Local Competitive Land Scape for Food Outlet Opening in New York city

Introduction

- Opening a new food outlet requires a right business strategy to have successful eatery business
- Location and Type of food outlet are crucial aspects of a business strategy

  - they affect our ability to draw the customers
- Knowing exactly who we are up against is important before deciding about location and type of food offered
- It helps to determine whether a particular neighborhood is ripe for the picking or is over-saturated with competitors

Objective

- To provide valuable insight on local competitive landscape to those who want to establish new food outlet/eatery in New York city
- Given the location data of various types of food outlets in New York city, predict the common type of food outlets present in different parts of New York city
- It will be quite useful while in deciding about the location and type of new food outlet

Data Acquisition

- Obtain the data that contains the boroughs and the neighborhoods of the New York city
  - also contains the latitude and longitude of each neighborhood of a borough
  - are obtained from https://geo.nyu.edu/catalog/nyu_2451_34572 in a '.json'file
  - 5 Boroughs (Manhattan, Brookyln, Queens, Staten Island, and Bronx) and 306 Neighborhoods are present in New York city
- Using FourSquare API, obtain the the data of food outlet/eatery of each borough seperately
  - obtain a maximum of 25 food outlets present inside 500 meters radius of the neighbourhood
  - also obtain the type of food outlet/eatery

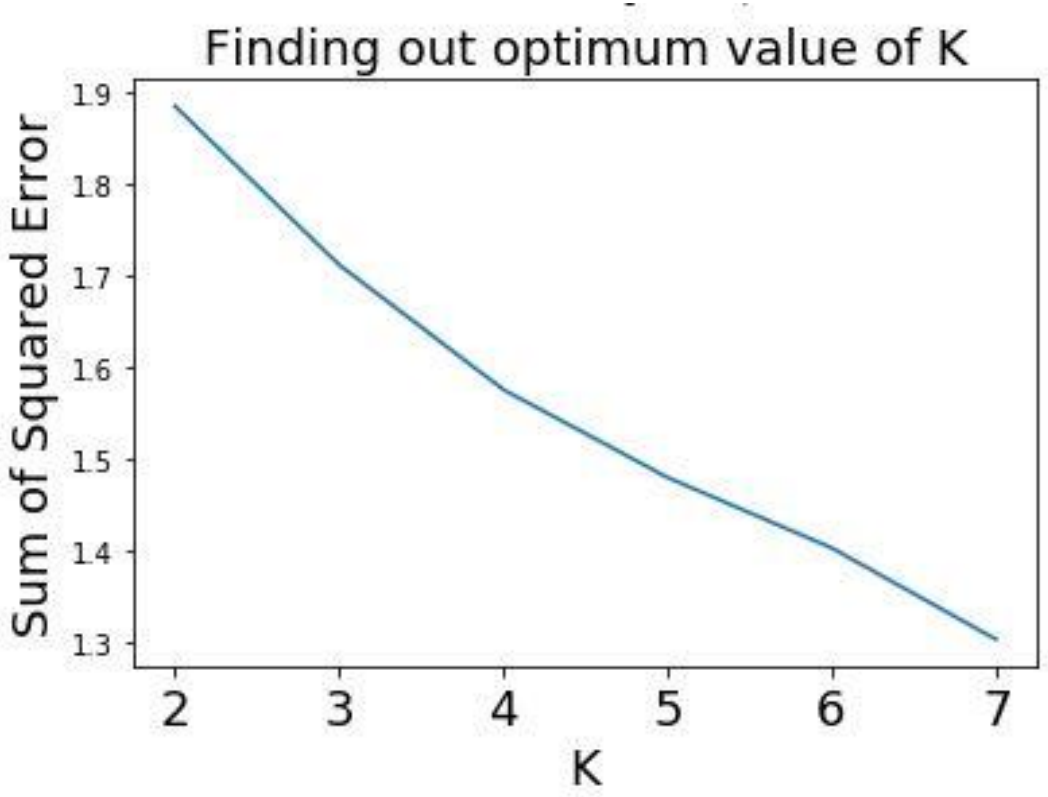
Data Processing

- For each borough of NY city, do the following:
  - The food outlet data set of the borough is read into a pandas dataframe
  - Perform one-hot coding on this dataframe based on the food outlet type
  - Group the rows of this dataframe by neighborhood
  - Take the mean of the frequency of occurrence of each type of food outlet
  - Create new dataframe containing top 10 most common outlets present in each neighborhood

