# The Battle of Neighborhoods – Report

## 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 lot of business opportunities and business friendly environment. It has attracted many different players into the market. It is 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, theatre, 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 analysed 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 the Investment will be reasonable.

## Business Problem

The City of New York is famous for its excellent cuisine. Its food culture includes an array of international cuisines influenced by the city's immigrant history. Sushi restaurants have become so popular in the United States now it seems that there one on every corner, not only in major cities but also in smaller cities. Starting a sushi restaurant can be a great business opportunity, but you need to distinguish yourself from others to enjoy long-term success.

If you plan a real restaurant that can demand higher prices for fresh fish, delivered daily from japan, focus on neighborhoods and outlets that already attract a sophisticated Japanese client. If u plan a cheap buffet restaurant, points to masses looking for affordable high-traffic locations with large shopping centers and other local points of interest.

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 sushi bars 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 sushi bar should be open in an area that inadequate neighborhood on this way the bar can attract more customers. Therefore, this analysis necessary to ensure that we have enough customers and that we are not so close to other sushi places.

## 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 hhtps://geo.nyu.edu/catalog/nyu_2451_344572

[3]:

| | 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 |

**Data 2:** New York city geographical coordinates data will be utilized as input for the Foursquare API, that will he leveraged to provision venues information for each neighborhood. We will use the Forsquare API to explore neighborhoods in New York City. The below is image of the Forsquare API data. In addition Sushi category ID 4bf58dd8d48988d1d2941735 is used for retrieving data from Frosquare API.

## 3. Methodology

In this method, I will use the basic methodology as taght in week 3 lab

3]:

| | Borough | Neighborhood | Latitude | Longitude |
|---|---|---|---|---|
| 0 | Bronx | Wakefield | 40.894705 | -73.847201 |
| 1 | Bronx | Co-op City | 40.874294 | -73.829939 |
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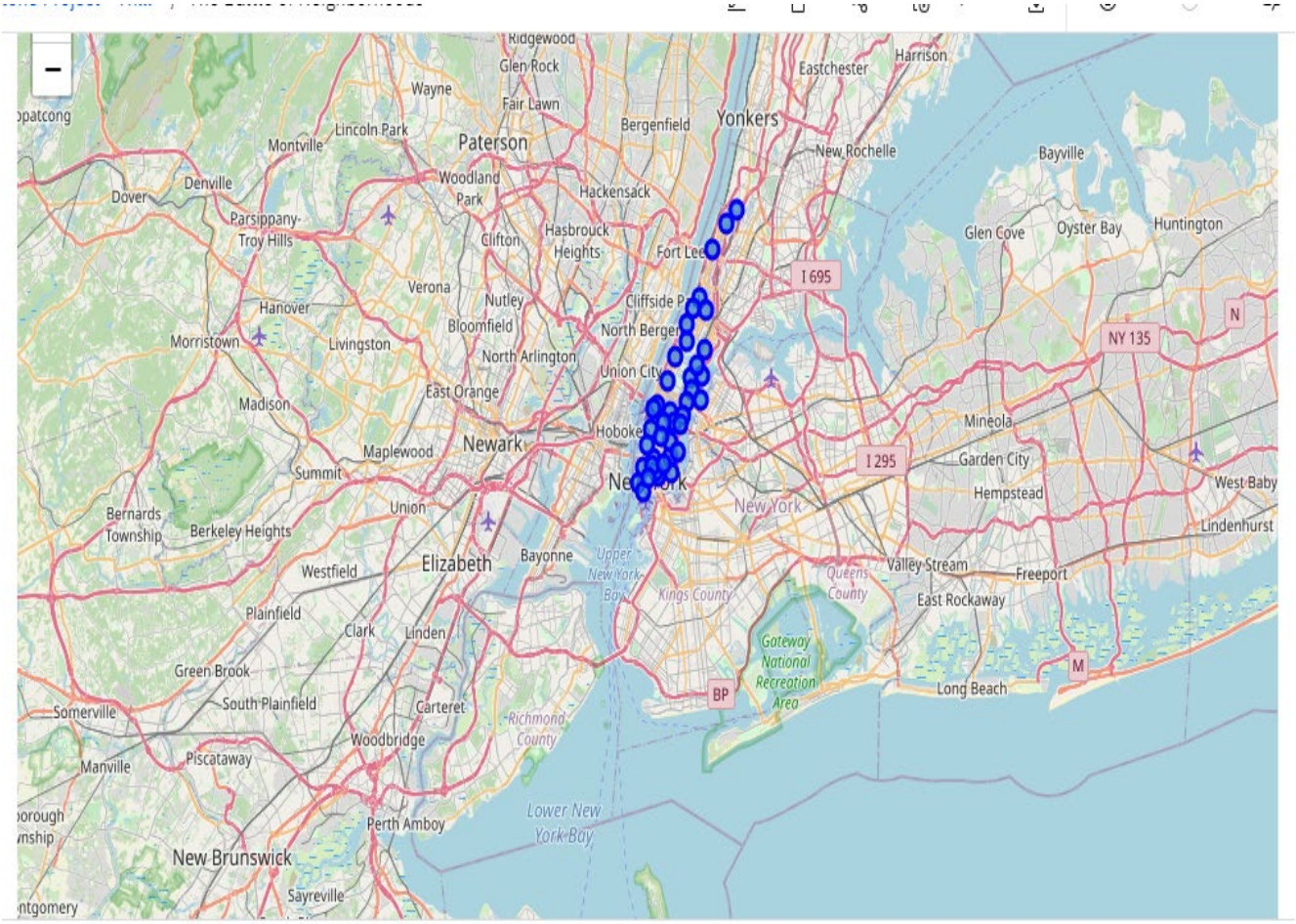
| 4 | Bronx | Riverdale | 40.890834 | -73.912585 |

