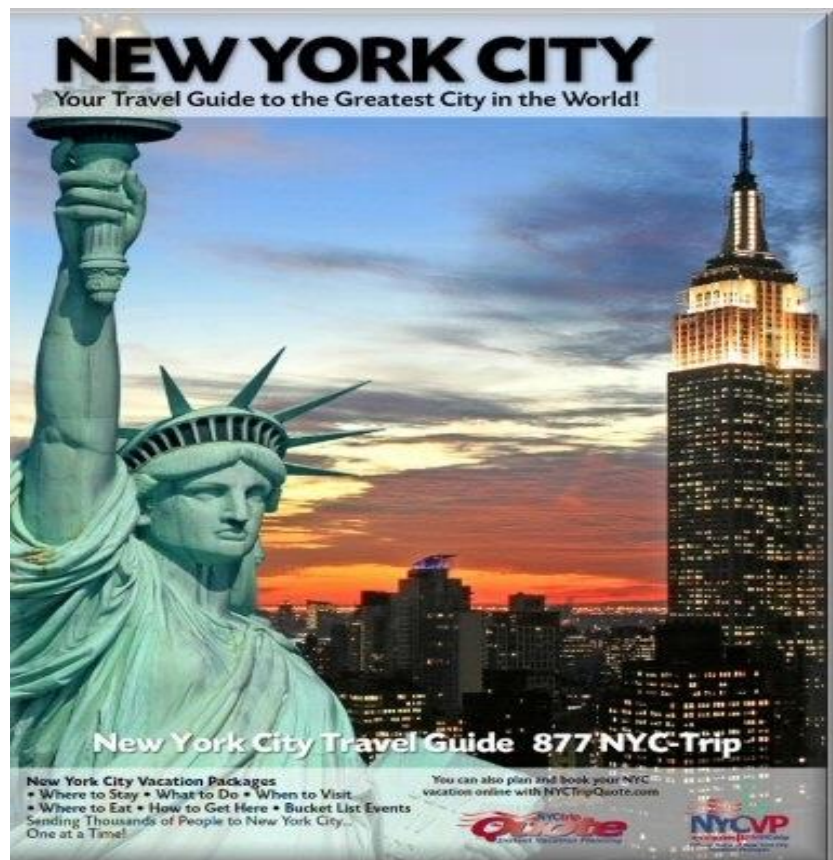


Applied Data Science Course – IBM Data Science

Final Project

The Battle of Neighborhoods

Analysis of Recommended Places for Tourists by A Travel Agency



Problem Information

The problem is to satisfy the tourist or group of tourists with the information requested by them about the places of leisure, entertainment and services located near the hotel where they will be staying, in this particular case near the Pennsylvania Hotel located at 401 7th Avenue, New York City, US 10001.

Providing this information to the tourist will help them to reduce the time in searching for these places and the time saved in it to take advantage of it to enjoy their stay in places of leisure, restaurant, entertainment or another place.

In order to satisfy this requirement, I must make use of data analysis tools.

Background

Tourists when they travel to new places, they look for tourist packages to know the most emblematic places of the visited country, generally visiting these tourist places occupy most of the day and they are mostly made during the morning and part of the afternoon, when the tourists return in in the afternoon and at night, they tend to visit places that are close to the hotel, for example:

- Rental Car Location.
- Bank.
- Nightclub.
- Theater,
- Movie Theater.
- National Park.

Having a list of information grouped by categories and ordered by rating, likes and distance helps a lot to the tourist to choose the suitable and recommended place where he would spend a pleasant and eliminating moment so that they waste time searching for this information that the travel agency could provide it in advance.

Required Data

The data necessary to resolve the requested information is:

Input data:

- The Hotel address and coordinates: latitude and longitude. This information is important since it will help to locate the places of leisure, entertainment and services located near the lodging hotel.
- The places of leisure, entertainment and services that are located near the hotel.

Output data:

- List or report of the places of leisure, entertainment and services located near the hotel.
- Distance between the hotel and the places.
- List by categories.
- List by Rating.
- Like List.
- Maps displaying localized places.
- In this section a description of the data and how it will be used to solve the problem is provided.

How to solve the Problem

The address of the hotel will be used as input data to obtain more data on the categories of venues requested by the tourist or group of tourists and using data preparation tools, data analysis and data visualization, I will be able to obtain the results desired and be able to deliver to the end user the information they will use.