Data Modeling using Clustering

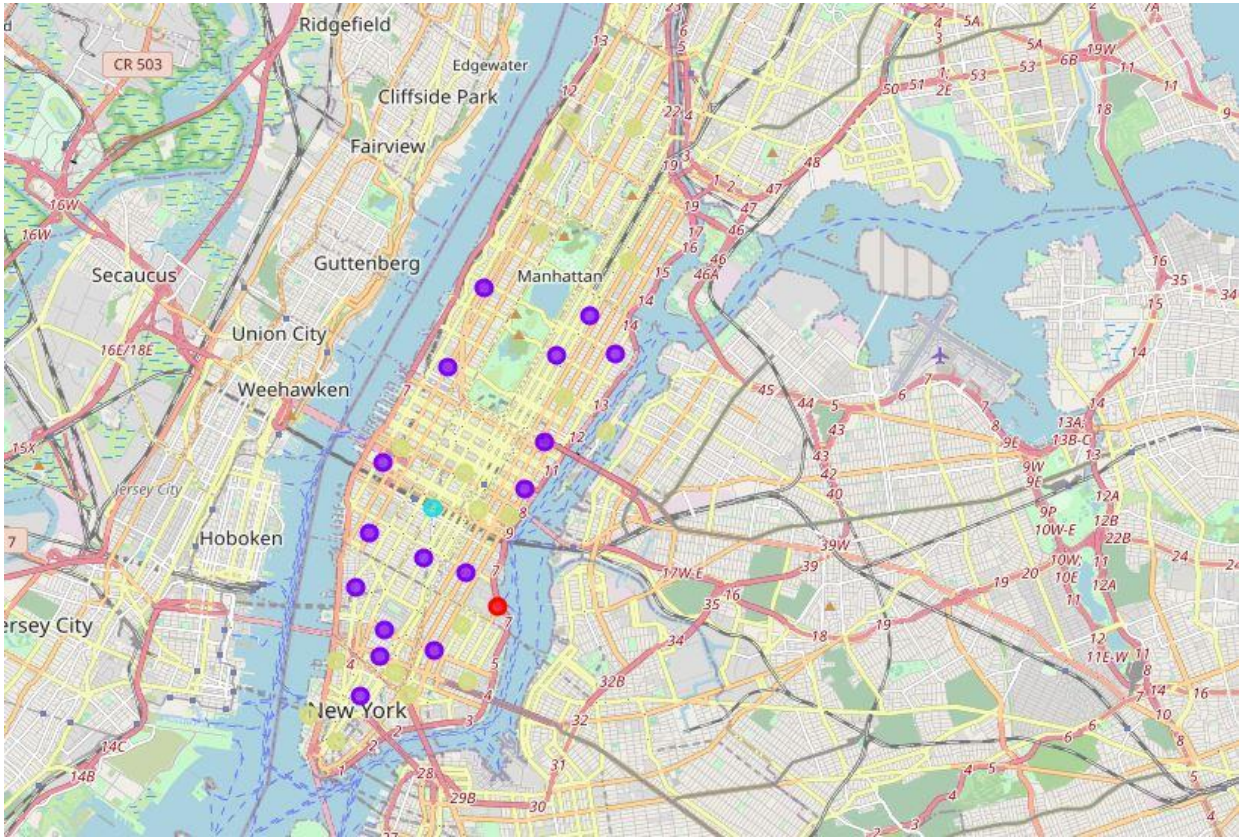
- Perform K-mean clustering on the dataframe containing top 10 common food outlets
- Perform clustering for different values of K
  - Determine the optimum value using elbow technique
- Perform clustering of neighborhoods of a borough using optimum value of K
- Observe the type of food outlets present in each borough of NY city
- Each cluster will have different types of common food outlets

