Restaurant Expansion from Boston to Manhattan and Chicago

IBM Applied Data Science Capstone Project

By Tiffany Brand

Location Characteristics are important for Successful Restaurants

▶ Types of venues present in the neighborhood

▶ Density of venues present in the neighborhood

▶ Look at strengths of existing location to inform an expansion into a new location

Assisting a Boston Restaurant Owner with Expansion to Manhattan and Chicago

1 Obtain and prepare neighborhood data for Boston, Chicago, and Manhattan.

2 Obtain and prepare nearby venues to each neighborhood. Look at the categories of venues and density of venues present.

3 Cluster the data to find similar neighborhoods to the Boston restaurant location to recommend for Manhattan and Chicago expansion.

Neighborhood Data Acquisition and Cleaning

- Boston data found on the Analyze Boston website: https://data.boston.gov/dataset/boston-neighborhoods

- Chicago data found on the Chicago Data Portal website: https://data.cityofchicago.org/Facilities-Geographic-Boundaries/Boundaries-Neighborhoods/bbvz-uum9

- Manhattan Data found on the NYU Spatial Dataset Repository: https://geo.nyu.edu/catalog/nyu_2451_34572

- Calculate neighborhood centroids from boundaries data and create a dataframe containing all three cities with the following features: Location, Neighborhood, Latitude, and Longitude.

Venue Data Acquisition and Cleaning

▶ Use the Foursquare API https://api.foursquare.com to extract data on the first 100 venues within 500 meters of neighborhood centroids.

▶ Create a dataframe with following features: Venue Name, Venue Category, Venue Latitude, and Venue Longitude, Location/Neighborhood Name, Neighborhood Latitude, Neighborhood Longitude
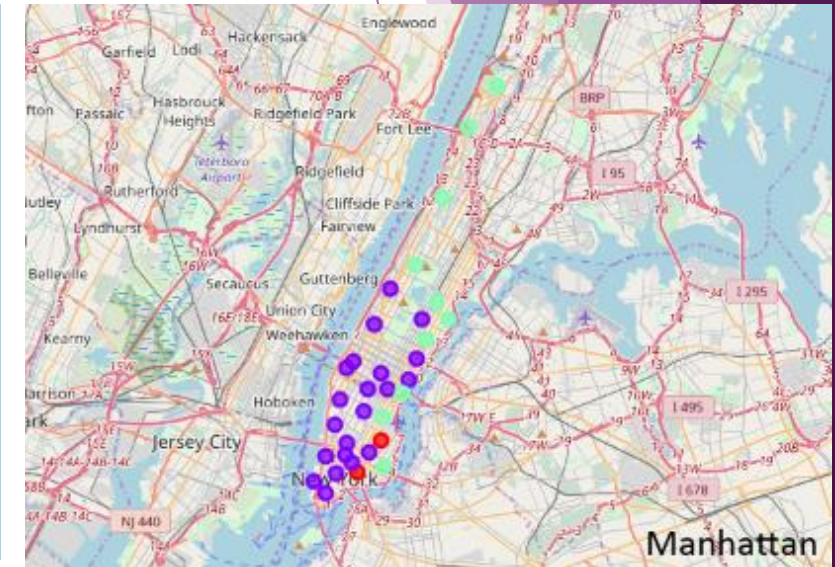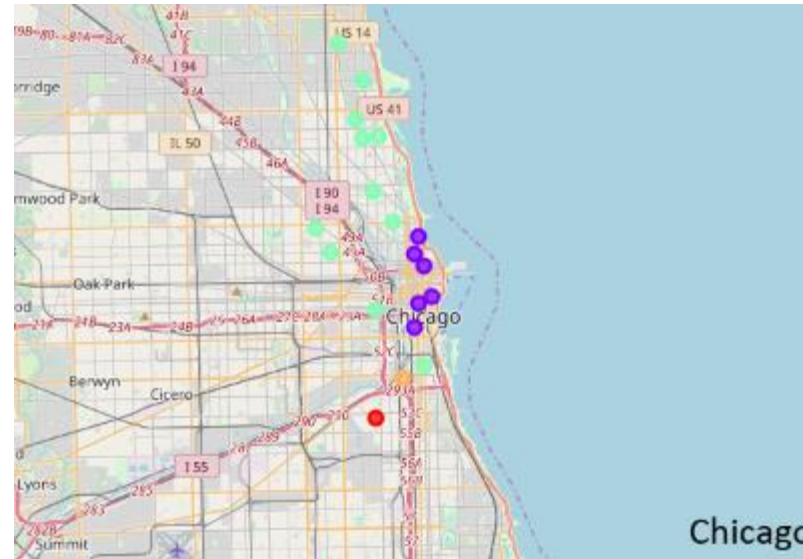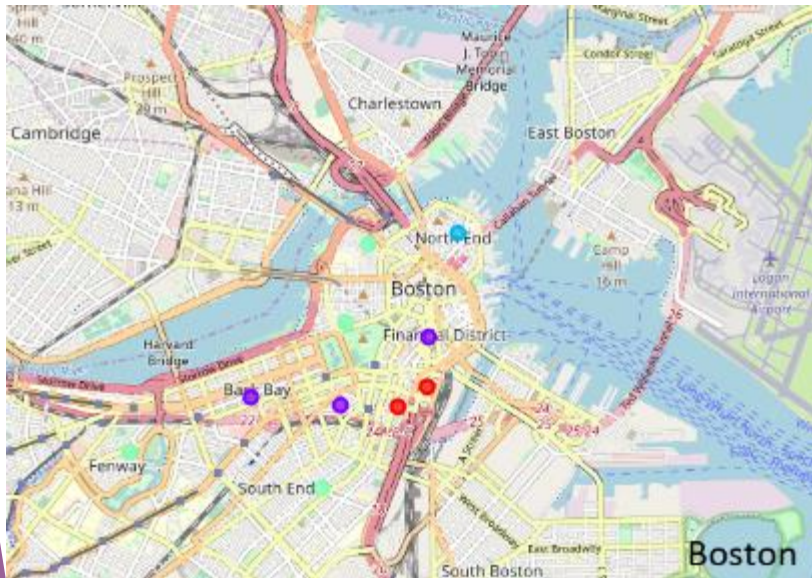
Analysis – Density of Venues

