

# Capstone Project - The Battle of the Neighborhoods (Week 2)

## Food Distribution in Downtown Houston, and its Business Implication

### Introduction: Business problem.

The city of Houston, Texas has been becoming a multicultural hub which has a wide variety of international restaurants. In order to support those business throughout the city, the supply chain has to set up efficiently to reduce transportation time and keep food fresh.

In this project I will try to analyze and compare different cuisine location in Downtown Houston, Texas. Specifically, this report will compare Japanese and French restaurant location to help client to make decision where to set up local supply centers to meet demands from different cuisine. This will benefit both food distribution and restaurant.

### Data

Following data will used for the analysis.

- Foursquare location data to find out existing restaurant in downtown Houston area.
- Geopy to find out longitude/ latitude of Houston, TX

Specifically, I will use Foursquare location data to find out Japanese and French restaurants in Downtown Houston. After that I will cluster and compare distribution between them and give my recommendation where to set up local supply center location and supply ratio.

### Methodology

#### Cuisine Distribution

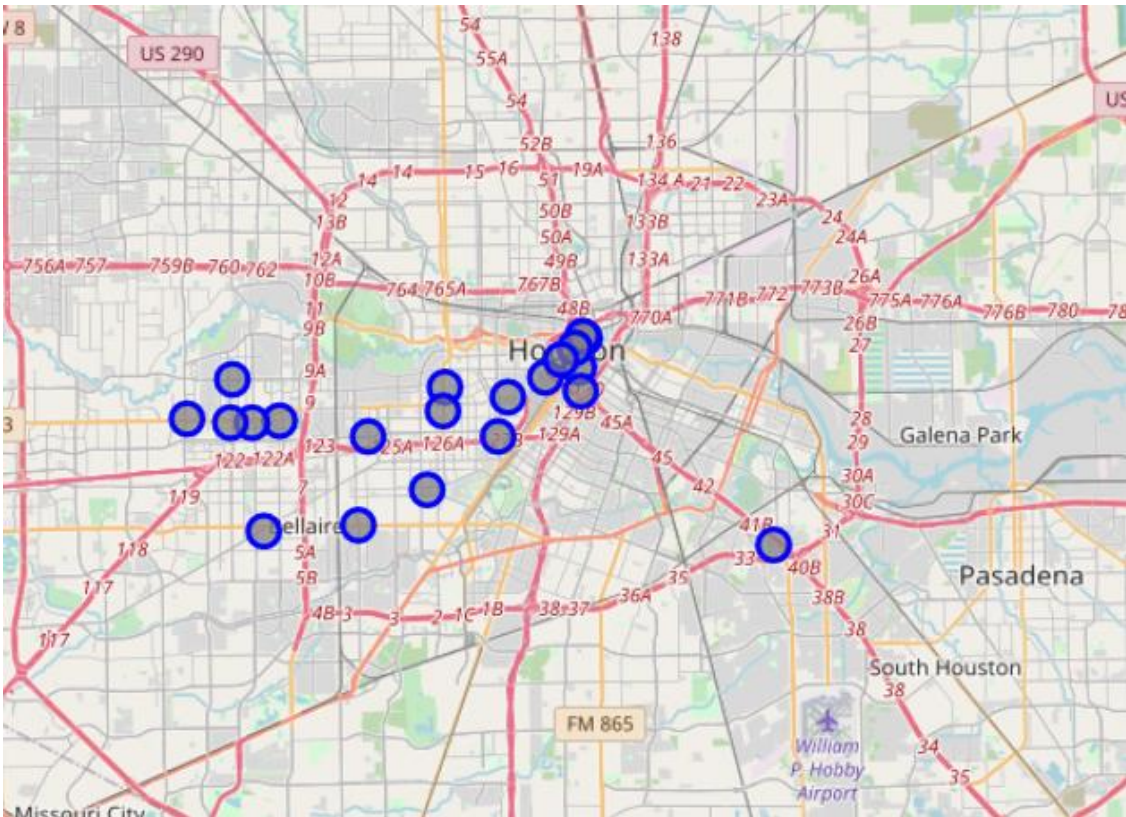
Here we will look at the distribution of ethnic cuisine, namely Japanese and French restaurants. The FourSquare API was used to retrieve the data on maximum 50 restaurants of each cuisine around downtown Houston, TX area

The restaurants were then plotted on a folium map and colour-coded depending on their cuisine.

