

As a part of a capstone final project, I have chosen to explore vegan restaurants in the city of Chicago, Illinois, USA.

Background:

The city of Chicago has been located on the shore of Lake Michigan. It is the third largest populated city in the USA. In 2018, 58 million domestic and international visitors visited the city became the second most visited cities in the USA. It is an international hub of multinational companies and culture. Hence, the city of Chicago attracts immigrants from all over the world due to multidimensional job opportunities and for the higher education and research.

Chicago is one of the fastest growing cities in the world. There are more than 200 neighborhoods by the community area in Chicago. The Chicago downtown area is referred to as 'The Loop' by the locals. The loop is a central business district of the city. The city has a widest racial and ethnic population which gets reflected in the city's food culture. Chicago is world famous for deep-dish pizza and non-vegetarian food items. However, considering the global environmental impact of industrial farming of animal and sustainability, awareness in the vegan diet has increased since 2010. Hence, as a part of the final project, This work aim to find out the possible vegan food options in the downtown Chicago.

The following work aim to answer listed below questions,

- 1) Looking to open a vegan restaurant
 - a) If one would like to explore, what kind of vegan options available in supermarkets and/or restaurants in the Chicago city downtown.
 - b) Is it a good option to open a vegan restaurant?
 - c) Which neighborhood will be most suitable to open the vegan restaurant?
- 2) If a contractor is trying to start his new business
 - a) Which neighborhood would be good to set up their new office?

Data description:

To answer the above questions the following data has been collected,

- 1) The city of Chicago neighborhood by community area was collected to gather information about the neighborhoods and community area.

https://en.wikipedia.org/wiki/List_of_neighborhoods_in_Chicago

The latitude and longitude data will get collected using the geocoder python library.

- 2) Various restaurants and vegan restaurant information will get collected Foursquare API. The following data will provide the information on vegan options available in the Chicago downtown neighborhoods.
- 3) For the contractor to set up his new office, we will try to collect data from the following,

<https://www.rentcafe.com/average-rent-market-trends/us/il/chicago/>

The data gives the Chicago rental market trend in the city of Chicago neighborhood.

Approach:

- 1) Collection of Chicago city neighborhood data.
- 2) Using the geocoder library to collect the latitude and longitude data of the neighborhoods.
- 3) Using FourSquare API we will find all venues for each neighborhood.
- 4) Filter out all venues that are restaurants.
- 5) Filter out the Vegan food option among all.
- 6) Visualize the Ranking of neighborhoods using the folium library.
- 7) For the contractor's new office setup, the Chicago city rental market trend data analysis to identify the suitable neighborhood for the business

Methodology:

The city of Chicago has 245 community area neighborhoods. These data were lacking in the geographical location details such as latitude and longitude, hence python geocoder library have been further used to collect those information. In this work, we will mainly focus on the Chicago downtown 7 neighborhoods, River north, Streeterville, South loop, Little Italy, River west, Near west side and near south side.

Further, we tried to search for the most common venue in the following neighborhood using the Foursquare API. We applied cluster analysis algorithm, K-means clustering to group different venue categories together. After performing K-means clustering algorithm with the different k values over the most common venue search category the following data clustered into 3 different groups. Group 1 represents the recreation area such as museum and park, group 2 cluster shows the area surrounded by restaurants and finally, cluster 3 represents the daily usage shops. From the cluster map it became clear that the south region has the highest number of restaurants in Chicago downtown.

From the cluster analysis results, we limit our Foursquare API search in and around the Harold Washington Library Center. We primarily explore the type of restaurants around this area to identify the possible vegan food options. In addition, we extend our search exclusively for vegan restaurants to analyze the existing market.

We further extend our analysis to search for a possible new office setup for a contractor. Our recommendation is based upon the monthly rental market trend. We tried to identify the places which are close to downtown with the affordable rent. For the given purpose, we practice the Chicago neighborhood data along with the geographical data as mentioned earlier. The following data were concatenated with the Chicago monthly rental market trend and visualized using the folium library.