Clustering of Manhattan



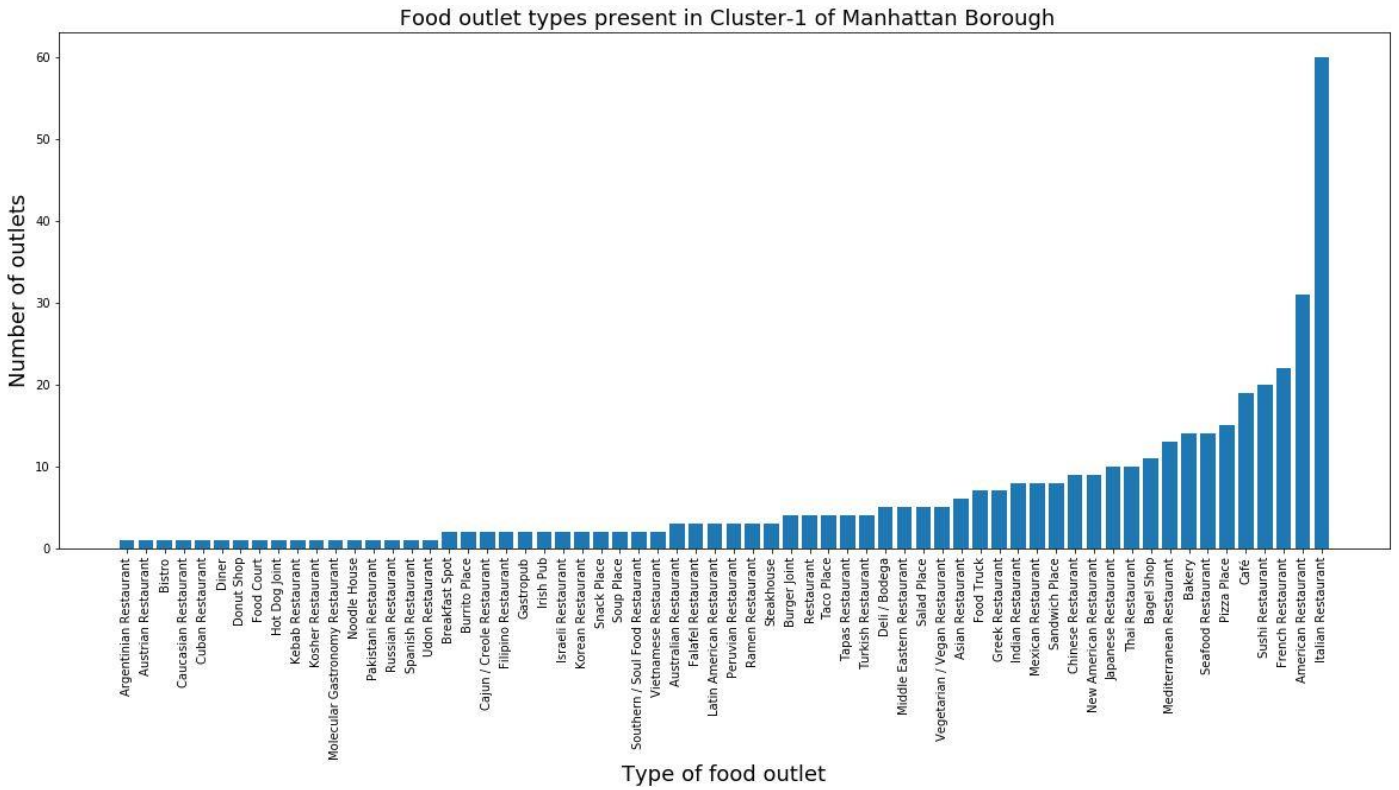
- Optimum value of K is 4

Clustering of Manhattan