Here is Japanese restaurant

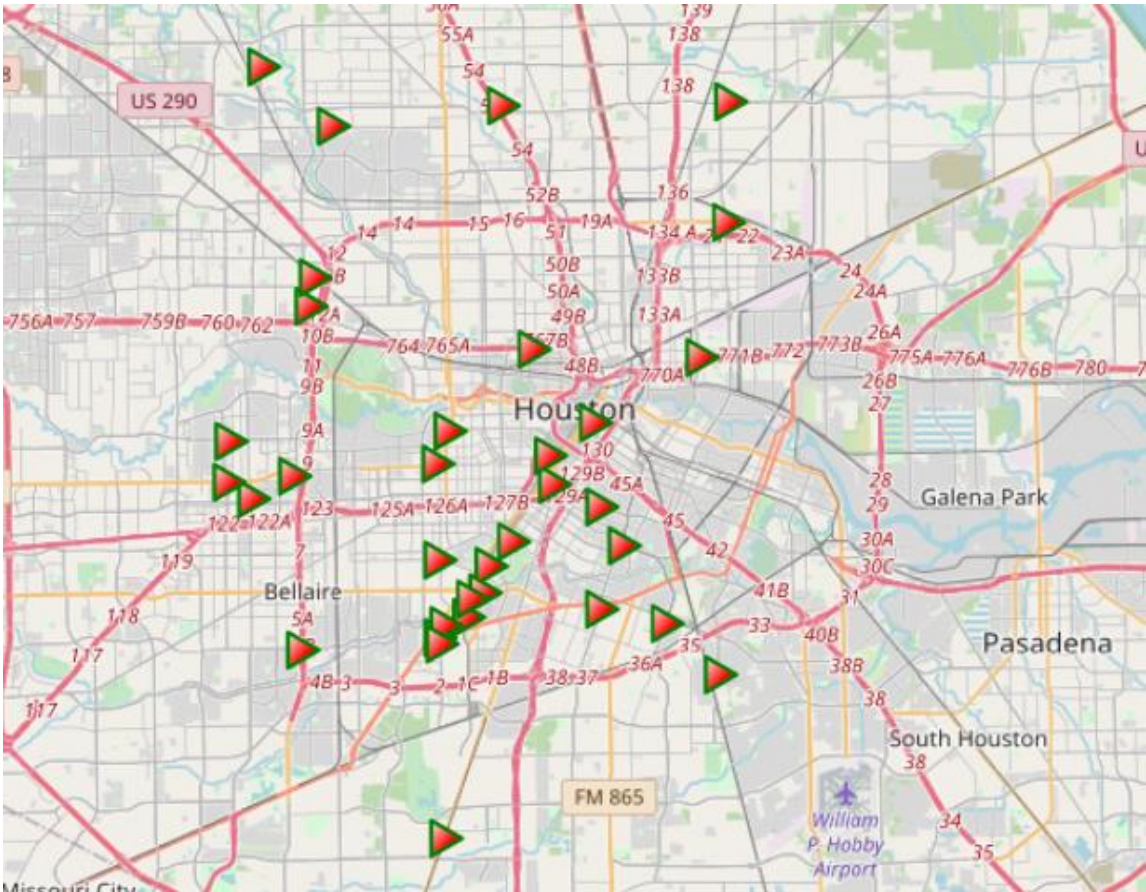
|   | id                       | name                                   | categories                                | referralId | hasPerk | location.address  | location.lat | location.lng | location.labeledLatLngs                            |
|---|--------------------------|--|---|------------|---------|-------------------|--------------|--------------|--|
| 0 | 52b17a3b498eeab2c01eb03d | Gyu-Kaku Japanese BBQ                  | '4bf58dd8d48988d1df931735', 'name': 'B... | 1614054456 | v-False | 510 Gray St Ste A | 29.750747    | -95.375275   | [[{"label": "display", "lat": 29.75074688956035... |
| 1 | 4f32a79019836c91c7ecd3e5 | Wasabi Japanese Restaurant             | '4d4b7105d754a06374d81259', 'name': 'F... | 1614054456 | v-False | 908 Congress St   | 29.762432    | -95.361374   | [[{"label": "display", "lat": 29.76243209838867... |
| 2 | 4bb650d02ea19521197bab2f | Oishii Japanese Restaurant & Sushi Bar | '4bf58dd8d48988d1d2941735', 'name': 'S... | 1614054456 | v-False | 3764 Richmond Ave | 29.732796    | -95.436760   | [[{"label": "display", "lat": 29.73279566286011... |
| 3 | 4f44a55e19836ed00195857a | Daiji's Japanese Tapas Bar             | '4d4b7105d754a06374d81259', 'name': 'F... | 1614054456 | v-False | 1201 Caroline St  | 29.753565    | -95.363438   | [[{"label": "display", "lat": 29.75356500000000... |
| 4 | 5b819553464d65002c8ddfd7 | Sapporo Japanese Bistro & Sushi Bar    | '4bf58dd8d48988d1d2941735', 'name': 'S... | 1614054456 | v-False | 801 Congress St   | 29.763384    | -95.362053   | [[{"label": "display", "lat": 29.76338386535644... |

