

# Capstone Project –

## The Battle of Neighborhoods

MANHATTAN, NEW YORK CITY

&

DOWNTOWN TORONTO, TORONTO CITY

**PREPARED BY: TONNY**

# Introduction

## PROPERTIES OF CITIES

1. MULTICULTURAL
2. FINANCIAL HUB
3. POINT OF INTEREST...

## SIMILARITY IN TERM OF

GASTRONOMY, NUMBERS OF ACCOMMODATION, ENTERTAINMENT ...

THE **UNIQUENESS** OF THE BOROUGHs

# Introduction

TARGETING AUDIENCE BUT NOT LIMITED

1. TOUR GROUP
2. BUSINESS FOUNDER
3. FRESH GRADUATES
4. STUDENTS
5. FAMILIES

# Data Section

## TWO GROUPS OF DATASET:

### 1. MANHATTAN, NEW YORK CITY

1. Neighbourhoods & Geographical coordinates (NYU Spatial Data Repository)
2. Categories of venues (Foursquare API)

### 2. DOWNTOWN TORONTO, TORONTO CITY

1. Postal Code, Borough & Neighbourhoods (Wikipedia webpage)
2. Each neighbourhoods' Geographical Coordinates
3. Categories of venues (Foursquare API)

# Methodology

COLLECTING AND CLEANING THE DATA



ANALYSING THE DATA



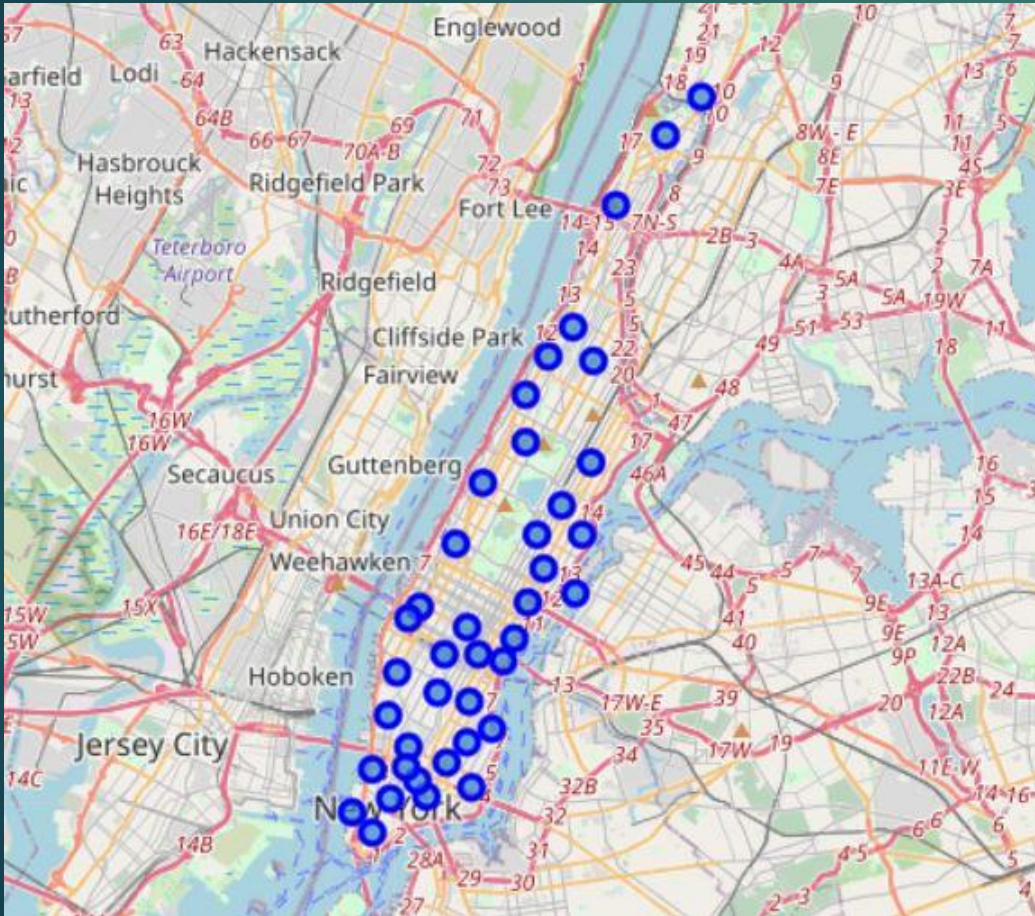
K-MEANS CLUSTERING ALGORITHM



DATA VISUALIZATION

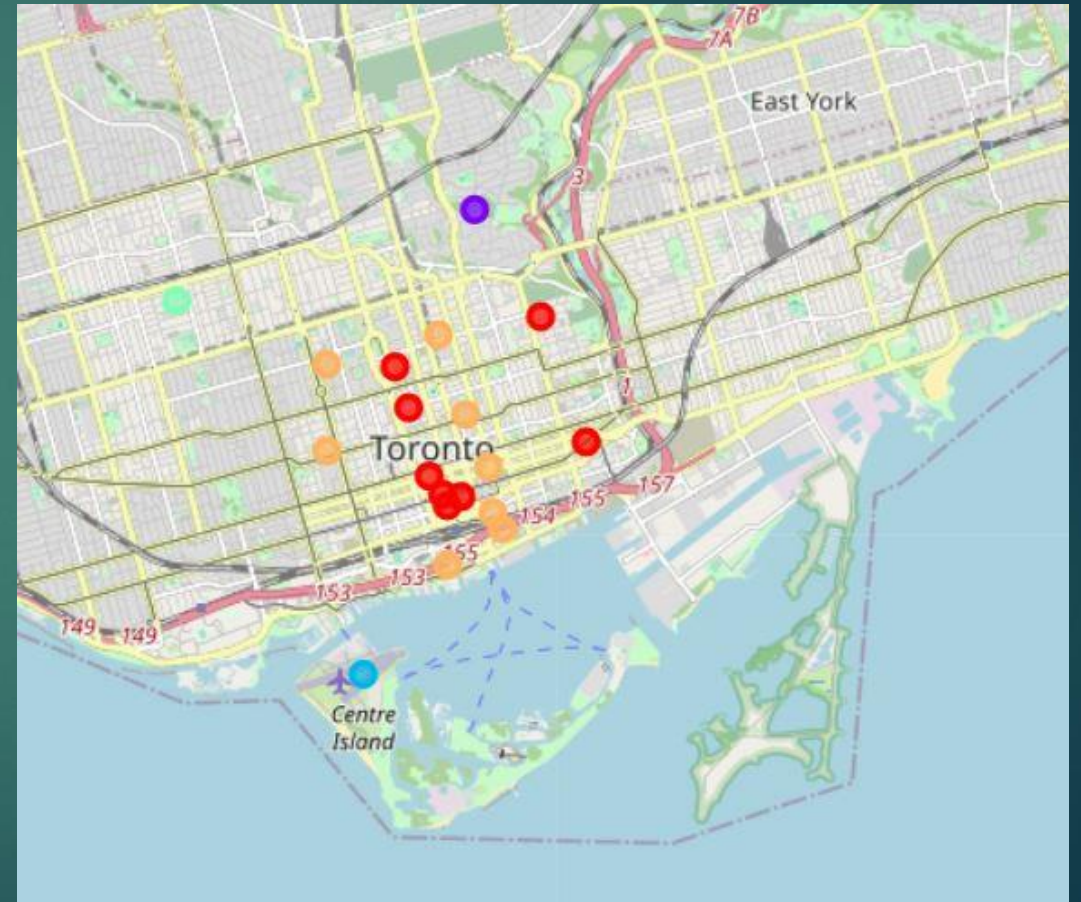
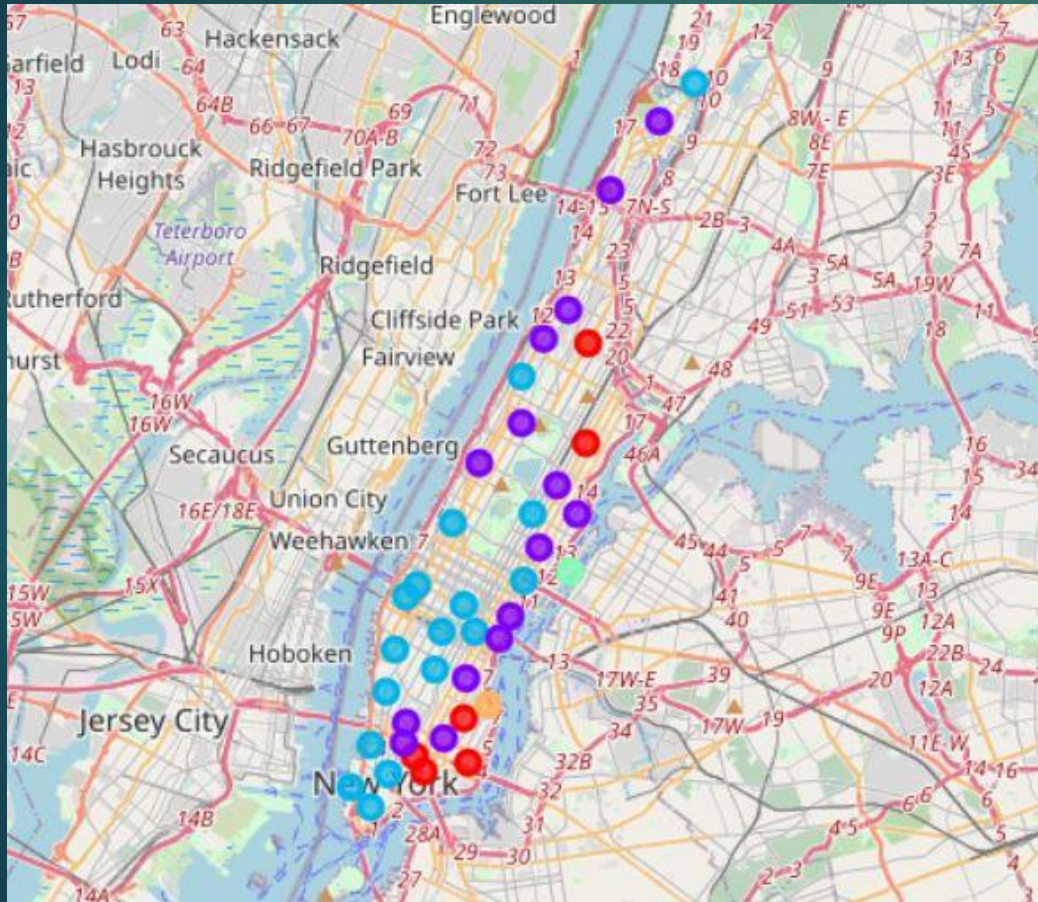