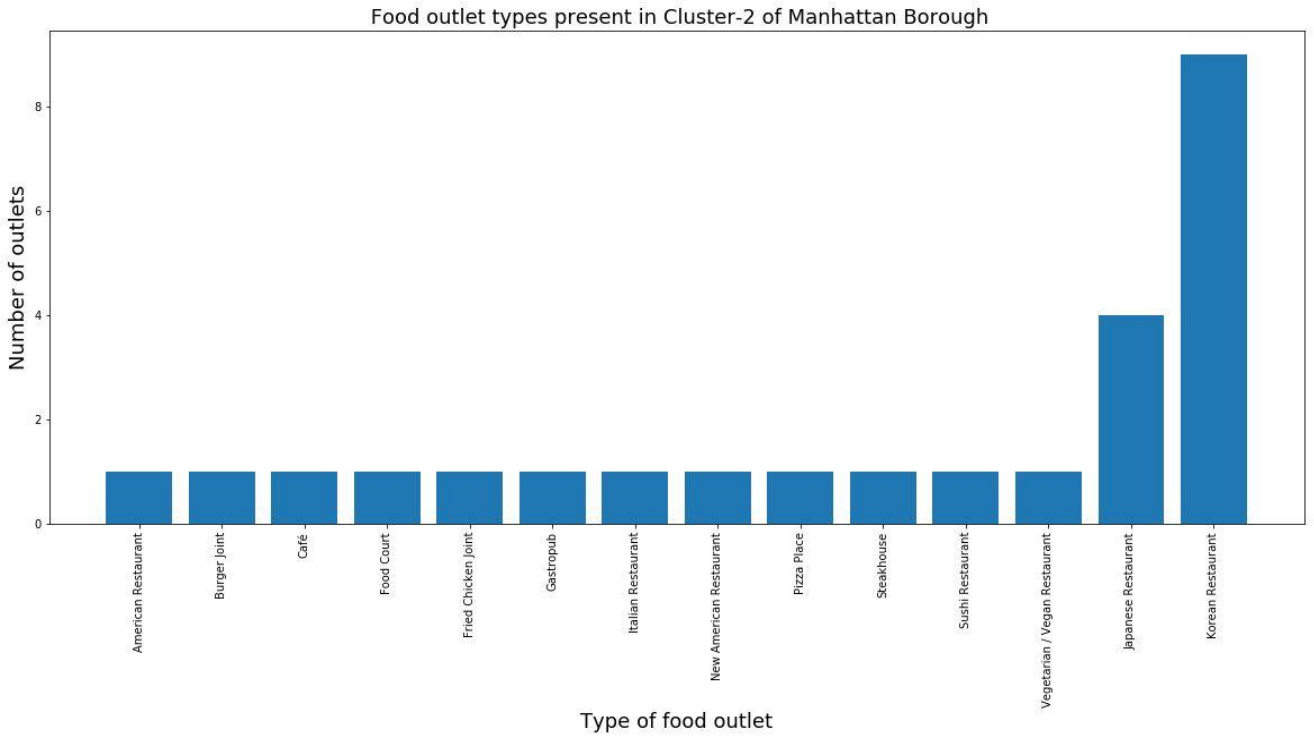
- Map showing different clusters of neighborhood present in Manhattan borough