5 rows × 23 columns



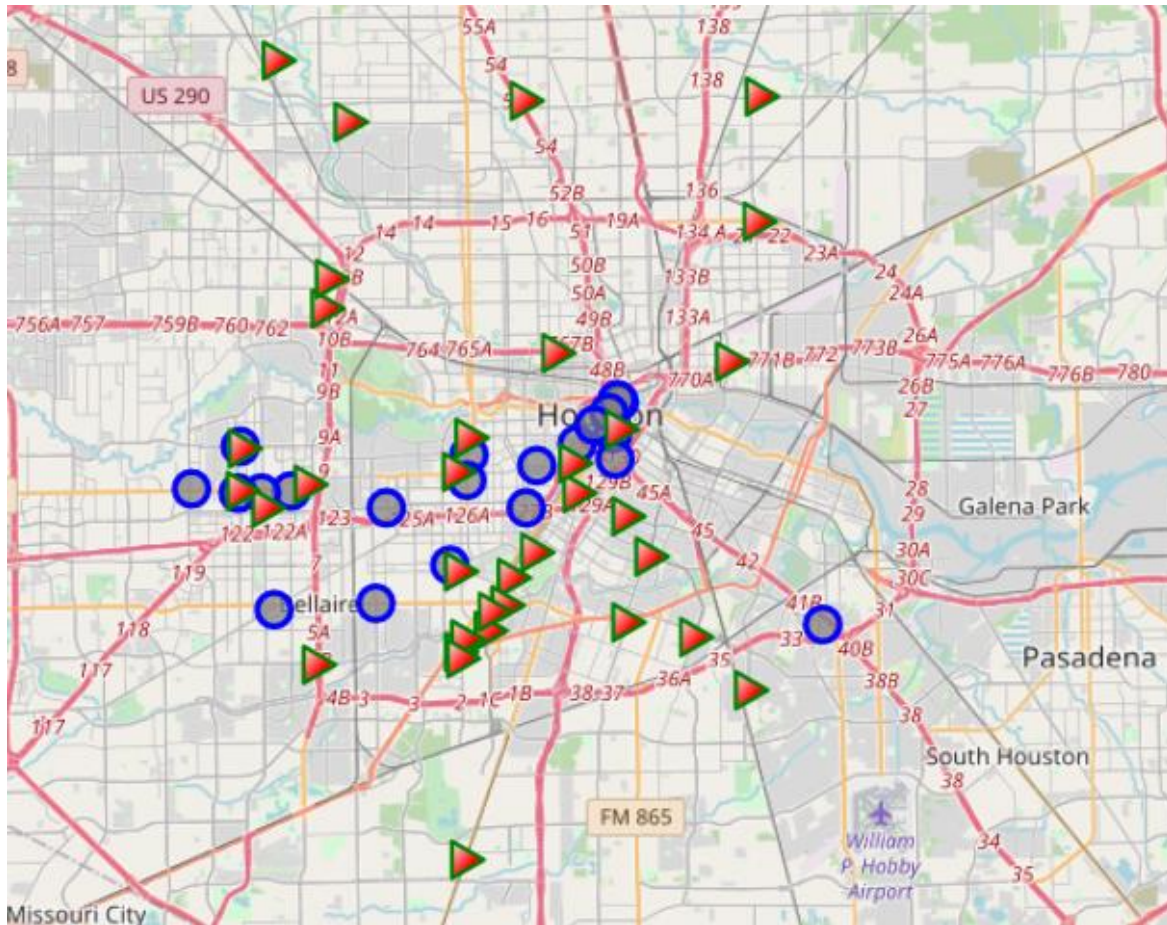
Here is French restaurant

|   | id                       | name   | categories  | referralId | hasPerk | location.address | location.crossStreet | location.lat | location.lng | loc        |
|---|--------------------------|--|---|------------|---------|------------------|----------------------|--------------|--------------|------------|
| 0 | 53b19449498e6360c185c939 | la Madeleine French Bakery & Café Sawyer Heights | '[[{"id": "4bf58dd8d48988d10c941735", "name": "F...'}]] | 1614054427 | v-      | False            | 2423 Katy Fwy Ste E  | Taylor       | 29.776412    | -95.382407 |
| 1 | 4d482971f046a1cd21e20ef6 | The French Corner-Catering                       | '[[{"id": "4bf58dd8d48988d10c941735", "name": "C..."}]] | 1614054427 | v-      | False            | 1001 Fannin St       | NaN          | 29.754899    | -95.361724 |