# Methodology



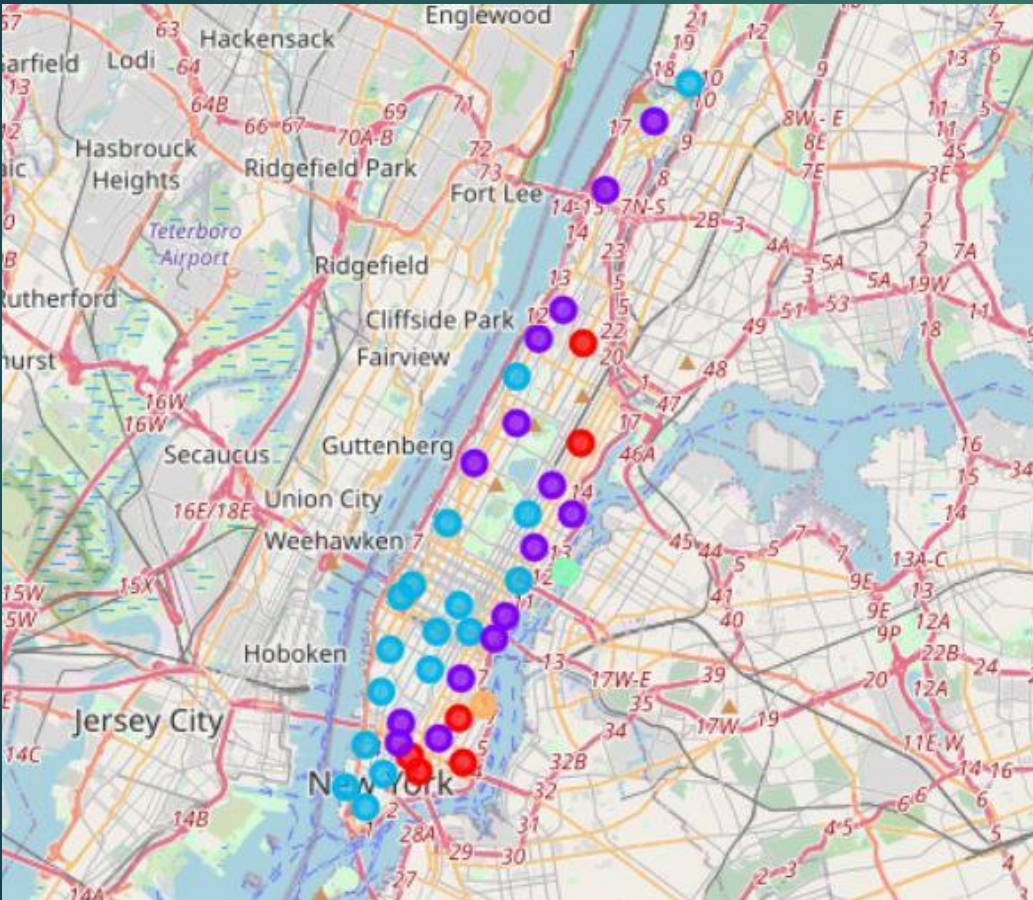


# Result and Discussion





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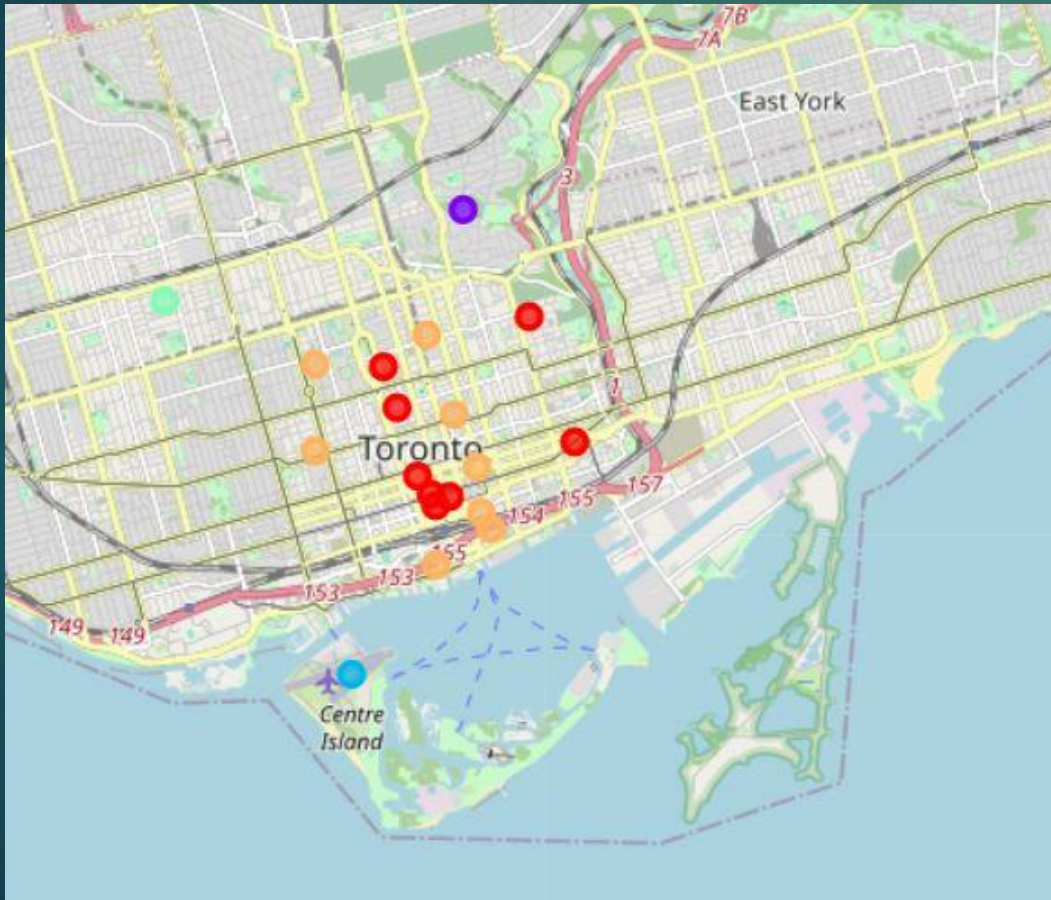