Clustering of Manhattan



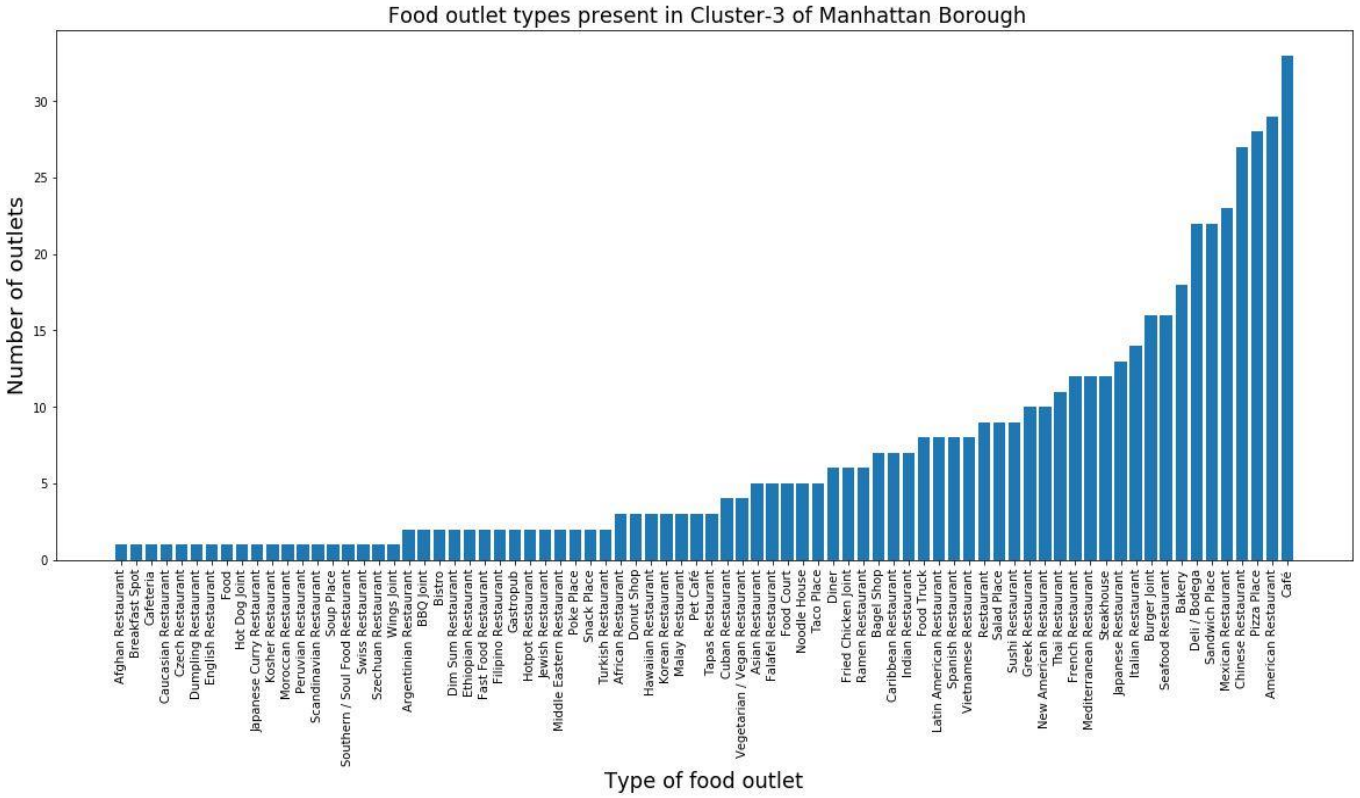
- Plot showing Type of food outlets vs Number of outlets in Cluster-1 of Manhattan