| 2 | 4b108f0df964a520d27223e3 | la Madeleine French Bakery & Café River Oaks     | '[[{"id": "4bf58dd8d48988d10c941735", "name": "F..."}]] | 1614054427 | v-      | False            | 2047 W Gray St Ste A | at Shepherd  | 29.752343    | -95.410441 |
| 3 | 4b3262a7f964a520320a25e3 | la Madeleine French Bakery & Café Meyerland      | '[[{"id": "4bf58dd8d48988d10c941735", "name": "F..."}]] | 1614054427 | v-      | False            | 4700 Beechnut St     | at I-610     | 29.688789    | -95.460208 |
| 4 | 4b084369f964a520a60723e3 | French Riviera Bakery & Cafe                     | '[[{"id": "4bf58dd8d48988d16d941735", "name": "C..."}]] | 1614054427 | v-      | False            | 3100 Chimney Rock Rd | NaN          | 29.732631    | -95.476584 |





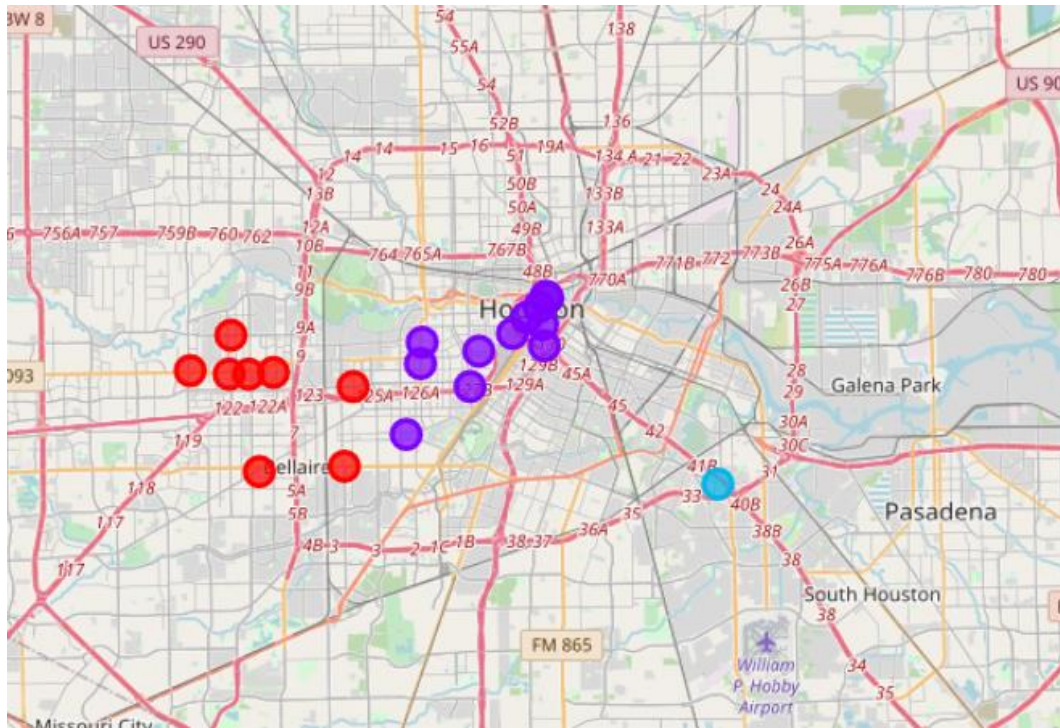
Here is distribution of Japanese and French restaurant together. We can see they have different distribution. There is almost no Japanese restaurant at North.