Data Preparation

At First, I had needed to have the Latitude and Longitude of the Hotel, I used the foursquare API to get this data using: <https://api.foursquare.com/v2/venues/search?> Including in one of the parameters the name of the hotel:

The Latitude and Longitude of Hotel Pennsylvania Hotel are:

Lat: 40.749904 Longitude: -73.99104

Once I got the Latitude and Longitude of the hotel, I could find the venues related with the categories that the tourist wants to know using Foursquare API with the following parameters:

<https://api.foursquare.com/v2/venues/explore?>

Categories to search: Rental Car Location, Bank, Nightclub, Theater, Movie Theater, National Park.

- Latitude
- Longitude
- Query [Categories]

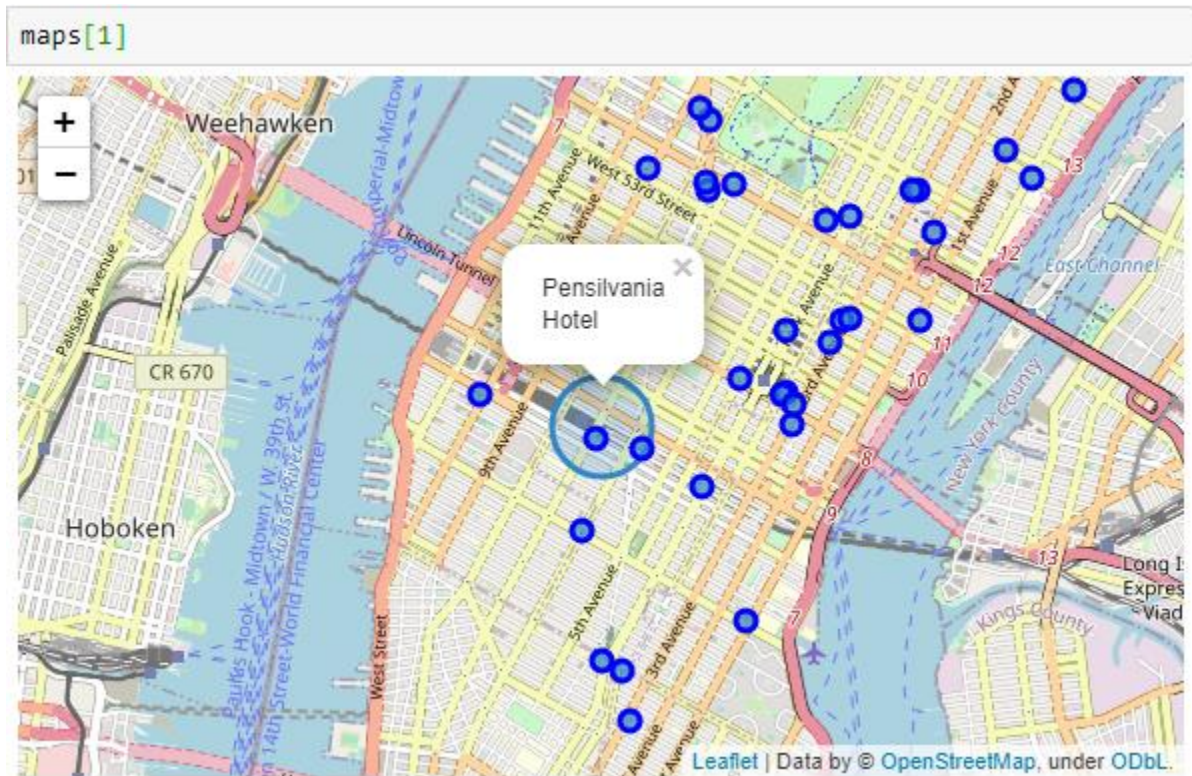
I have normalized the results using: json_normalize and move to a Pandas' Dataframe and this is the result:

	Category	Name	ID	Address	Lat	Lng
0	Rental Car Location	Enterprise Rent-A-Car	4ad49a36f964a5204fe820e3	106 W 24th St	40.743671	-73.992900
1	Rental Car Location	Enterprise Rent-A-Car	4b60f29bf964a520fb022ae3	667 11th Ave	40.765045	-73.995458
2	Rental Car Location	Enterprise Rent-A-Car	4ba7e70cf964a52045bd39e3	403 E 65th St	40.763286	-73.958469
3	Rental Car Location	Hertz	4ba4d846f964a5208dba38e3	210 W 77th St	40.782047	-73.979798
4	Rental Car Location	Hertz	4bfffd279f326ef3bcc2d0604	337 East 64th Street	40.763184	-73.960190
5	Rental Car Location	National Car Rental	4c28ab99d26eb713e64914d1	219 W 77th St	40.782299	-73.980380
6	Rental Car Location	National Car Rental	4e1591fbb61c42e7c54bfba0	252 W 40th St	40.755978	-73.990261