Clustering of Manhattan



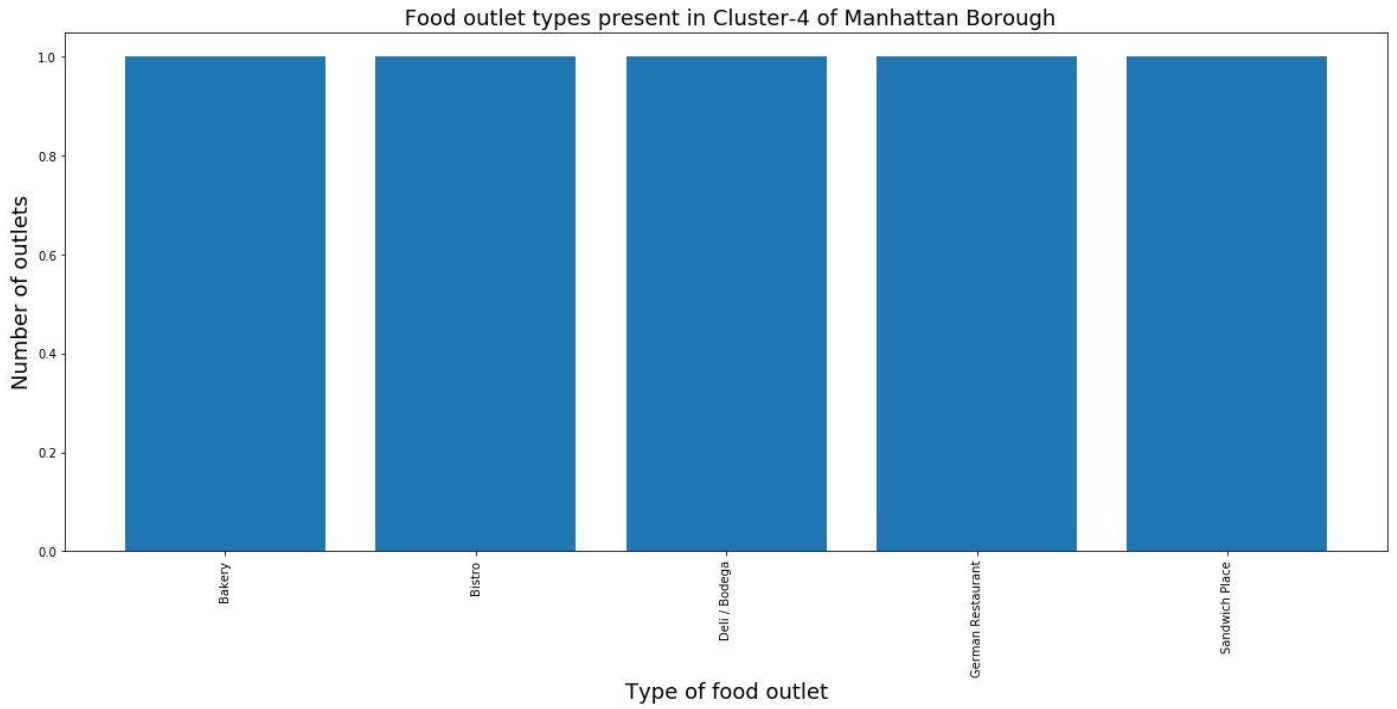
- Plot showing Type of food outlets vs Number of outlets in Cluster-2 of Manhattan

Clustering of Manhattan



- Plot showing Type of food outlets vs Number of outlets in Cluster-3 of Manhattan

Clustering of Manhattan



- Plot showing Type of food outlets vs Number of outlets in Cluster-4 of Manhattan

