final_assigment

January 9, 2020

[2]:
```
import numpy as np # library to handle data in a vectorized manner

import pandas as pd # library for data analsysis
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

import json # library to handle JSON files

#!conda install -c conda-forge geopy --yes # uncomment this line if you haven't␣
 ↪completed the Foursquare API lab
from geopy.geocoders import Nominatim # convert an address into latitude and␣
 ↪longitude values

import requests # library to handle requests
from pandas.io.json import json_normalize # tranform JSON file into a pandas␣
 ↪dataframe

# Matplotlib and associated plotting modules
import matplotlib.cm as cm
import matplotlib.colors as colors

# import k-means from clustering stage
from sklearn.cluster import KMeans

#!conda install -c conda-forge folium=0.5.0 --yes # uncomment this line if you␣
 ↪haven't completed the Foursquare API lab
import folium # map rendering library

print('Libraries imported.')
```

```
Libraries imported.
```

[2]:
```
!wget -q -O 'newyork_data.json' https://geo.nyu.edu/download/file/
 ↪nyu-2451-34572-geojson.json
print('Data downloaded!')
```

```
Data downloaded!
```

[3]:
```
with open('newyork_data.json') as json_data:
    newyork_data = json.load(json_data)

neighborhoods_data = newyork_data['features']
```

[4]:
```
# define the dataframe columns
column_names = ['Borough', 'Neighborhood', 'Latitude', 'Longitude']

# instantiate the dataframe
neighborhoods = pd.DataFrame(columns=column_names)
```

[5]:
```
for data in neighborhoods_data:
    borough = neighborhood_name = data['properties']['borough']
    neighborhood_name = data['properties']['name']

    neighborhood_latlon = data['geometry']['coordinates']
    neighborhood_lat = neighborhood_latlon[1]
    neighborhood_lon = neighborhood_latlon[0]

    neighborhoods = neighborhoods.append({'Borough': borough,
                                          'Neighborhood': neighborhood_name,
                                          'Latitude': neighborhood_lat,
                                          'Longitude': neighborhood_lon},␣
 ↪ignore_index=True)
```

[6]:
```
#!conda install -c conda-forge geopy --yes
from geopy.geocoders import Nominatim
```

[7]:
```
address = 'New York City, NY'

geolocator = Nominatim(user_agent="ny_explorer")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of New York City are {}, {}.'.
 ↪format(latitude, longitude))
```

```
The geograpical coordinate of New York City are 40.7127281, -74.0060152.
```

[8]:
```
# create map of New York using latitude and longitude values
map_newyork = folium.Map(location=[latitude, longitude], zoom_start=10)

# add markers to map
for lat, lng, borough, neighborhood in zip(neighborhoods['Latitude'],␣
 ↪neighborhoods['Longitude'], neighborhoods['Borough'],␣
 ↪neighborhoods['Neighborhood']):
    label = '{}, {}'.format(neighborhood, borough)
```

```
    label = folium.Popup(label, parse_html=True)
    color = 'blue'
    if borough=='Manhattan':
        color='red'
    folium.CircleMarker(
        [lat, lng],
        radius=3,

        popup=label,
        color=None,
        fill=True,
        fill_color=color,
        fill_opacity=0.8,
        parse_html=False).add_to(map_newyork)
map_newyork.save('map.html')
map_newyork
```

[8]:
```
<folium.folium.Map at 0x7f6d56ad2be0>
```

[9]:
```
manhattan_data = neighborhoods[neighborhoods['Borough'] == 'Manhattan'].
 ↪reset_index(drop=True)
manhattan_data.head()
```

[9]:

	Borough	Neighborhood	Latitude	Longitude
0	Manhattan	Marble Hill	40.876551	-73.910660
1	Manhattan	Chinatown	40.715618	-73.994279
2	Manhattan	Washington Heights	40.851903	-73.936900
3	Manhattan	Inwood	40.867684	-73.921210
4	Manhattan	Hamilton Heights	40.823604	-73.949688

[11]:
```
address = 'Manhattan, NY'

geolocator = Nominatim(user_agent="ny_explorer")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of Manhattan are {}, {}.'.format(latitude,␣
 ↪longitude))
```

```
The geograpical coordinate of Manhattan are 40.7896239, -73.9598939.
```

[12]:
```
import os
CLIENT_ID = os.environ['foursquare_ClientId'] # your Foursquare ID
CLIENT_SECRET = os.environ['foursquare_ClientSecret'] # your Foursquare Secret
VERSION = '20180604'
LIMIT = 50
```