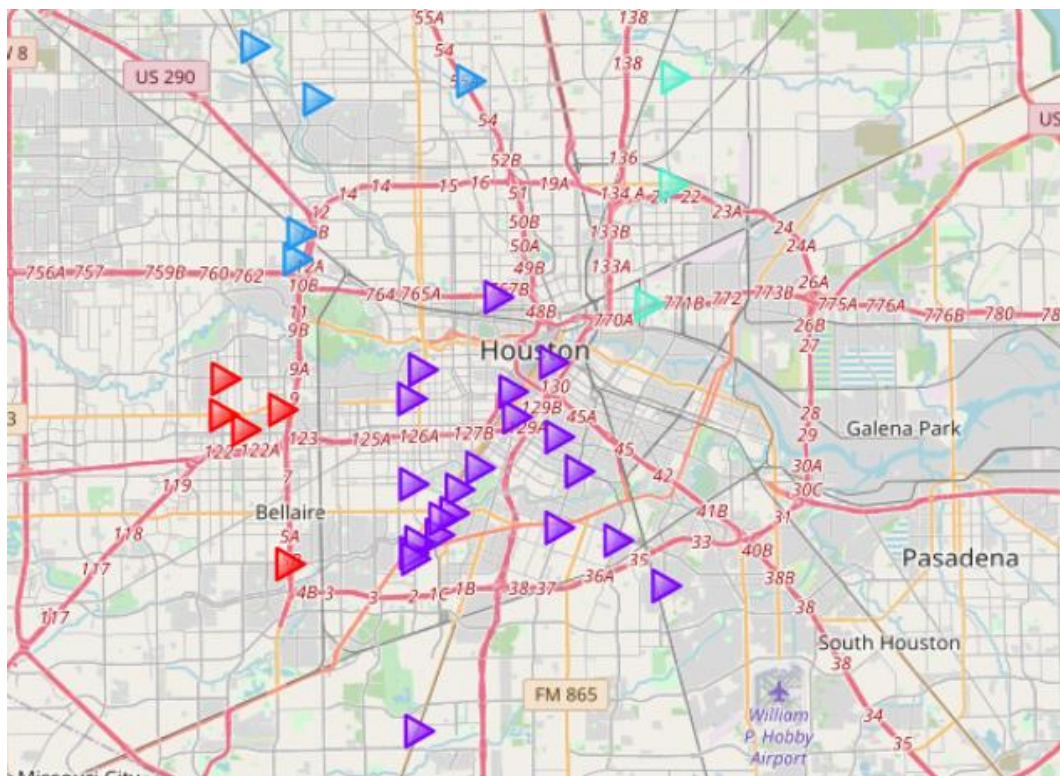
## Restaurant Clustering

This section aims to cluster Restaurant into groups based on their location. In order to do so, the KMeans machine learning algorithm will be utilized. KMeans is a vector quantization method whereby a data point is put into a cluster with the nearest Euclidean mean. In other words, it is used to cluster points of greater similarity. 12 iteration is used to optimize the results.

Here is Japanese restaurant clustering.



Here is French restaurant clustering.