Clustering of Manhattan

Borough	Cluster	Neighbourhoods	Top 5 dominant/common type of restaurants
Manhattan	Cluster-1	Upper East Side, Yorkville, Upper West Side,Lincoln Square, Clinton, Greenwich Village, Chelsea, Soho, West Village, Gramercy,Carnegie Hill, Noho, Civic Center, Sutton Place, Turtle Bay, Flatiron, Hudson Yards	1.Italian Restaurant 2.American Restaurant 3.French Restaurant 4.Sushi Restaurant 5.Cafe
	Cluster-2	Midtown South	1.Korean Restaurant 2.Japanese Restaurant 2.Vegeterian Restaurant 4.Sushi Restaurant 5. Steak house
	Cluster-3	Marble Hill, Chinatown, Washington Heights, Inwood, Hamilton Heights, Manhattanville,Central Harlem, East Harlem, Roosevelt IslandEast Village, Lower East Side, Little Italy, Financial District, Manhattan Valley, Morningside Heights, Tribeca, Battery Park City, Lenox Hill, Midtown, Murray Hill, Tudor City	1.Cafe 2.American Restaurant 3.Pizza place 4.Mexican Restaurant 5.Chinese Restaurant
	Cluster-4	Stuyvesant Town	1.Sandwitch place 2.German Restaurant 3.Deli/Bodega 4.Bistro 5.Bakery

Summary of results after clustering of Manhattan

Clustering of Brooklyn

Borough	Cluster	Neighbourhoods	Top 5 dominant/common type of restaurants
Brooklyn	Cluster-1	Bensonhurst, Sunset Park, Gravesend Brighton Beach, Sheepshead Bay Manhattan Terrace, Flatbush, Kensington Windsor Terrace, Brownsville, Cypress Hills Starrett City, Bath Beach, Downtown City Line, Georgetown, Ocean Parkway Fort Hamilton, Ditmas Park, Wingate Rugby, Remsen Village, Mill Basin, Weeksville, Broadway Junction, Homecrest Erasmus	1.Chinese Restaurant 2.Pizza place 3.Deli/Bodega 4.Donut Shop 5.Bakery
	Cluster-2	Crown Heights, Bedford Stuyvesant, East New York, Flatlands, Coney IslandBorough Park, Gerritsen Beach, Marine ParkOcean Hill, Midwood Prospect, Park South New Lots, Highland Park, Madison	1.Deli/Bodega 2.Pizza place 3.Fried chicken joint 4.Chinese Restaurant 5.Caribbean Restaurant
	Cluster-3	Bay Ridge, Greenpoint, Prospect HeightsWilliamsburg , Bushwick, Brooklyn HeightsCobble Hill, Carroll Gardens, Red HookGowanus, Fort Greene, Park SlopeManhattan Beach, Dyker HeightsClinton Hill, Boerum Hill, Prospect Lefferts Gardens, Bergen Beach, East WilliamsburgNorth Side, South Side, Fulton FerryVinegar Hill, Dumbo	1.Pizza Place 2.Italian Restaurant 3.Bakery 4.Cafe 5.American Restauarant
	Cluster-4	East Flatbush, Canarsie, Paerdegat Basin	1.General Food 2.Deli/Bodega 3.Chinese Restaurant 4.Caribbean Restaurant 5.Asian Restaurant

Summary of results after clustering of Brooklyn

Clustering of Staten Island

Borough	Cluster	Neighbourhoods	Top 5 dominant/common type of restaurants
Staten Island	Cluster-1	Butler Manor	1.BBQ Joint
	Cluster-2	New Brighton, Grymes Hill, South BeachMariner's Harbor, Arden Heights	1.Deli/Bodega 2.Pizza place 3.Italian Restaurant 4.Chinese Restaurant 5.American Restaurant
	Cluster-3	St. George, Stapleton, Rosebank, West BrightonPort Richmond, Castleton Corners, New Springville, Travis, New Dorp, Great KillsEltingville, Annadale, Woodrow, Tompkinsville, Silver Lake, Sunnyside Westerleigh, Graniteville, Arlington Arrochar, Grasmere, Old Town, Dongan Hills Midland Beach, Grant City, Huguenot Pleasant Plains, Charleston, Rossville, Greenridge, Heartland Village, Bulls Head Clifton, Concord, Emerson Hill, Randall Manor Elm Park, Manor Heights, Willowbrook Sandy Ground, Prince's Bay, Richmond Valley Fox Hills	1.Pizza Place 2.Deli/Bodega 3. Italian Restaurant 4.Bagel shop 5. Chinese Restaurant
	Cluster-4	Tottenville, New Dorp Beach, Bay TerraceChelsea, Richmond Town, Shore AcresHowland Hook, Egbertville, Lighthouse Hill	1. Italian Restaurant 2.Deli/Bodega 3.Cafe 4.Bagel shop 5.Sandwich place

