1. **Introduction & Business Problem:**

   The City of New York, is the most populous city in the United States. It is diverse and is the financial capital of USA. It is multicultural. It provides a lot of business opportunities and business friendly environment. It has attracted many different players into the market. It is a global hub of business and commerce. The city is a major center for banking and finance, retailing, world trade, transportation, tourism, real estate, new media, traditional media, advertising, legal services, accountancy, insurance, theater, fashion, and the arts in the United States. This also means that the market is highly competitive. As it is highly developed city so cost of doing business is also one of the highest. Thus, any new business venture or expansion needs to be analyzed carefully. The insights derived from analysis will give good understanding of the business environment which help in strategically targeting the market. This will help in reduction of risk and the Return on Investment will be reasonable.

   Business Problem

   The City of New York is famous for its vibrant night life. New York's id emerges each night; a nocturnal other half every bit as essential to its identity as its business-hours alter ego. Hence, opening a new night club will not only enrich this culture but also have a smaller chance of failure if done right. Hence, with the following data and analysis, we'll be able to deduce the most optimum spot to open a night club.

   While social media and dating apps have perhaps reduced the perceived need for in-person socializing and meeting new people, platforms like Instagram have also allowed us to discover new venues and parties in real time. That, in turn, has pushed proprietors and party masters to create new attention-worthy experiences and moments that'll inspire people to get off their couches.

   My client wants to open his business in Manhattan area, so I focus on that borough during my analysis. We define potential neighborhood based on the number of night life stops which are operating right in each neighborhood. Manhattan has full potential but also is a very challenging district to open a business because of high competition. New night club should be open in an area that inadequate neighborhood in this way the

business can attract more customers. Therefore, this analysis necessary to ensure that we have enough customers and that we are not so close to other night clubs.

2. Data

Data 1: Neighborhood has a total of 5 boroughs and 306 neighborhoods. In order to segment the neighborhoods and explore them, we will essentially need a dataset that contains the 5 boroughs and the neighborhoods that exist in each borough as well as the latitude and longitude coordinates of each neighborhood. This dataset exists for free on the web. Link to the dataset is: https://geo.nyu.edu/catalog/nyu_2451_34572

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

Data2: Newyork city geographical coordinates data will be utilized as input for the Foursquare API, that will be leveraged to provision venues information for each neighborhood. We will use the Foursquare API to explore neighborhoods in New York City. The below is image of the Foursquare API data. The nightlife Spot category Id 4d4b7105d754a06376d81259 is used for retrieving data from Foursquare API.

3. Methodology

In this project, I will use the basic methodology as taught in Week 3 lab.

	Borough	Neighborhood	Latitude	Longitude
0	Manhattan	Marble Hill	40.876551	-73.910660
1	Manhattan	Chinatown	40.715618	-73.994279
2	Manhattan	Washington Heights	40.851903	-73.936900
3	Manhattan	Inwood	40.867684	-73.921210
4	Manhattan	Hamilton Heights	40.823604	-73.949688

Above, I have done convert addresses into their equivalent latitude and longitude values. Then we will use the Foursquare API to explore neighborhoods in Manhattan,

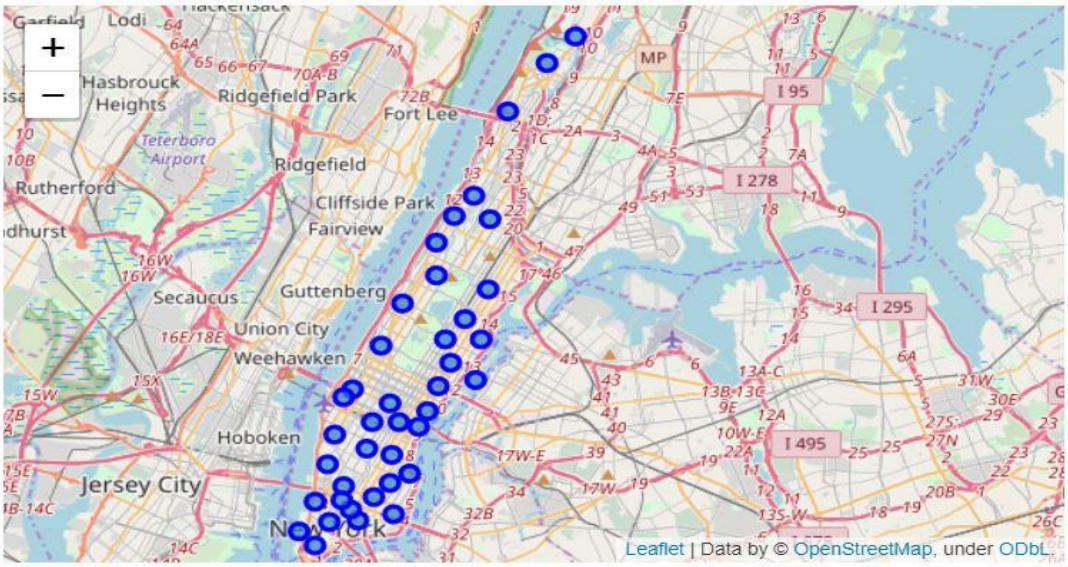
New York. After that, explore the function to get Nightlife Spots categories in each neighborhood.

```
newyork_venues_NightLifeSpots.head()
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.91066	Applebee's Grill + Bar	40.873685	-73.908928	American Restaurant
1	Marble Hill	40.876551	-73.91066	Rowes Wharf Bar	40.883200	-73.910000	Bar
2	Marble Hill	40.876551	-73.91066	Indian Road Café	40.872922	-73.918459	Café
3	Marble Hill	40.876551	-73.91066	Irish Eyes	40.868928	-73.917465	Pub
4	Marble Hill	40.876551	-73.91066	Beach Walk at Sea Bright	40.886700	-73.911600	Beach Bar