Manhattan, New York City

- 1) Cluster 0 Red
  - **Miscellaneous/Night Life**
- 2) Cluster 1 Purple
  - **Gastronomy**
- 3) Cluster 2 Blue
  - **Entertainment & Accommodation**
- 4) Cluster 3 Green
  - **Nature**
- 5) Cluster 4 Yellow
  - **Sport Hub**



# Result and Discussion



Downtown Toronto, Toronto City

- 1) Cluster 0 Red
  - **Gastronomy**
- 2) Cluster 1 Purple
  - **Nature**
- 3) Cluster 2 Blue
  - **Transportation Hub**
- 4) Cluster 3 Green
  - **Miscellaneous**
- 5) Cluster 4 Yellow
  - **Entertainment & Accommodation**

# Conclusion & Recommendation

- BOTH BOROUGHES SHOW HIGH SIMILARITY OF CLUSTERED TOP-MOST COMMON VENUES CATEGORIZATION
- HIGH DISCREPANCIES IN TERM OF SPECIFIC CATEGORISED CLUSTER
- RECOMMENDATION:
  - Increase the amounts of neighbourhoods to explore and analyse, getting higher accuracy of result

# Appendix (Manhattan)

|    | 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       | Chinese Restaurant    | Cocktail Bar          | Bubble Tea Shop           | Bakery                | Coffee Shop              | Salon / Barbershop    | Vietnamese Restaurant | Optical Shop          | American Restaurant   | Spa                    |
| 6  | Central Harlem  | African Restaurant    | Fried Chicken Joint   | American Restaurant       | Bar                   | Cosmetics Shop           | French Restaurant     | Seafood Restaurant    | Chinese Restaurant    | Café                  | Tapas Restaurant       |
| 7  | East Harlem     | Mexican Restaurant    | Bakery                | Latin American Restaurant | Thai Restaurant       | Deli / Bodega            | Restaurant            | Beer Bar              | French Restaurant     | Liquor Store          | Steakhouse             |
| 19 | East Village    | Cocktail Bar          | Pizza Place           | Mexican Restaurant        | Coffee Shop           | Bar                      | Juice Bar             | Wine Bar              | Japanese Restaurant   | Ramen Restaurant      | Speakeasy              |
| 20 | Lower East Side | Chinese Restaurant    | Park                  | Cocktail Bar              | Café                  | Ramen Restaurant         | Art Gallery           | Pet Café              | Performing Arts Venue | Pharmacy              | Ice Cream Shop         |
| 22 | Little Italy    | Bubble Tea Shop       | Chinese Restaurant    | Bakery                    | Spa                   | Mediterranean Restaurant | Italian Restaurant    | Thai Restaurant       | Hotel                 | Ice Cream Shop        | Coffee Shop            |



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|----|--------------------|-----------------------|--------------------------|-----------------------|-----------------------|---------------------------|-----------------------|---------------------------|--------------------------|-----------------------|------------------------|
| 2  | Washington Heights | Café                  | Bakery                   | Pizza Place           | Mobile Phone Shop     | Chinese Restaurant        | Grocery Store         | Latin American Restaurant | Donut Shop               | Sandwich Place        | Supplement Shop        |
| 3  | Inwood             | Mexican Restaurant    | Café                     | Lounge                | Pizza Place           | Restaurant                | Deli / Bodega         | Chinese Restaurant        | Spanish Restaurant       | Caribbean Restaurant  | Park                   |
| 4  | Hamilton Heights   | Pizza Place           | Coffee Shop              | Café                  | Deli / Bodega         | Mexican Restaurant        | Cocktail Bar          | Indian Restaurant         | Sushi Restaurant         | Park                  | Yoga Studio            |
| 5  | Manhattanville     | Coffee Shop           | Seafood Restaurant       | Italian Restaurant    | Deli / Bodega         | Park                      | Sushi Restaurant      | Mexican Restaurant        | Café                     | Bike Trail            | Boutique               |
| 9  | Yorkville          | Italian Restaurant    | Coffee Shop              | Gym                   | Sushi Restaurant      | Bar                       | Deli / Bodega         | Mexican Restaurant        | Japanese Restaurant      | Diner                 | Wine Shop              |
| 10 | Lenox Hill         | Coffee Shop           | Italian Restaurant       | Pizza Place           | Café                  | Sushi Restaurant          | Cocktail Bar          | Gym / Fitness Center      | Gym                      | Burger Joint          | Salad Place            |
| 12 | Upper West Side    | Italian Restaurant    | Coffee Shop              | Dessert Shop          | Bar                   | Middle Eastern Restaurant | Bookstore             | Sushi Restaurant          | Mediterranean Restaurant | Pizza Place           | Bakery                 |
| 18 | Greenwich Village  | Italian Restaurant    | Coffee Shop              | Café                  | Gym                   | Indian Restaurant         | Ice Cream Shop        | Bakery                    | Comedy Club              | Clothing Store        | Gourmet Shop           |
| 23 | Soho               | Italian Restaurant    | Mediterranean Restaurant | Coffee Shop           | Sandwich Place        | French Restaurant         | Clothing Store        | Gym                       | Bakery                   | Café                  | Spa                    |