[13]:
```
neighborhood_latitude = manhattan_data.loc[0, 'Latitude'] # neighborhood␣
 ↪latitude value
```

```
neighborhood_longitude = manhattan_data.loc[0, 'Longitude'] # neighborhood␣
 ↪longitude value

neighborhood_name = manhattan_data.loc[0, 'Neighborhood'] # neighborhood name

print('Latitude and longitude values of {} are {}, {}.'.
 ↪format(neighborhood_name,

                                                                 ␣
 ↪neighborhood_latitude,

                                                                 ␣
 ↪neighborhood_longitude))
```

```
Latitude and longitude values of Marble Hill are 40.87655077879964,
-73.91065965862981.
```

[14]:
```
# type your answer here
radius = 500 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?
 ↪&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}&section=trending&categoryId
 ↪format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    neighborhood_latitude,
    neighborhood_longitude,
    radius,
    LIMIT)
```

[15]:
```
results = requests.get(url).json()
```

[16]:
```
# function that extracts the category of the venue
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return categories_list[0]['shortName']
```

[17]:
```
venues = results['response']['groups'][0]['items']
```

[18]:
```
venues = results['response']['groups'][0]['items']

nearby_venues = json_normalize(venues) # flatten JSON

# filter columns
```

```
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat',␣
 ↪'venue.location.lng']
nearby_venues =nearby_venues.loc[:, filtered_columns]

# filter the category for each row
nearby_venues['venue.categories'] = nearby_venues.apply(get_category_type,␣
 ↪axis=1)

# clean columns
nearby_venues.columns = [col.split(".")[-1] for col in nearby_venues.columns]
nearby_venues = np.round(nearby_venues,2)
nearby_venues.head(5)
```

[18]:

	name	categories	lat	lng
0	Arturo's	Pizza	40.87	-73.91
1	Pick Up Six: Asian Kitchen	Asian	40.88	-73.91
2	Boston Market	American	40.88	-73.91
3	SUBWAY	Sandwiches	40.88	-73.91
4	Dunkin'	Donuts	40.88	-73.91

[19]:
```
with open('marble_hill_venues.tex','w') as f:
    f.write(nearby_venues.head().to_latex(index=False))
```

[20]:
```
print('{} venues were returned by Foursquare.'.format(nearby_venues.shape[0]))
```

```
13 venues were returned by Foursquare.
```

[33]:
```
def getNearbyVenues(names, latitudes, longitudes, radius=500):

    venues_list=[]
    for name, lat, lng in zip(names, latitudes, longitudes):
        print(name)

        # create the API request URL
        url = 'https://api.foursquare.com/v2/venues/explore?
 ↪&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}&section=trending&categoryId
 ↪format(
            CLIENT_ID,
            CLIENT_SECRET,
            VERSION,
            lat,
            lng,
            radius,
            LIMIT)

        # make the GET request
        results = requests.get(url).json()["response"]['groups'][0]['items']
```

```
        # return only relevant information for each nearby venue
        venues_list.append([(
            name,
            lat,
            lng,
            v['venue']['name'],
            v['venue']['location']['lat'],
            v['venue']['location']['lng'],
            v['venue']['categories'][0]['shortName']) for v in results])

    nearby_venues = pd.DataFrame([item for venue_list in venues_list for item␣
↪in venue_list])
    nearby_venues.columns = ['Neighborhood',
                  'Neighborhood Latitude',
                  'Neighborhood Longitude',
                  'Venue',
                  'Venue Latitude',
                  'Venue Longitude',
                  'Venue Category']

    return(nearby_venues)
```

[34]:
```
# type your answer here

manhattan_venues = getNearbyVenues(names=manhattan_data['Neighborhood'],
                                   latitudes=manhattan_data['Latitude'],
                                   longitudes=manhattan_data['Longitude']
                                  )
```

```
Marble Hill
Chinatown
Washington Heights
Inwood
Hamilton Heights
Manhattanville
Central Harlem
East Harlem
Upper East Side
Yorkville
Lenox Hill
Roosevelt Island
Upper West Side
Lincoln Square
Clinton
Midtown
Murray Hill
Chelsea
Greenwich Village
```

```
East Village
Lower East Side
Tribeca
Little Italy
Soho
West Village
Manhattan Valley
Morningside Heights
Gramercy
Battery Park City
Financial District
Carnegie Hill
Noho
Civic Center
Midtown South
Sutton Place
Turtle Bay
Tudor City
Stuyvesant Town
Flatiron
Hudson Yards
```