```
newyork_venues_NightLifeSpots.shape
```

```
(1986, 7)
```

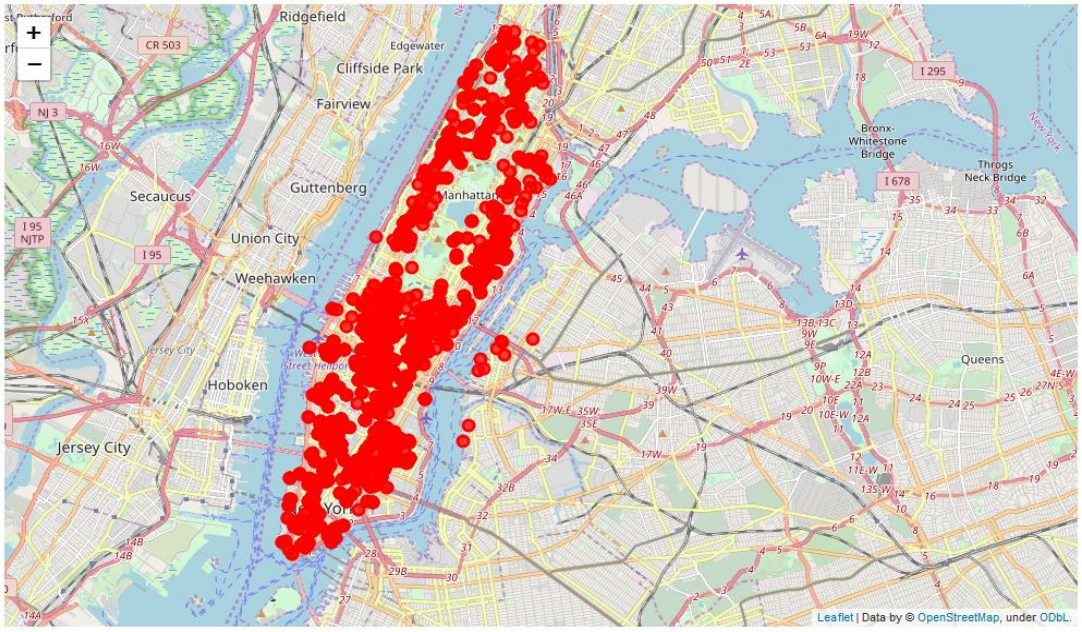


Nightlife Spots in Manhattan

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.91066	Applebee's Grill + Bar	40.873685	-73.908928	American Restaurant
1	Marble Hill	40.876551	-73.91066	Rowes Wharf Bar	40.883200	-73.910000	Bar
2	Marble Hill	40.876551	-73.91066	Indian Road Café	40.872922	-73.918459	Café
3	Marble Hill	40.876551	-73.91066	Irish Eyes	40.868928	-73.917465	Pub
4	Marble Hill	40.876551	-73.91066	Beach Walk at Sea Bright	40.886700	-73.911600	Beach Bar

Then use this feature to group the neighborhoods into clusters K-means clustering algorithm will be use to complete this task. And also, the Folium library to visualize the neighborhoods in Manhattan and its emerging clusters.

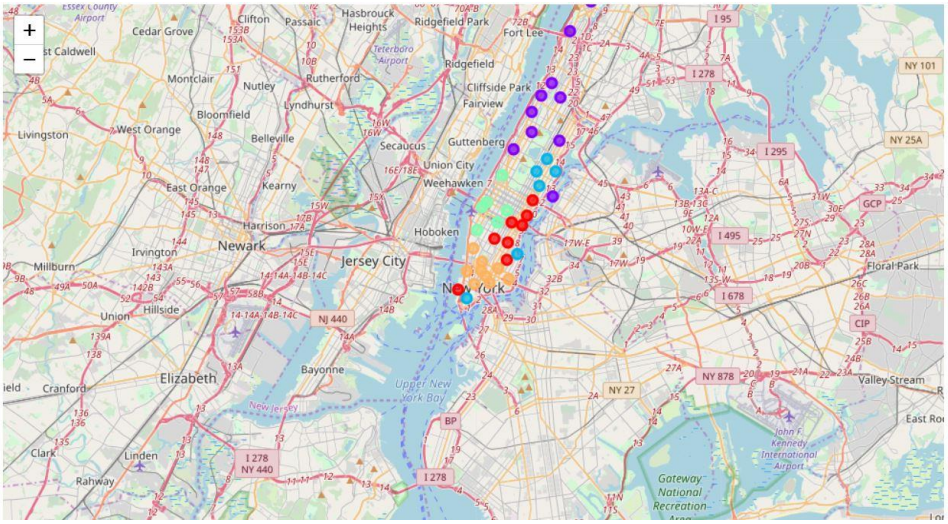
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Battery Park City	Bar	Cocktail Bar	American Restaurant	Pub	Beer Garden	Hotel Bar	Burger Joint	Wine Bar	Gastropub	Café
1	Carnegie Hill	Bar	Cocktail Bar	Pub	Sports Bar	Coffee Shop	Wine Bar	New American Restaurant	Roof Deck	Indian Restaurant	Residential Building (Apartment / Condo)
2	Central Harlem	Bar	Lounge	Cocktail Bar	Other Nightlife	Hookah Bar	American Restaurant	Tapas Restaurant	Wine Bar	Beer Bar	Nightclub
3	Chelsea	Bar	Cocktail Bar	Gay Bar	Nightclub	American Restaurant	Lounge	Mediterranean Restaurant	New American Restaurant	Gastropub	Coffee Shop
4	Chinatown	Cocktail Bar	Dive Bar	Bar	Lounge	Beer Bar	Hotel Bar	American Restaurant	Gastropub	Sports Bar	Karaoke Bar



4. Results

K-mean Cluster Using K-mean to clustering data area with a smaller number of nightlife spots

Cluster



Cluster 1

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 0, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape
```