# Appendix (Manhattan)

|    |                  |                    |                          |                    |                     |                    |                    |                    |                  |                     |                           |
|----|------------------|--------------------|--------------------------|--------------------|---------------------|--------------------|--------------------|--------------------|------------------|---------------------|---------------------------|
| 23 | Soho             | Italian Restaurant | Mediterranean Restaurant | Coffee Shop        | Sandwich Place      | French Restaurant  | Clothing Store     | Gym                | Bakery           | Café                | Spa                       |
| 25 | Manhattan Valley | Coffee Shop        | Spa                      | Pizza Place        | Bar                 | Mexican Restaurant | Grocery Store      | Playground         | Park             | Noodle House        | Latin American Restaurant |
| 27 | Gramercy         | Italian Restaurant | Bar                      | Coffee Shop        | Playground          | Pizza Place        | Mexican Restaurant | Grocery Store      | Bagel Shop       | Ice Cream Shop      | Diner                     |
| 30 | Carnegie Hill    | Coffee Shop        | Pizza Place              | Yoga Studio        | Gym                 | Wine Shop          | Bar                | Bookstore          | Café             | Japanese Restaurant | Grocery Store             |
| 31 | Noho             | Italian Restaurant | Coffee Shop              | Pizza Place        | Japanese Restaurant | Grocery Store      | Sandwich Place     | Mexican Restaurant | Wine Shop        | Gift Shop           | Tea Room                  |
| 35 | Turtle Bay       | Coffee Shop        | Park                     | Italian Restaurant | Café                | Deli / Bodega      | Seafood Restaurant | Wine Bar           | Sushi Restaurant | French Restaurant   | Karaoke Bar               |
| 36 | Tudor City       | Café               | Park                     | Mexican Restaurant | Deli / Bodega       | Diner              | Pizza Place        | Dog Run            | Asian Restaurant | Bar                 | Garden                    |

# Appendix (Manhattan)

|    | 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     | Sandwich Place        | Coffee Shop           | Gym                   | Ice Cream Shop          | Department Store      | Pharmacy              | Diner                 | Discount Store        | Donut Shop            | Bank                   |
| 8  | Upper East Side | Italian Restaurant    | Bakery                | Gym / Fitness Center  | Spa                     | American Restaurant   | Exhibit               | Hotel                 | Juice Bar             | Yoga Studio           | Wine Shop              |
| 13 | Lincoln Square  | Italian Restaurant    | Café                  | Plaza                 | Gym / Fitness Center    | Theater               | Performing Arts Venue | Concert Hall          | Wine Shop             | French Restaurant     | Grocery Store          |
| 14 | Clinton         | Theater               | Coffee Shop           | Gym / Fitness Center  | Hotel                   | Gym                   | Italian Restaurant    | Wine Shop             | Sandwich Place        | Spa                   | American Restaurant    |
| 15 | Midtown         | Coffee Shop           | Hotel                 | Theater               | Pizza Place             | Cuban Restaurant      | Bakery                | Japanese Restaurant   | Clothing Store        | Cosmetics Shop        | Spa                    |
| 16 | Murray Hill     | Hotel                 | Sandwich Place        | Coffee Shop           | Gym / Fitness Center    | Steakhouse            | Japanese Restaurant   | Pizza Place           | Chinese Restaurant    | Indian Restaurant     | Juice Bar              |
| 17 | Chelsea         | Art Gallery           | Coffee Shop           | Café                  | Ice Cream Shop          | American Restaurant   | Market                | Seafood Restaurant    | Boutique              | Cupcake Shop          | Cycle Studio           |
| 21 | Tribeca         | Italian Restaurant    | Park                  | Wine Bar              | Café                    | Spa                   | Hotel                 | Coffee Shop           | Bakery                | Steakhouse            | Greek Restaurant       |
| 24 | West Village    | Italian Restaurant    | American Restaurant   | Wine Bar              | New American Restaurant | Coffee Shop           | Jazz Club             | Bakery                | Park                  | Cocktail Bar          | Pizza Place            |