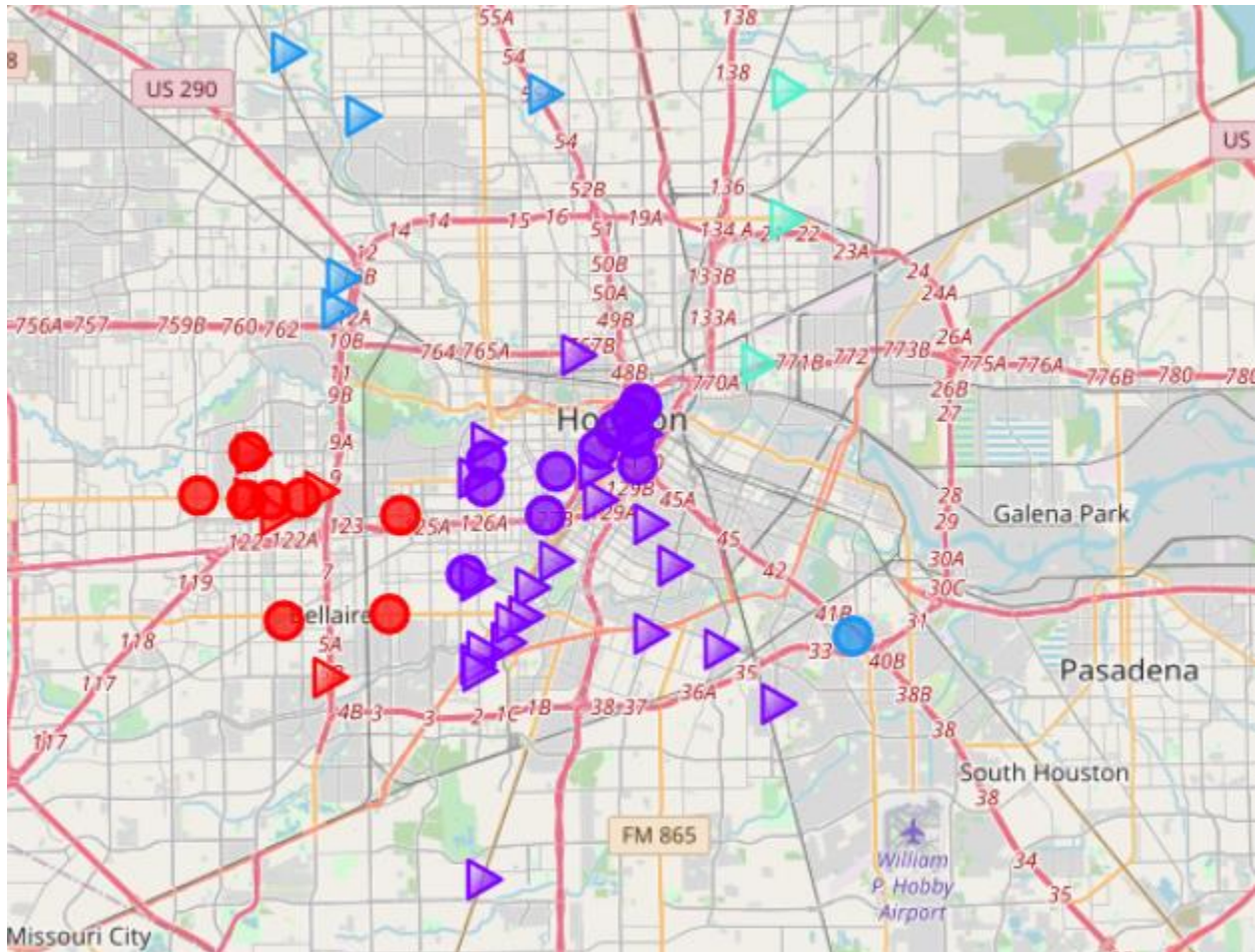




## Results

From distribution, we can see that Japanese restaurant is more concentrated at center and west, while French restaurant is more spread out, especially at north and south area there are quite some French restaurant.

Further clustering analysis is confirmed that French restaurant is more spread out. At center area, both Japanese and French restaurant have similar clustering.



## Discussion

The results show that Japanese and French restaurant have different concentration and distribution. This information will help supply chain to optimize location selection for local supply center. At center area, French and Japanese can share supply center. while at North and south area, a dedicate center is needed for French restaurant only.

## **Conclusion**

By analyzing the geographical distribution of restaurants in downtown Houston area, this report concluded that Japanese and French restaurant have different concentration and distribution. From this study, recommendation is made for future supply chain location selection. At center area, French and Japanese can share supply center. while at North and south area, a dedicate center is needed for French restaurant only.