[35]:
```
print(manhattan_venues.shape)
manhattan_venues.head()
```

```
(1830, 7)
```

[35]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.91066	Arturo's	40.874412	-73.910271	Pizza
1	Marble Hill	40.876551	-73.91066	Pick Up Six: Asian Kitchen	40.878075	-73.907033	Asian
2	Marble Hill	40.876551	-73.91066	Boston Market	40.877430	-73.905412	American
3	Marble Hill	40.876551	-73.91066	SUBWAY	40.878493	-73.905385	Sandwiches
4	Marble Hill	40.876551	-73.91066	Dunkin'	40.877136	-73.906666	Donuts

[36]:
```
manhattan_venues.groupby('Neighborhood').count()
```

[36]:

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Battery Park City	32	32	32	32	32	32
Carnegie Hill	50	50	50	50	50	50
Central Harlem	46	46	46	46	46	46

Chelsea	50	50	50
Chinatown	50	50	50
Civic Center	50	50	50
Clinton	50	50	50
East Harlem	49	49	49
East Village	50	50	50
Financial District	50	50	50
Flatiron	50	50	50
Gramercy	50	50	50
Greenwich Village	50	50	50
Hamilton Heights	50	50	50
Hudson Yards	45	45	45
Inwood	49	49	49
Lenox Hill	50	50	50
Lincoln Square	50	50	50
Little Italy	50	50	50
Lower East Side	48	48	48
Manhattan Valley	44	44	44
Manhattanville	45	45	45
Marble Hill	13	13	13
Midtown	50	50	50
Midtown South	50	50	50
Morningside Heights	42	42	42
Murray Hill	50	50	50
Noho	50	50	50
Roosevelt Island	12	12	12
Soho	50	50	50
Stuyvesant Town	5	5	5
Sutton Place	50	50	50
Tribeca	50	50	50
Tudor City	50	50	50
Turtle Bay	50	50	50
Upper East Side	50	50	50
Upper West Side	50	50	50
Washington Heights	50	50	50
West Village	50	50	50
Yorkville	50	50	50

Neighborhood	Venue Latitude	Venue Longitude	Venue Category
Battery Park City	32	32	32
Carnegie Hill	50	50	50
Central Harlem	46	46	46
Chelsea	50	50	50
Chinatown	50	50	50
Civic Center	50	50	50
Clinton	50	50	50

East Harlem	49	49	49
East Village	50	50	50
Financial District	50	50	50
Flatiron	50	50	50
Gramercy	50	50	50
Greenwich Village	50	50	50
Hamilton Heights	50	50	50
Hudson Yards	45	45	45
Inwood	49	49	49
Lenox Hill	50	50	50
Lincoln Square	50	50	50
Little Italy	50	50	50
Lower East Side	48	48	48
Manhattan Valley	44	44	44
Manhattanville	45	45	45
Marble Hill	13	13	13
Midtown	50	50	50
Midtown South	50	50	50
Morningside Heights	42	42	42
Murray Hill	50	50	50
Noho	50	50	50
Roosevelt Island	12	12	12
Soho	50	50	50
Stuyvesant Town	5	5	5
Sutton Place	50	50	50
Tribeca	50	50	50
Tudor City	50	50	50
Turtle Bay	50	50	50
Upper East Side	50	50	50
Upper West Side	50	50	50
Washington Heights	50	50	50
West Village	50	50	50
Yorkville	50	50	50

[25]:
```
print('There are {} uniques categories.'.format(len(manhattan_venues['Venue␣
 ↪Category'].unique())))
```

```
There are 104 uniques categories.
```

[37]:
```
# one hot encoding
manhattan_onehot = pd.get_dummies(manhattan_venues[['Venue Category']],␣
 ↪prefix="", prefix_sep="")

# add neighborhood column back to dataframe
manhattan_onehot['Neighborhood'] = manhattan_venues['Neighborhood']

# move neighborhood column to the first column
```

```
fixed_columns = [manhattan_onehot.columns[-1]] + list(manhattan_onehot.columns[:
↪-1])
manhattan_onehot = manhattan_onehot[fixed_columns]

manhattan_onehot.head()
```

[37]:

	Neighborhood	African	American	Argentinian	Asian	Australian	Austrian
0	Marble Hill	0	0	0	0	0	0
1	Marble Hill	0	0	0	1	0	0
2	Marble Hill	0	1	0	0	0	0
3	Marble Hill	0	0	0	0	0	0
4	Marble Hill	0	0	0	0	0	0