# Appendix (Manhattan)

|    |                     |                      |                      |                      |                     |                    |                   |                      |                      |                         |                          |
|----|---------------------|----------------------|----------------------|----------------------|---------------------|--------------------|-------------------|----------------------|----------------------|-------------------------|--------------------------|
| 26 | Morningside Heights | Park                 | Coffee Shop          | Bookstore            | American Restaurant | Deli / Bodega      | Burger Joint      | Sandwich Place       | Tennis Court         | New American Restaurant | Supermarket              |
| 28 | Battery Park City   | Park                 | Coffee Shop          | Hotel                | Memorial Site       | Gym                | Boat or Ferry     | Gourmet Shop         | Food Court           | Shopping Mall           | Wine Shop                |
| 29 | Financial District  | Coffee Shop          | Hotel                | Pizza Place          | American Restaurant | Sandwich Place     | Salad Place       | Gym / Fitness Center | Juice Bar            | Café                    | Cocktail Bar             |
| 32 | Civic Center        | French Restaurant    | Coffee Shop          | American Restaurant  | Park                | Hotel              | Spa               | Sushi Restaurant     | Gym / Fitness Center | Yoga Studio             | Wine Shop                |
| 33 | Midtown South       | Korean Restaurant    | Hotel                | Japanese Restaurant  | Burger Joint        | Café               | Coffee Shop       | Hotel Bar            | Gym / Fitness Center | Lounge                  | Dessert Shop             |
| 34 | Sutton Place        | Italian Restaurant   | Coffee Shop          | Gym / Fitness Center | Gym                 | Park               | Bagel Shop        | Hotel                | Bakery               | Furniture / Home Store  | Grocery Store            |
| 38 | Flatiron            | Gym / Fitness Center | Italian Restaurant   | Salon / Barbershop   | Wine Shop           | Park               | Outdoor Sculpture | Cosmetics Shop       | Gym                  | Grocery Store           | Mediterranean Restaurant |
| 39 | Hudson Yards        | Hotel                | Gym / Fitness Center | American Restaurant  | Café                | Italian Restaurant | Restaurant        | Park                 | Gym                  | Boat or Ferry           | Coffee Shop              |

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|----|------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 11 | Roosevelt Island | Playground            | Park                  | Gym                   | Dry Cleaner           | Greek Restaurant      | Coffee Shop           | Outdoors & Recreation | Sandwich Place        | Scenic Lookout        | School                 |

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|----|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 37 | Stuyvesant Town | Park                  | Playground            | Gas Station           | Gym                   | Gym / Fitness Center  | Baseball Field        | Cocktail Bar          | Harbor / Marina       | German Restaurant     | Bistro                 |

# Appendix (Downtown Toronto)

|    | Neighborhood                                | Cluster Labels | 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  | St. James Town, Cabbagetown                 | 0              | Restaurant            | Italian Restaurant    | Coffee Shop           | Café                  | Bakery                | Liquor Store          | Indian Restaurant     | Japanese Restaurant   | Deli / Bodega         | Jewelry Store              |
| 3  | Regent Park, Harbourfront                   | 0              | Coffee Shop           | Park                  | Breakfast Spot        | Theater               | Bakery                | Event Space           | Performing Arts Venue | Café                  | Pub                   | Restaurant                 |
| 7  | Central Bay Street                          | 0              | Coffee Shop           | Café                  | Seafood Restaurant    | Sandwich Place        | Ramen Restaurant      | Poke Place            | Bubble Tea Shop       | Park                  | Chinese Restaurant    | Modern European Restaurant |
| 8  | Richmond, Adelaide, King                    | 0              | Coffee Shop           | Café                  | Pizza Place           | Sushi Restaurant      | Concert Hall          | Lounge                | Japanese Restaurant   | Colombian Restaurant  | Seafood Restaurant    | Deli / Bodega              |
| 10 | Toronto Dominion Centre, Design Exchange    | 0              | Coffee Shop           | Café                  | Restaurant            | Japanese Restaurant   | Hotel                 | Museum                | Gastropub             | Pub                   | Concert Hall          | Deli / Bodega              |
| 11 | Commerce Court, Victoria Hotel              | 0              | Café                  | Gastropub             | Restaurant            | Japanese Restaurant   | Coffee Shop           | Deli / Bodega         | Sandwich Place        | Seafood Restaurant    | Pub                   | Ice Cream Shop             |
| 16 | First Canadian Place, Underground city      | 0              | Café                  | Coffee Shop           | Restaurant            | Seafood Restaurant    | Tea Room              | Steakhouse            | Gastropub             | Pub                   | Bookstore             | Deli / Bodega              |
| 18 | Queen's Park, Ontario Provincial Government | 0              | Coffee Shop           | Sushi Restaurant      | Yoga Studio           | Diner                 | Bar                   | Smoothie Shop         | Beer Bar              | Distribution Center   | Sandwich Place        | Italian Restaurant         |