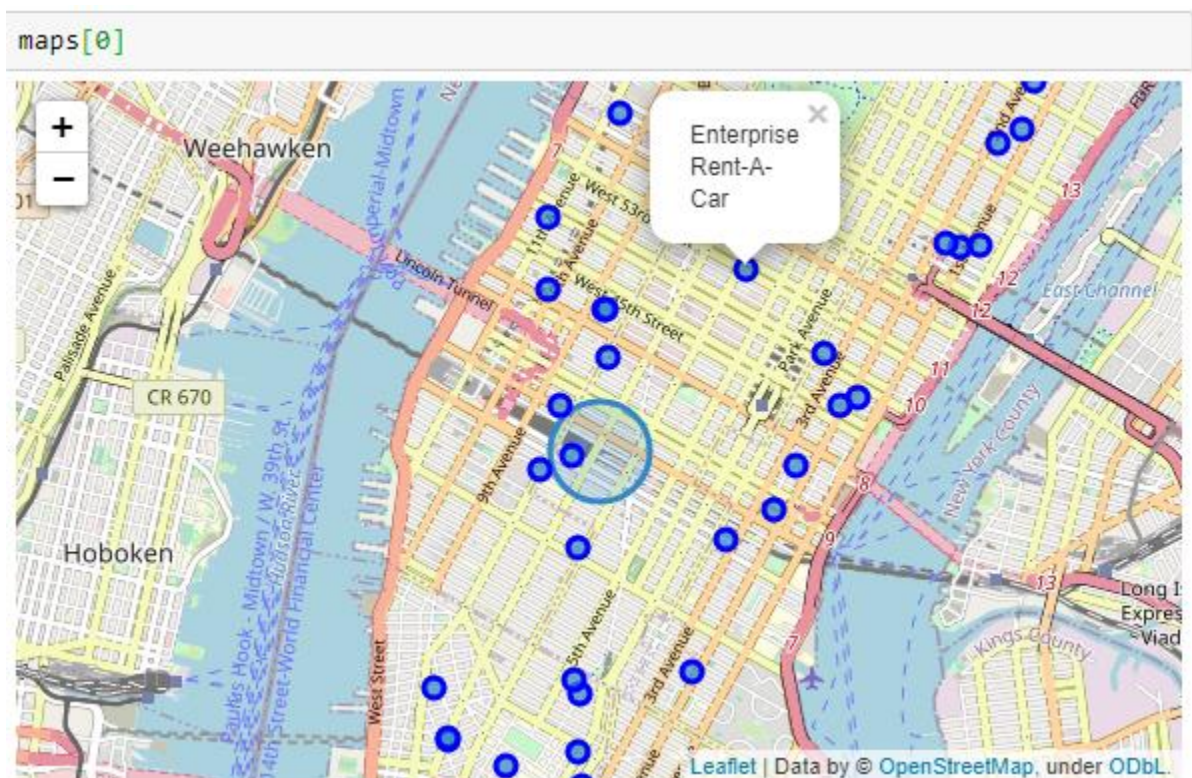
I have checked the venues number by categories:

Category	Category
Category	
Bank	50
Movie Theater	50
National Park	12
Nightclub	50
Rental Car Location	50
Theater	50

Using folium Map, I can generate a map with venues close to the Hotel by categories, for example the following map is showing the ATMs near to the Pennsylvania Hotel.



And the following map shows the Rental car companies near to the hotel:



I created another column called “Distance” to calculate distance between venues to the Hotel where using the library geodesic.