	Neighborhood	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
16	Murray Hill	Bar	American Restaurant	Lounge	Cocktail Bar	Gastropub	Speakeasy	Irish Pub	Hotel Bar	Pub	Mexican Restaurant
19	East Village	Bar	Cocktail Bar	Pub	American Restaurant	Dive Bar	Speakeasy	Lounge	Café	Gastropub	Nightclub
27	Gramercy	Bar	American Restaurant	Speakeasy	Cocktail Bar	Gastropub	Mexican Restaurant	Lounge	Pub	Hookah Bar	Sake Bar
28	Battery Park City	Bar	Cocktail Bar	American Restaurant	Pub	Beer Garden	Hotel Bar	Burger Joint	Wine Bar	Gastropub	Café
34	Sutton Place	Bar	Hotel Bar	Cocktail Bar	Lounge	Beer Bar	American Restaurant	Pub	Beer Garden	Sports Bar	Restaurant
35	Turtle Bay	Bar	American Restaurant	Pub	Cocktail Bar	Beer Garden	Lounge	Café	Seafood Restaurant	Italian Restaurant	Hotel
36	Tudor City	Bar	American Restaurant	Cocktail Bar	Pub	Korean Restaurant	Seafood Restaurant	Jazz Club	Beer Bar	Hotel	Italian Restaurant
38	Flatiron	Bar	American Restaurant	Cocktail Bar	Italian Restaurant	Nightclub	Gastropub	Pub	Sports Bar	Speakeasy	Lounge