Above, I have done convert addresses into their equivalent latitude and longitude values. Then we will use the Forsquare API to explore neighborhoods in Manhattan, New York. After that, explore function to get sushi restaurant categories in each neighborhood.

19]:

| | Neighborhood | Neighborhood Latitude | Neighborhood Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|---|
| 0 | Marble Hill | 40.876551 | -73.910660 | Planet Tokyo | 40.886233 | -73.909479 | Sushi Restaurant |
| 1 | Chinatown | 40.715618 | -73.994279 | Sushi Hatsune | 40.715994 | -73.992859 | Sushi Restaurant |
| 2 | Chinatown | 40.715618 | -73.994279 | Shinsen | 40.715608 | -73.996611 | Japanese Restaurant |
| 3 | Chinatown | 40.715618 | -73.994279 | Nakaji | 40.715912 | -73.996597 | Sushi Restaurant |
| 4 | Chinatown | 40.715618 | -73.994279 | Mikaku Sushi | 40.721419 | -73.996731 | Sushi Restaurant |




**Sushi bar in Manhattan**

| | Neighborhood | Asian Restaurant | Bakery | Bubble Tea Shop | Chinese Restaurant | Cocktail Bar | Deli / Bodega | Fish Market | Grocery Store | Hawaiian Restaurant | Indian Chinese Restaurant | Japanese Restaurant | Noodle House | Ra Restau |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Marble Hill | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | Chinatown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Chinatown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 3 | Chinatown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | Chinatown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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 on Manhattan and its emerging clusters.