Results:

K-means clustering:

The K-means clustering applied to the Chicago neighborhood most common venues. The common venues are categorized into 3 different cluster. In Figure 1., red, indigo and green represent the cluster 1,2 and 3 respectively. Cluster 1 in red illustrates the recreational activity area. Cluster 2 in indigo shows the area with top 5 most common venues with food options and Cluster3 in green represents the daily usage shops. It can be seen from the map that most of the restaurants are located in the south and daily necessary shops in the north.

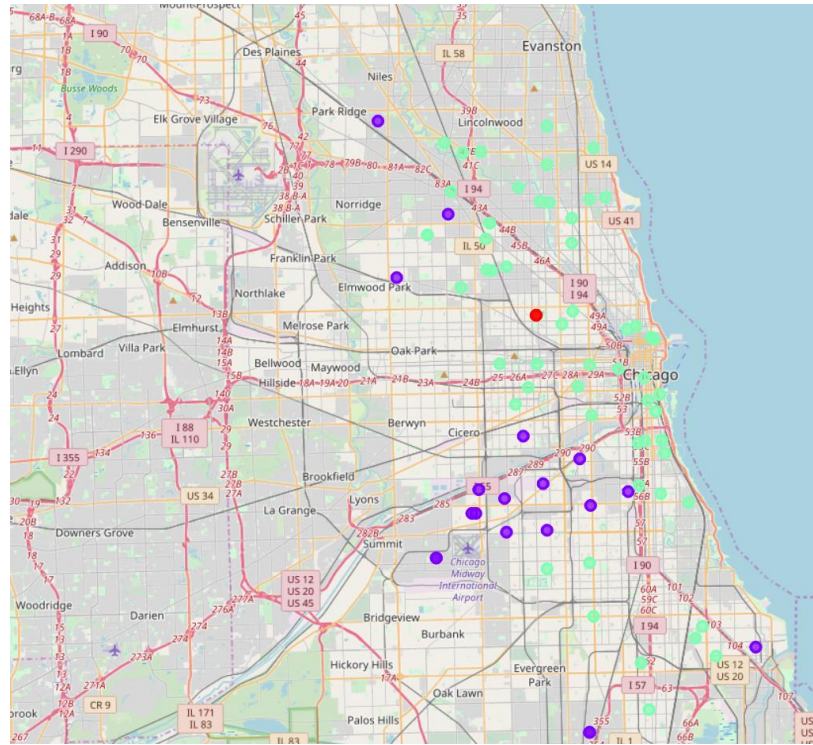


Figure 1. k-means clustering of the Chicago downtown common venues based upon their categories.

Restaurant information:

Next, we tried to find out the available restaurant and food options surrounding the HW library center in Chicago downtown. The Table 1. Shows the list of restaurants. It can be seen from the list that it is difficult to find the vegan food option in the list. The following restaurants geographical distribution visualized using the python folium library in figure 2. The red marker shows the HW library location in Chicago downtown map, whereas blue marker represents the distribution of restaurants.

| | |
|----|---------------------------------------|
| 0 | The Berghoff Restaurant |
| 1 | Plymouth Restaurant & Bar |
| 2 | Exchequer Restaurant & Pub |
| 3 | Sofi Restaurant |
| 4 | Chicago Curry House Indian Restaurant |
| 5 | Luna Cafe Restaurant |
| 6 | Gazebo Restaurant at Grant Park |
| 7 | Himalayan Restaurant |
| 8 | Lord Gore Restaurant |
| 9 | Rawabi Grill Mediterranean Restaurant |
| 10 | Amarit Thai Restaurant |
| 11 | Miller's Pub |
| 12 | G & G Restaurant |
| 13 | McKinlock Court Restaurant |
| 14 | HALO' Restaurant - Chicago |
| 15 | Gino's East |
| 16 | Dearborn Dentistry |
| 17 | Plymouth Street |
| 18 | La Cocina Mexican Grill |
| 19 | S.R.O. - Standing Room Only |
| 20 | Subway |
| 21 | Middle Eastern Restaurants |

Table 1. represents the list of restaurant option in and around the HW library center.