	Category	Name	ID	Address	Lat	Lng	Distance
0	Bank	PNC Bank	4cbf6aaa8db3b60c0a337878	11 Penn Plz, 7th & W 31st St	40.749092	-73.991528	0.06
1	Bank	Chase Bank	4b5f82d5f964a520b3be29e3	1801 2nd Ave	40.782544	-73.948631	3.17
2	Bank	Chase Bank	4b073450f964a52091f922e3	453 E 86th St	40.776331	-73.947175	2.94
3	Bank	Wells Fargo	4b43a8e5f964a5207de525e3	1755 Broadway	40.765674	-73.982180	1.18
4	Bank	Chase Bank	4c0182fef7ab0f47024316b6	1260 Broadway	40.748416	-73.987626	0.21
5	Bank	Citibank	4c49eb346594be9a11b3ba25	734 3rd Ave	40.753200	-73.972806	0.98
6	Bank	Chase Bank	581d85abbd2d737777605ec	350 W 125th St	40.810673	-73.953111	4.64
7	Bank	Chase Bank	4b507b54f964a520bf2427e3	333 E 23rd St	40.737284	-73.978685	1.09
8	Bank	Chase Bank	4bdf7aece75c0f4747f73cb03	179 E 116th St	40.798351	-73.940338	4.27
9	Bank	Wells Fargo	4b895382f964a520d62b32e3	143 Malcolm X Blvd	40.802986	-73.949380	4.27

```
# Showing the map by bank included venue's distance line with the hotel
mapsdist[1]
```



Create new columns 'Likes' and 'Rating'

```
# Create columns "Likes" and "Rating"
Datanyc['Likes'] = ''
Datanyc['Rating'] = ''
Datanyc.head(10)
```

	Category	Name	ID	Address	Lat	Lng	Distance	Likes	Rating
0	Bank	PNC Bank	4cbf6aaa8db3b60c0a337878	11 Penn Plz, 7th & W 31st St	40.749092	-73.991528	0.06		
1	Bank	Chase Bank	4b5dd8bbf964a5205e6f29e3	510 Park Ave	40.763530	-73.969768	1.46		
2	Bank	Chase Bank	4ba272b8f964a5207f937e3	181 E 90th St	40.781777	-73.952270	3		
3	Bank	Chase Bank	4c5186555ee81b8da6476200	994 1st Ave	40.756700	-73.963807	1.5		
4	Bank	Wells Fargo	4d6fc709a045721ec8792ab8	666 3rd Ave	40.751292	-73.974480	0.87		
5	Bank	Capital One Bank	4c4f2398f53d0f47c5aaada7	845 Third Ave	40.756854	-73.969715	1.22		
6	Bank	Chase Bank	4bcf6c01462cb71375add607	126 E 86th St	40.780798	-73.959105	2.71		
7	Bank	Chase Bank	4bc364554cdfc9b68a479721	633 3rd Ave	40.749926	-73.974756	0.85		
8	Bank	Chase Bank	4bdc7acbc79cc9287dbe86e9	1495 York Ave	40.771707	-73.950512	2.6		
9	Bank	Chase Bank	4d20ed27e56f6ea89a27791d	201 E 79th St	40.774406	-73.956906	2.46		

To fill it up the added columns, I have used the Foursquare API to be requested by individual venues within a loop using:

<https://api.foursquare.com/v2/venues/>

with the ID venue parameter required to used.

```
Datanyc.head(10)
```

	Category	Name	ID	Address	Lat	Lng	Distance	Likes	Rating
0	Bank	PNC Bank	4cbf6aaa8db3b60c0a337878	11 Penn Plz, 7th & W 31st St	40.749092	-73.991528	0.06	6	6.6
1	Rental Car Location	Avis Car Rental	4b7aa259f964a5209a342fe3	220 West 31st Street	40.749555	-73.993390	0.13	1	6.5
2	Bank	Chase Bank	4c0182fef7ab0f47024316b6	1260 Broadway	40.748416	-73.987626	0.21	5	6.1
3	Movie Theater	AMC 34th Street 14	45b893e3f964a520cf411fe3	312 W 34th St	40.752479	-73.994403	0.25	1253	6.5
4	Rental Car Location	Hertz	4c083dd37e3fc928040bf082	323 West 34th Street	40.752821	-73.994522	0.27	5	5.7
5	Rental Car Location	U-Haul Neighborhood Dealer	5263df76498ebb8d61ce2f86	629 W 50th Street	40.748627	-73.996131	0.28	1	6.5
6	Nightclub	Liberty Hall at Ace Hotel New York	4b65fd87f964a520f00c2be3	20 W 29th St	40.745838	-73.988097	0.32	25	7.0
7	Nightclub	230 Fifth Rooftop Lounge	4459f9bff964a520e1321fe3	230 5th Ave	40.744232	-73.988660	0.41	2759	8.0
8	Theater	Nederlander Theatre	4ef22ce4722eb49f525d2b06	208 W 41st St	40.755708	-73.988386	0.42	220	8.9
9	Rental Car Location	National Car Rental	4e1591fbb61c42e7c54bfa0	252 W 40th St	40.755978	-73.990261	0.42	1	6.9