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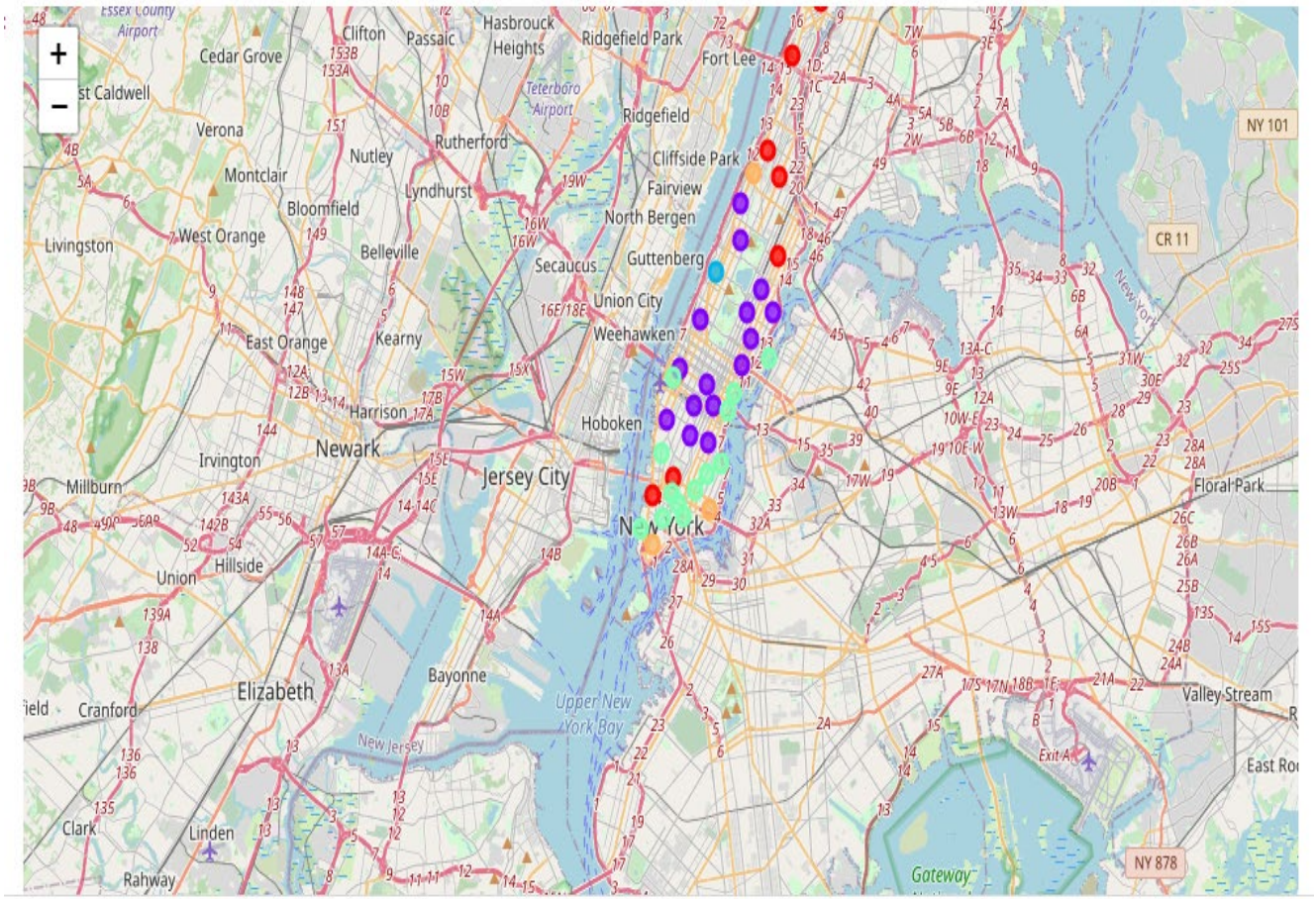
| | Neighborhood | 1st Most Common Venue | 2nd Most Common Venue | 3rd Most Common Venue | 4th Most Common Venue | 5th Most Common Venue | 6th Most Common Venue | 7th Most Common Venue | 8th Most Common Venue | 9th Most Common Venue | 10th Most Common Venue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Battery Park City | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 1 | Carnegie Hill | Sushi Restaurant | Japanese Restaurant | Indian Chinese Restaurant | Asian Restaurant | Vegetarian / Vegan Restaurant | Restaurant | Bubble Tea Shop | Steakhouse | Smoothie Shop | Seafood Restaurant |
| 2 | Central Harlem | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 3 | Chelsea | Sushi Restaurant | Japanese Restaurant | Asian Restaurant | Vegetarian / Vegan Restaurant | Fish Market | Restaurant | Bubble Tea Shop | Steakhouse | Smoothie Shop | Seafood Restaurant |
| 4 | Chinatown | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |