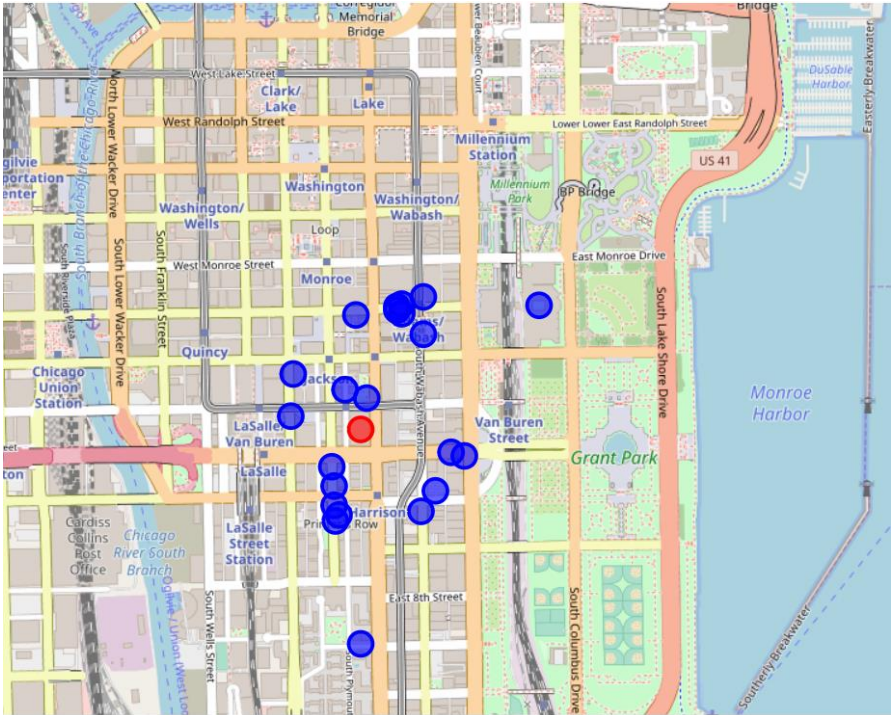


Figure 2. distribution of the restaurants in and around the HW library center. The red marker shows the HW library location in Chicago downtown map, whereas blue marker represents the distribution of restaurants.

Vegan Restaurant:

Further, we exclusively tried to search for the vegan food option near the HW library center in Chicago downtown. The Table 2. Shows the list of vegan food option or restaurants. It can be seen from the list

that there is no exclusive vegan restaurant in the list. These restaurants only provide selective vegan food options. The following restaurants geographical distribution visualized using the python folium library in figure 3. The red marker shows the HW library location in Chicago downtown map, whereas blue marker represents the distribution of restaurants.

| | |
|----|---------------------------------|
| 0 | Metra Food Court |
| 1 | CTA - Adams/Wabash |
| 2 | Coco's southern style soul food |
| 3 | Wabash Food & Liquors |
| 4 | Southern Pitch Food Truck |
| 5 | Japan Food Express 6 |
| 6 | Japan Food Express |
| 7 | Giordano's Food Truck |
| 8 | Hot Dog Fiend Food Truck |
| 9 | University Food Services |
| 10 | DePaul Center Cafeteria |
| 11 | Hat Trick Food Truck |
| 12 | H&J Deli |

Table 2. shows the list of vegan food option in and around the HW library center.