Summary of results after clustering of Staten Island

Clustering of Bronx

Borough	Cluster	Neighbourhoods	Top 5 Most dominant/common type of restaurants
Bronx	Cluster-1	Williamsbridge	1.Caribbean Restaurant 2. Soup place 3.Fast Food place
	Cluster-2	Wakefield, Eastchester, Woodlawn, Norwood,Pelham Parkway, City Island, Bedford Park,West Farms, Melrose, LongwoodClason Point, Throgs Neck, Country ClubVan Nest, Morris Park, Belmont, Pelham Bay Schuylerville, Edgewater Park, Castle Hill Concourse, Concourse Village, Mount Hope Bronxdale, Allerton	1.Deli/Bodega 2.Pizza place 3.Chinese Restaurant 4. Italian Restaurant 5. Sandwich place
	Cluster-3	Riverdale	1.Food Truck
	Cluster-4	Co-op City, Kingsbridge, BaychesterUniversity Heights, Morris HeightsFordham, East Tremont, High BridgeMott Haven, Port Morris, Hunts PointMorrisania, Soundview, ParkchesterWestchester Square, Spuyten Duyvil North Riverdale, OlinvillePelham Gardens, Unionport, EdenwaldClaremont Village, Mount Eden, Kingsbridge Heights	1.Pizza place 2.Chinese Restaurant 3.Common Food 4.Spanish Restaurant 5.Deli/Bodega

Summary of results after clustering of Bronx

Clustering of Queens

Borough	Cluster	Neighbourhoods	Top 5 Most dominant/common type of restaurants
Queens	Cluster-1	Astoria, Woodside, Jackson Heights, Elmhurst Howard Beach, Corona, Forest Hills, Kew Gardens, Richmond Hill, Flushing Long Island City, Sunnyside, East Elmhurst Maspeth, Ridgewood, Glendale, Rego Park Woodhaven, Ozone Park, South Ozone Park College Point, Bayside, Auburndale Little Neck, Douglaston, Glen Oaks Bellerose, Kew Gardens Hills, Fresh Meadows Briarwood, Jamaica Center, Oakland Gardens Queens Village, Hollis, South Jamaica St. Albans, Rochdale, Springfield Gardens Cambria Heights, Rosedale, Far Rockaway Steinway, Beechhurst, Bay Terrace Edgemere, Arverne, Rockaway Beach Murray Hill, Holliswood, Queensboro Hill Hillcrest, Ravenswood, Lindenwood Laurelton, Lefrak City, Belle Harbor Rockaway Park, Bellaire, North Corona Forest Hills Gardens, Jamaica Hills, Utopia Pomonok, Astoria Heights, Hunters Point Sunnyside Gardens, Blissville, Roxbury Middle Village, Malba, Hammels, Queensbridge	1.Deli/Bodega 2.Chinese Restaurant 3.Pizza place 4.Bakery 5.Donut Shop
	Cluster-2	Floral Park, Jamaica Estates	1.Indian Restaurant 2.Pizza place 3.Dosa Place 4. Chinese Restaurant
	Cluster-3	Whitestone, Broad Channel, Brookville	1.Deli/Bodega 2.Sandwich Place 3.Pizza Place

Summary of results after clustering of Queens

Conclusions

- Neighborhoods of each borough in NY city has been partitioned into different clusters using K-means clustering algorithm
- Top 10 common food outlets of each neighborhood are used as a data point
- This analysis can be helpful for those who are planning to open a new food outlet in NY city
- It can help them in deciding the type and location of food outlet that provides them the competitive advantage.