▶ The stakeholder's current restaurant is in Boston's Back Bay neighborhood. 100 venues were returned from Foursquare

▶ To find venues of similar density, the dataframe was further refined by extracting neighborhoods with greater than 50 venues returned.

Loc_Neigh	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Boston_Allston	9	9	9	9	9	9
Boston_Back Bay	100	100	100	100	100	100
Boston_Bay Village	87	87	87	87	87	87
Boston_Beacon Hill	56	56	56	56	56	56
Chicago_Andersonville	60	60	60	60	60	60
Chicago_Archer Heights	22	22	22	22	22	22
Chicago_Armour Square	25	25	25	25	25	25
Chicago_Ashburn	5	5	5	5	5	5

K Means Clustering

- The data was further refined to group by the mean of the frequency of occurrence of each venue category within the neighborhoods.

- Through K means cluster analysis, 5 clusters were generated.

Results of Cluster Analysis

The purple cluster contains Boston's Back Bay and similar neighborhoods in Boston, Chicago, and Manhattan.

Results of Cluster Analysis

- The five clusters created were characterized as the following based on location and types of venues:

  - First Cluster (0) - Asian Restaurants

  - Second Cluster (1) - Mixed Variety Restaurants, Hotels, Theater, City Center

  - Third Cluster (2) - Unique Italian Neighborhood

  - Fourth Cluster (3) - Quick Food - Cafes, Coffee Shops & Pizza

  - Fifth Cluster (4) - Unique Chinatown Neighborhood

- The stakeholder's current restaurant is in Boston's Back Bay – the Second Cluster consisting of mixed variety restaurants, hotels, theaters and located in the city centers.

Results – Recommended Neighborhoods for Expansion

Chicago

| Printers Row |
| Loop |
| Magnificent Mile |
| Rush & Division |
| Millennium Park |
| Gold Coast |

Manhattan

| Upper East Side |
| Upper West Side |
| Lincoln Square |
| Clinton |
| Midtown |
| Murray Hill |
| Chelsea |
| Greenwich Village |
| Tribeca |
| Little Italy |

| Soho |
| West Village |
| Battery Park City |
| Financial District |
| Noho |
| Civic Center |
| Midtown South |
| Sutton Place |
| Turtle Bay |
| Flatiron |
| Hudson Yards |