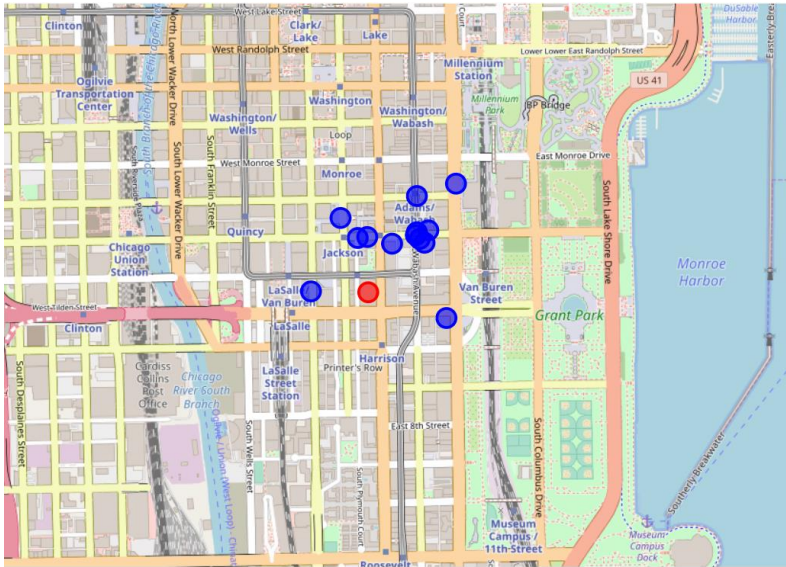


Figure 3. distribution of the vegan food option in and around the HW library center. The red marker shows the HW library location in Chicago downtown map, whereas blue marker represents the distribution of vegan food options.

Recommendation for the contractor office setup:

We further try to provide a recommendation for the contractor office setup using the Chicago neighborhood rental market trend. Figure 4. Illustrate the monthly rent distribution in the Chicago downtown region. The Light green illustrates the rental price below 600 \$/month, Light blue shows rent

between 600-1000 \$/month, Orange between 1000-1500 \$/month and red represents the monthly rent >1500 \$/month. It is difficult to find a office space for rent below 1000 \$/month in Chicago downtown. Monthly rent below 1000 \$ only possible in south loop. However, West Garfield park seems in the downtown seems the most suitable option from the map.

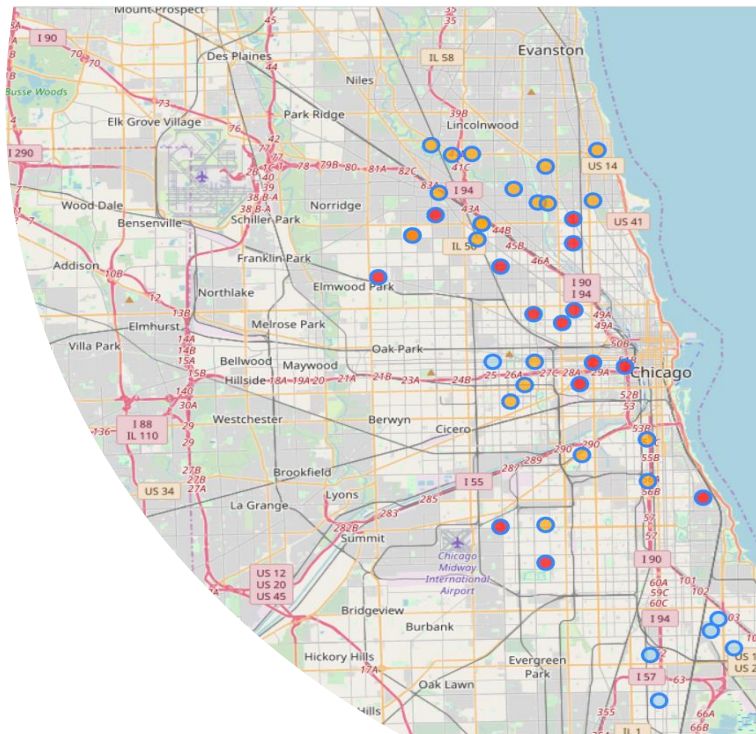


Figure 4. illustrate the monthly rental trend around the Chicago downtown. The Light green marker illustrates the rental price below 600 \$/month, Light blue shows rent between 600-1000 \$/month, Orange between 1000-1500 \$/month and red represents the monthly rent >1500 \$/month.

Discussion:

The battle of the neighborhood study was performed on the Chicago city downtown region to provide a recommendation to open a new vegan restaurant. From the cluster analysis results it became clear that most of the restaurants are located at the south side to the downtown. However, these restaurants are basically lacking in providing the vegan options to the customers. Further search concluded that the south region does not have any restaurants that provide vegan food option. There is only one vegan food option on east and west side of the Chicago downtown. Furthermore, Chicago downtown exclusively lack the vegan restaurant. In addition, For the contractor new office setup, it is difficult to find an office space for rent below 1000 \$/month in Chicago downtown. It is only possible in south loop.

Conclusions:

From the above study it can be conclude that, the Chicago downtown south, east and west side would be most suitable option to open an exclusive vegan restaurant. For the contractor new office setup West Garfield park in the downtown seems the most suitable option from the map.