With all this information in DataFrame, I could able to give information requesting by tourist like:

Top rating venues by category:

```
# Showing the top 5 Rating by Category
```

```
Datanyc_Group = Datanyc.groupby(['Category','Name', 'Address', 'Distance']).agg({'Rating':max})
Sorted_Data= Datanyc_Group['Rating'].groupby(level=0, group_keys=False)
Sorted_Data.nlargest(5)
```

Category	Name	Address	Distance	
Bank	Chase Bank	2824-26 Broadway	3.92	8.0
	JPMorgan Chase & Co. World Headquarters	270 Park Ave	0.93	8.0
	Chase Bank	610 Madison Ave	1.37	7.6
	Citibank	717 Avenue of the Americas	0.48	7.6
	TD Bank	1709 3rd Ave	3.26	7.5
Movie Theater	Metrograph	7 Ludlow St	2.41	9.4
	Regal Essex 14 & RPX	129 Delancey St	2.20	9.3
	AMC Loews 84th Street 6	2310 Broadway	2.64	9.2
	Film Forum	209 W Houston St	1.64	9.1
	IFC Center	323 Avenue of the Americas	1.40	9.1
National Park	Central Park	59th St to 110th St	2.73	9.7
	American Museum of Natural History	200 Central Park W	2.33	9.2
	Statue of Liberty	Liberty Island	5.03	9.1
	Governors Island	10 South Street New York, NY 10004-1921	4.44	8.9
	Gramercy Park	btwn Gramercy Park N & S	0.87	8.8
Nightclub	Le Bain	848 Washington St	1.11	8.8
	Studio 54	254 W 54th St	1.04	8.8
	Basement	52-19 Flushing Ave.	4.68	8.6
	Bathtub Gin	132 9th Ave	0.77	8.6
	Nublu	62 Avenue C	1.97	8.5
Rental Car Location	Sixt Rent A Car	20 Morris St	3.26	7.8
	Enterprise Rent-A-Car	106 W 24th St	0.44	7.5
	Hertz	18 Morton Street	1.46	7.4
	Enterprise Rent-A-Car	667 11th Ave	1.07	7.3
		221 Thompson St	1.48	7.2
Theater	Lincoln Center for the Performing Arts	70 Lincoln Center Plz	1.60	9.5
	Minskoff Theatre	1515 Broadway	0.59	9.5
	David H. Koch Theater	Lincoln Center Plaza	1.60	9.4
	New Amsterdam Theater	214 W 42nd St	0.43	9.4
	Radio City Music Hall	1260 Avenue of the Americas	0.92	9.4

Name: Rating, dtype: float64

Top Likes venues by Category

```
# Showing the top 10 Likes by Category
```

```
Datanyc_Group1 = Datanyc.groupby(['Category','Name', 'Address']).agg({'Likes':max})
Sorted_Data1= Datanyc_Group1['Likes'].groupby(level=0, group_keys=False)
Sorted_Data1.nlargest(5)
```

Category	Name	Address	
Bank	JPMorgan Chase & Co. World Headquarters	270 Park Ave	139
	Wells Fargo	1755 Broadway	16
	Citibank	717 Avenue of the Americas	13
	TD Bank	47 3rd Ave	13
	Chase Bank	2824-26 Broadway	11
Movie Theater	AMC Lincoln Square 13	1998 Broadway	2826
	AMC Empire 25	234 W 42nd St	2226
	Regal Union Square ScreenX & 4DX	850 Broadway	2213
	AMC Kips Bay 15	570 2nd Ave	1633
	Regal Battery Park	102 North End Ave.	1374
National Park	Central Park	59th St to 110th St	21541
	American Museum of Natural History	200 Central Park W	11409
	Statue of Liberty	Liberty Island	4275
	Governors Island	10 South Street New York, NY 10004-1921	915
	Gramercy Park	btwn Gramercy Park N & S	297
Nightclub	230 Fifth Rooftop Lounge	230 5th Ave	2759
	Webster Hall	125 E 11th St	1625
	Le Bain	848 Washington St	1576
	Lavo	39 E 58th St	1432
	Bathtub Gin	132 9th Ave	1244
Rental Car Location	Avis Car Rental	225 East 43rd Street, (Between 2nd Ave & 3rd Ave)	19
	Hertz	310 East 48th Street	17
	Enterprise Rent-A-Car	221 Thompson St	13
		106 W 24th St	11
	Hertz	355 East 76th Street	11
Theater	Radio City Music Hall	1260 Avenue of the Americas	3287
	The McKittrick Hotel	530 W 27th St	1394
	Lincoln Center for the Performing Arts	70 Lincoln Center Plz	1368
	Minskoff Theatre	1515 Broadway	1327
	Beacon Theatre	2124 Broadway	1269