	BBQ	Bagels	Bakery	Belgian	Bistro	Brazilian	Breakfast	Burgers
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0

	Burritos	Cafeteria	Café	Cajun / Creole	Caribbean	Caucasian	Chinese
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0

	Creperie	Cuban	Czech	Deli / Bodega	Dim Sum	Diner	Donuts	Dumplings
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	1	0

	Eastern European	Egyptian Restaurant	Empanada	English	Ethiopian
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0

	Falafel	Fast Food	Filipino	Food	Food Court	Food Truck	French
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0

```
   Fried Chicken  Gastropub  German  Gluten-free  Greek  Hawaiian  Himalayan  \
0              0          0       0            0      0         0          0
1              0          0       0            0      0         0          0
2              0          0       0            0      0         0          0
3              0          0       0            0      0         0          0
4              0          0       0            0      0         0          0

   Hot Dogs  Hotpot  Indian  Indonesian  Irish  Israeli  Italian  Japanese  \
0         0       0       0           0      0        0        0         0
1         0       0       0           0      0        0        0         0
2         0       0       0           0      0        0        0         0
3         0       0       0           0      0        0        0         0
4         0       0       0           0      0        0        0         0

   Japanese Curry  Korean  Kosher  Latin American  Mac & Cheese  Malay  \
0               0       0       0               0             0      0
1               0       0       0               0             0      0
2               0       0       0               0             0      0
3               0       0       0               0             0      0
4               0       0       0               0             0      0

   Mediterranean  Mexican  Middle Eastern  Modern European  \
0              0        0               0                0
1              0        0               0                0
2              0        0               0                0
3              0        0               0                0
4              0        0               0                0

   Molecular Gastronomy  Moroccan  New American  Noodles  North Indian  \
0                     0         0             0        0             0
1                     0         0             0        0             0
2                     0         0             0        0             0
3                     0         0             0        0             0
4                     0         0             0        0             0

   Paella  Pakistani  Peruvian  Pet Café  Pizza  Poke Place  Ramen  \
0       0          0         0         0      1           0      0
1       0          0         0         0      0           0      0
2       0          0         0         0      0           0      0
3       0          0         0         0      0           0      0
4       0          0         0         0      0           0      0

   Restaurant  Russian  Salad  Sandwiches  Scandinavian  Seafood  Shanghai  \
0           0        0      0           0             0        0         0
1           0        0      0           0             0        0         0
2           0        0      0           0             0        0         0
```

```
3           0        0      0           1             0        0         0
4           0        0      0           0             0        0         0

   Snacks  Soup  South Indian  Southern / Soul  Spanish  Steakhouse  Sushi  \
0       0     0             0                0        0           0      0
1       0     0             0                0        0           0      0
2       0     0             0                0        0           0      0
3       0     0             0                0        0           0      0
4       0     0             0                0        0           0      0

   Szechuan  Tacos  Taiwanese  Tapas  Tex-Mex  Thai  Tonkatsu  Turkish  Udon  \
0         0      0          0      0        0     0         0        0     0
1         0      0          0      0        0     0         0        0     0
2         0      0          0      0        0     0         0        0     0
3         0      0          0      0        0     0         0        0     0
4         0      0          0      0        0     0         0        0     0

   Vegetarian / Vegan  Vietnamese  Wings
0                   0           0      0
1                   0           0      0
2                   0           0      0
3                   0           0      0
4                   0           0      0
```

[38]:
```
manhattan_onehot.shape
```

[38]:
```
(1830, 105)
```

[39]:
```
manhattan_grouped = manhattan_onehot.groupby('Neighborhood').mean().
 ↪reset_index()
manhattan_grouped
```

[39]:
```
           Neighborhood   African  American  Argentinian     Asian  \
0     Battery Park City  0.000000  0.031250     0.000000  0.000000
1         Carnegie Hill  0.000000  0.000000     0.020000  0.000000
2        Central Harlem  0.065217  0.043478     0.000000  0.000000
3               Chelsea  0.000000  0.060000     0.000000  0.020000
4            Chinatown  0.000000  0.000000     0.000000  0.040000
5          Civic Center  0.000000  0.080000     0.000000  0.000000
6               Clinton  0.000000  0.040000     0.000000  0.020000
7          East Harlem  0.000000  0.000000     0.000000  0.000000
8          East Village  0.000000  0.060000     0.020000  0.000000
9    Financial District  0.000000  0.080000     0.000000  0.000000
10             Flatiron  0.000000  0.020000     0.000000  0.020000
11             Gramercy  0.000000  0.060000     0.000000  0.000000
12    Greenwich Village  0.000000  0.020000     0.000000  0.000000
13     Hamilton Heights  0.000000  0.000000     0.000000  0.000000
14         Hudson Yards  0.000000  0.111111     0.000000  0.022222
15               Inwood  0.000000  0.040816     0.000000  0.000000
```