## 4. Results

**K-mean Cluster** Using K-mean to clustering data area with less number of sushi bars

## Cluster 0

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| | 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 | Marble Hill | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 2 | Washington Heights | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 3 | Inwood | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 4 | Hamilton Heights | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 6 | Central Harlem | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 7 | East Harlem | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 18 | Greenwich Village | Sushi Restaurant | Japanese Restaurant | Sake Bar | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Restaurant | Ramen Restaurant |
| 21 | Tribeca | Sushi Restaurant | Noodle House | Asian Restaurant | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |

## Cluster 1

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

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| | 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 | Sushi Restaurant | Japanese Restaurant | Asian Restaurant | Vegetarian / Vegan Restaurant | Fish Market | Restaurant | Bubble Tea Shop | Steakhouse | Smoothie Shop | Seafood Restaurant |
| 9 | Yorkville | Sushi Restaurant | Japanese Restaurant | Fish Market | Indian Chinese Restaurant | Asian Restaurant | Vegetarian / Vegan Restaurant | Deli / Bodega | Cocktail Bar | Grocery Store | Hawaiian Restaurant |
| 10 | Lenox Hill | Sushi Restaurant | Asian Restaurant | Japanese Restaurant | Vegetarian / Vegan Restaurant | Fish Market | Restaurant | Bubble Tea Shop | Steakhouse | Smoothie Shop | Seafood Restaurant |
| 13 | Lincoln Square | Sushi Restaurant | Japanese Restaurant | Chinese Restaurant | Smoothie Shop | Grocery Store | Ramen Restaurant | Steakhouse | Seafood Restaurant | Sandwich Place | Sake Bar |
| 14 | Clinton | Sushi Restaurant | Japanese Restaurant | Cocktail Bar | Seafood Restaurant | Asian Restaurant | Chinese Restaurant | Deli / Bodega | Fish Market | Grocery Store | Hawaiian Restaurant |

## Cluster 2

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

:

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | Upper West Side | Sushi Restaurant | Japanese Restaurant | Grocery Store | Asian Restaurant | Cocktail Bar | Restaurant | Bubble Tea Shop | Steakhouse | Smoothie Shop | Seafood Restaurant |

## Cluster 3

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

| | 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 | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 11 | Roosevelt Island | Sushi Restaurant | Asian Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 19 | East Village | Sushi Restaurant | Japanese Restaurant | Fish Market | Vegetarian / Vegan Restaurant | Cocktail Bar | Restaurant | Bubble Tea Shop | Steakhouse | Smoothie Shop | Seafood Restaurant |
| 22 | Little Italy | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 23 | Soho | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 24 | West Village | Sushi Restaurant | Japanese Restaurant | Fish Market | Sake Bar | Asian Restaurant | Vegetarian / Vegan Restaurant | Deli / Bodega | Cocktail Bar | Grocery Store | Hawaiian Restaurant |
| | Battery Park | Sushi | Japanese | Noodle | | Smoothie | Seafood | Sandwich | | | Ramen |

## Cluster 4

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

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Manhattanville | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 20 | Lower East Side | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |
| 29 | Financial District | Sushi Restaurant | Japanese Restaurant | Noodle House | Steakhouse | Smoothie Shop | Seafood Restaurant | Sandwich Place | Sake Bar | Restaurant | Ramen Restaurant |

# 5. Discussion

In this section, I would be discussing the observations I have noted and 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 good amount of data is available there is scoop to come up with better results.

- There is high competition in Midtown and solo so it is very risky to open business in these areas.
- Central Harlem has also potential where closes to Morningside heights area.

- It can be done more detailed analysis by adding other factors such as transpotation, demographics of inhabitants.

Finally, Forsquare proved to be a good source of data frustrating at times. Despite having a developer account I regularly exceeded my hourly limit locking me out for the day.

## 6. Conclusions

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 work, could easily be developed into a fully pledged application that could support the opening business idea in an unknown location.

As per the neighborhood or restaurant type mentioned like Sushi restaurants analysis can be checked. A venue with lowest risk and completion can be identified.