Name: Likes, dtype: int64

Top venues with minimum distance to the Hotel by category:

```
# The top 10 Category by minimum Distance to the Hotel
```

```
Datanyc_Group = Datanyc.groupby(['Category','Name', 'Address']).agg({'Distance':max})
```

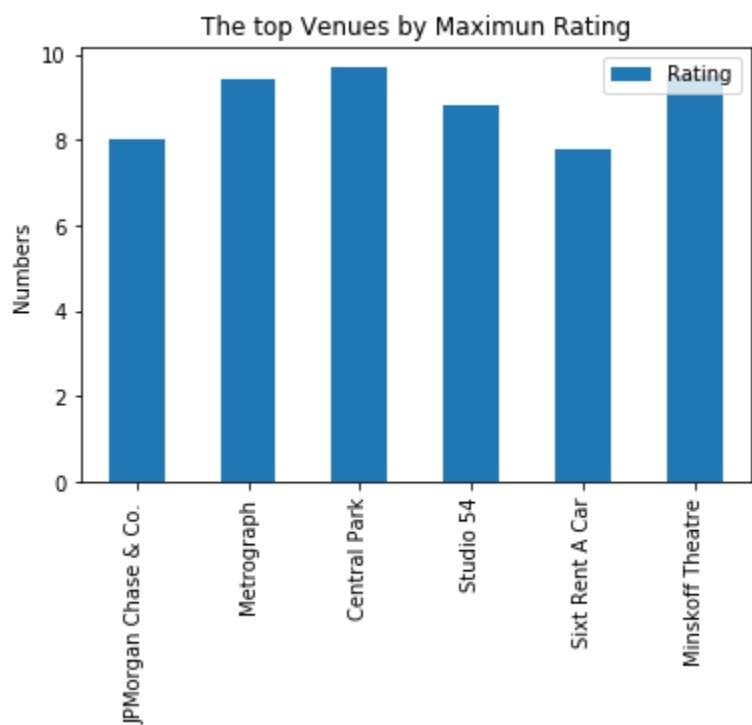
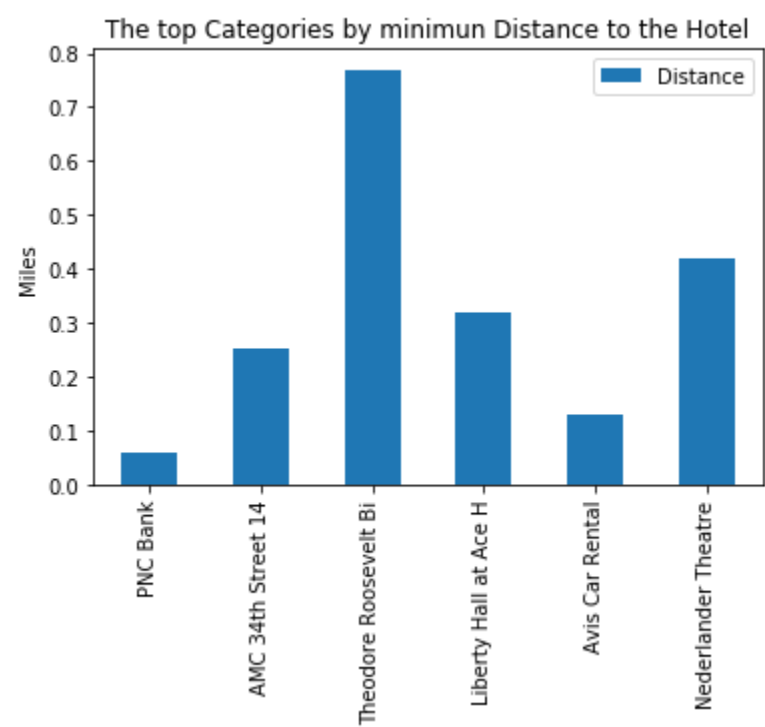
```
Sorted_Data= Datanyc_Group['Distance'].groupby(level=0, group_keys=False)
```