# Appendix (Downtown Toronto)

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|---|--------------|----------------|-----------------------|-----------------------|-----------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 0 | Rosedale     | 1              | Park                  | Playground            | Trail                 | Comfort Food Restaurant | Deli / Bodega         | Dance Studio          | Creperie              | Cosmetics Shop        | Concert Hall          | Comic Shop             |

|    | Neighborhood                                      | Cluster Labels | 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 |
|----|---|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 14 | CN Tower, King and Spadina, Railway Lands, Har... | 2              | Airport Lounge        | Airport Service       | Airport Terminal      | Airport               | Plane                 | Boutique              | Coffee Shop           | Bar                   | Sculpture Garden      | Boat or Ferry          |

|    | Borough          | Cluster Labels | 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 |
|----|------------------|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 17 | Downtown Toronto | 3              | Grocery Store         | Café                  | Park                  | Italian Restaurant    | Nightclub             | Candy Store           | Restaurant            | Diner                 | Baby Store            | Athletics & Sports     |

# Appendix (Downtown Toronto)

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|----|---|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------|-------------------------|-----------------------|---------------------------|-----------------------|------------------------|
| 2  | Church and Wellesley                              | 4              | Café                  | Dance Studio          | Smoke Shop            | Indian Restaurant     | Japanese Restaurant     | Salon / Barbershop      | Bookstore             | Restaurant                | Juice Bar             | Ramen Restaurant       |
| 4  | Garden District, Ryerson                          | 4              | Café                  | Theater               | Coffee Shop           | Burger Joint          | Electronics Store       | Shopping Mall           | Music Venue           | Plaza                     | Ramen Restaurant      | Hotel                  |
| 5  | St. James Town                                    | 4              | Gastropub             | Café                  | Cocktail Bar          | Coffee Shop           | BBQ Joint               | New American Restaurant | Park                  | Middle Eastern Restaurant | Restaurant            | Cosmetics Shop         |
| 6  | Berczy Park                                       | 4              | Beer Bar              | Coffee Shop           | Seafood Restaurant    | Cocktail Bar          | French Restaurant       | Breakfast Spot          | Creperie              | Liquor Store              | Bistro                | Concert Hall           |
| 9  | Harbourfront East, Union Station, Toronto Islands | 4              | Plaza                 | Park                  | Hotel                 | Italian Restaurant    | Lounge                  | Roof Deck               | Salad Place           | Bubble Tea Shop           | Japanese Restaurant   | Skating Rink           |
| 12 | University of Toronto, Harbord                    | 4              | Café                  | Bookstore             | Restaurant            | Bar                   | Bakery                  | Japanese Restaurant     | Italian Restaurant    | Yoga Studio               | Dessert Shop          | Beer Bar               |
| 13 | Kensington Market, Chinatown, Grange Park         | 4              | Café                  | Mexican Restaurant    | Bakery                | Vietnamese Restaurant | Comfort Food Restaurant | Record Shop             | Pizza Place           | Cheese Shop               | Organic Grocery       | Cocktail Bar           |
| 15 | Stn A PO Boxes                                    | 4              | Café                  | Restaurant            | Seafood Restaurant    | Beer Bar              | Cocktail Bar            | Jazz Club               | Hotel                 | Park                      | Cheese Shop           | Museum                 |