Cluster 2

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape
```

	Neighborhood	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
8	Upper East Side	Bar	Cocktail Bar	Pub	Sports Bar	Italian Restaurant	Wine Bar	New American Restaurant	Burger Joint	Roof Deck	Ice Cream Shop
9	Yorkville	Bar	Pub	Cocktail Bar	Wine Bar	Coffee Shop	New American Restaurant	Sports Bar	Italian Restaurant	Piano Bar	Diner
10	Lenox Hill	Bar	Cocktail Bar	Pub	Gastropub	Hotel Bar	Wine Bar	Restaurant	Beer Garden	Burger Joint	Italian Restaurant
29	Financial District	Bar	Cocktail Bar	Pub	Hotel Bar	American Restaurant	Beer Garden	Mexican Restaurant	Burger Joint	Hotel	Mediterranean Restaurant
30	Carnegie Hill	Bar	Cocktail Bar	Pub	Sports Bar	Coffee Shop	Wine Bar	New American Restaurant	Roof Deck	Indian Restaurant	Residential Building (Apartment / Condo)
37	Stuyvesant Town	Bar	Cocktail Bar	Speakeasy	Wine Bar	Mexican Restaurant	Hookah Bar	Gay Bar	Dive Bar	Pub	American Restaurant

Cluster 3

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 3, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape
```

	Neighborhood	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
13	Lincoln Square	Bar	Gay Bar	American Restaurant	Hotel	Cocktail Bar	Pub	Lounge	Mexican Restaurant	Hotel Bar	Burrito Place
14	Clinton	Bar	Cocktail Bar	Lounge	Gay Bar	Coffee Shop	Sports Bar	Bowling Alley	English Restaurant	Pub	Gastropub
15	Midtown	Bar	Cocktail Bar	Lounge	Gay Bar	American Restaurant	Hotel	Burger Joint	Bowling Alley	Sports Bar	Japanese Restaurant
17	Chelsea	Bar	Cocktail Bar	Gay Bar	Nightclub	American Restaurant	Lounge	Mediterranean Restaurant	New American Restaurant	Gastropub	Coffee Shop
33	Midtown South	Bar	American Restaurant	Lounge	Cocktail Bar	Sports Bar	Coffee Shop	Nightclub	Bowling Alley	Tiki Bar	Seafood Restaurant
39	Hudson Yards	Bar	Cocktail Bar	Lounge	Pub	Hotel Bar	Bowling Alley	Nightclub	Gay Bar	Restaurant	Dive Bar

Cluster 4

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 4, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape
```

	Neighborhood	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
1	Chinatown	Cocktail Bar	Dive Bar	Bar	Lounge	Beer Bar	Hotel Bar	American Restaurant	Gastropub	Sports Bar	Karaoke Bar
18	Greenwich Village	Cocktail Bar	Lounge	American Restaurant	Bar	Burger Joint	Beer Bar	Italian Restaurant	Pub	Hotel Bar	New American Restaurant
20	Lower East Side	Cocktail Bar	Bar	Dive Bar	Lounge	Speakeasy	American Restaurant	Café	Beer Bar	Gastropub	Hotel Bar
21	Tribeca	Cocktail Bar	Bar	Burger Joint	Pub	Speakeasy	Italian Restaurant	Wine Bar	New American Restaurant	Hotel Bar	American Restaurant
22	Little Italy	Cocktail Bar	Dive Bar	American Restaurant	Beer Bar	Hotel Bar	Lounge	Bar	Gastropub	Sports Bar	Rock Club
23	Soho	Cocktail Bar	Lounge	Hotel Bar	Dive Bar	Bar	Beer Bar	American Restaurant	Speakeasy	Wine Bar	Gastropub
24	West Village	Cocktail Bar	Bar	Italian Restaurant	New American Restaurant	Gay Bar	Speakeasy	Burger Joint	French Restaurant	Nightclub	Roof Deck
31	Noho	Cocktail Bar	Bar	American Restaurant	Lounge	Dive Bar	Beer Bar	Hotel Bar	Gastropub	Rock Club	Italian Restaurant
32	Civic Center	Cocktail Bar	Bar	Burger Joint	Wine Bar	Pub	Beer Garden	Dive Bar	Hotel Bar	Hotel	Karaoke Bar

Based on dataframe analysis above Cluster 3 (Lincoln Square) and Cluster 4 (Chinatown) areas are the best places to open a new night life spot (Cocktail Bar) business.

5. Discussion

In this section, I would be discussing the observations I have noted and the recommendation that I can make based on the results.

This analysis is performed on limited data. This may be right or may be wrong. But if a good amount of data is available there is the scope to come up with better results. It can be done more detailed analysis by adding other factors such as transportation, demographics of inhabitants. Finally, Foursquare proved to be a good source of data but frustrating at times. Despite having a Developer account, I regularly exceeded my hourly limit locking me out for the day.

6. Conclusion

Although all of the goals of this project were met there is definitely room for further improvement and development as noted below. However, the goals of the project were met and, with some more work, could easily be developed into a fully pledged application that could support the opening a business idea in an unknown location.

As per the neighborhood or restaurant type mentioned like nightlife spots analysis can be checked. A venue with lowest risk and competition can be identified.