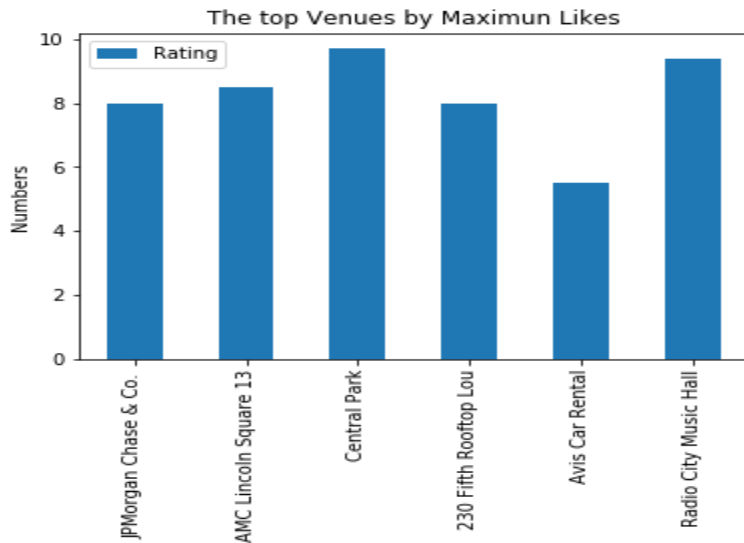
```
Sorted_Data.nsmallest(5)
```

Category	Name	Address	
Bank	PNC Bank	11 Penn Plz, 7th & W 31st St	0.06
	Chase Bank	1260 Broadway	0.21
	Citibank	717 Avenue of the Americas	0.48
	Chase Bank	2 Park Ave	0.53
	Wells Fargo Bank	500 W 30th St	0.56
Movie Theater	AMC 34th Street 14	312 W 34th St	0.25
	AMC Empire 25	234 W 42nd St	0.49
	Cinépolis Chelsea	260 W 23rd St	0.50
	Regal E-Walk 4DX & RPX	247 W. 42nd St.	0.50
	The POP Bag	260 W 23rd St	0.51
National Park	Theodore Roosevelt Birthplace National Historic Site	28 E 20th St	0.77
	Gramercy Park	btwn Gramercy Park N & S	0.87
	Stonewall National Monument	Christopher Street	1.28
	American Museum of Natural History	200 Central Park W	2.33
	Columbus Park	49 Mulberry St	2.41
Nightclub	Liberty Hall at Ace Hotel New York	20 W 29th St	0.32
	230 Fifth Rooftop Lounge	230 5th Ave	0.41
	The Seville	22 E 29th St	0.46
	Sky Room	330 W 40th St	0.47
	Squares	East 26th	0.60
Rental Car Location	Avis Car Rental	220 West 31st Street	0.13
	Hertz	323 West 34th Street	0.27
	U-Haul Neighborhood Dealer	629 W 50th Street	0.28
	National Car Rental	252 W 40th St	0.42
	Enterprise Rent-A-Car	106 W 24th St	0.44
Theater	Nederlander Theatre	208 W 41st St	0.42
	New Amsterdam Theater	214 W 42nd St	0.43
	Lyric Theatre	213 W 42nd St	0.48
	Aladdin @ New Amsterdam Theatre	214 West 42nd Street, New York, NY 10036	0.53
	SVA Theatre	333 W 23rd St	0.53

Name: Distance, dtype: float64

And some bar charts graphics:





Conclusion

The purpose of this project has been satisfied the requirement of tourist about specific category venues:

- Rental Car Location.
- Bank.
- Nightclub.
- Theater,
- Movie Theater.
- National Park.

Containing information like:

- List or report of the places of leisure, entertainment and services located near the hotel.
- Distance between the hotel and the places.
- List by categories.
- List by Rating.
- Venue's Like List.
- Maps displaying localized places.

This information requested by the tourist has been possible using the analysis tools and the Foursquare API. It can include many improvements of course, including the main categories of places that a tourist may need in advance to help him better plan his stay and even help to plan reservations for tourist places, restaurants, ballroom, etc.