16	Lenox Hill	0.000000	0.000000	0.000000	0.000000
17	Lincoln Square	0.000000	0.100000	0.000000	0.000000
18	Little Italy	0.000000	0.020000	0.000000	0.020000
19	Lower East Side	0.000000	0.020833	0.020833	0.000000
20	Manhattan Valley	0.000000	0.022727	0.000000	0.000000
21	Manhattanville	0.000000	0.022222	0.000000	0.000000
22	Marble Hill	0.000000	0.076923	0.000000	0.076923
23	Midtown	0.000000	0.060000	0.000000	0.000000
24	Midtown South	0.000000	0.000000	0.000000	0.000000
25	Morningside Heights	0.000000	0.071429	0.000000	0.000000
26	Murray Hill	0.000000	0.120000	0.000000	0.020000
27	Noho	0.000000	0.040000	0.020000	0.040000
28	Roosevelt Island	0.000000	0.000000	0.000000	0.000000
29	Soho	0.000000	0.020000	0.000000	0.020000
30	Stuyvesant Town	0.000000	0.000000	0.000000	0.000000
31	Sutton Place	0.000000	0.100000	0.000000	0.020000
32	Tribeca	0.000000	0.100000	0.020000	0.020000
33	Tudor City	0.000000	0.060000	0.000000	0.020000
34	Turtle Bay	0.000000	0.000000	0.000000	0.020000
35	Upper East Side	0.000000	0.080000	0.000000	0.020000
36	Upper West Side	0.000000	0.040000	0.000000	0.020000
37	Washington Heights	0.000000	0.020000	0.000000	0.000000
38	West Village	0.000000	0.060000	0.000000	0.000000
39	Yorkville	0.000000	0.000000	0.000000	0.000000

	Australian	Austrian	BBQ	Bagels	Bakery	Belgian	Bistro	\
0	0.00	0.00	0.062500	0.000000	0.031250	0.00	0.031250	
1	0.00	0.00	0.000000	0.000000	0.120000	0.00	0.000000	
2	0.00	0.00	0.021739	0.021739	0.021739	0.00	0.000000	
3	0.00	0.00	0.000000	0.020000	0.100000	0.00	0.000000	
4	0.00	0.00	0.000000	0.000000	0.060000	0.00	0.000000	
5	0.00	0.00	0.000000	0.000000	0.060000	0.00	0.000000	
6	0.00	0.00	0.000000	0.000000	0.000000	0.00	0.000000	
7	0.00	0.00	0.000000	0.000000	0.102041	0.00	0.000000	
8	0.00	0.00	0.000000	0.000000	0.000000	0.00	0.000000	
9	0.00	0.00	0.000000	0.020000	0.020000	0.00	0.000000	
10	0.00	0.00	0.000000	0.000000	0.040000	0.02	0.000000	
11	0.00	0.00	0.000000	0.060000	0.020000	0.00	0.000000	
12	0.02	0.00	0.000000	0.020000	0.040000	0.00	0.000000	
13	0.00	0.00	0.000000	0.000000	0.020000	0.00	0.000000	
14	0.00	0.00	0.022222	0.000000	0.000000	0.00	0.000000	
15	0.00	0.00	0.000000	0.020408	0.061224	0.00	0.020408	
16	0.00	0.00	0.020000	0.020000	0.020000	0.00	0.000000	
17	0.00	0.00	0.000000	0.020000	0.020000	0.00	0.000000	
18	0.02	0.00	0.000000	0.000000	0.100000	0.00	0.000000	
19	0.00	0.00	0.000000	0.020833	0.062500	0.00	0.000000	
20	0.00	0.00	0.000000	0.000000	0.022727	0.00	0.000000	

21	0.00	0.00	0.022222	0.000000	0.044444	0.00	0.000000
22	0.00	0.00	0.000000	0.000000	0.076923	0.00	0.000000
23	0.00	0.00	0.000000	0.000000	0.020000	0.00	0.000000
24	0.00	0.00	0.000000	0.020000	0.100000	0.00	0.000000
25	0.00	0.00	0.000000	0.000000	0.000000	0.00	0.000000
26	0.00	0.00	0.000000	0.040000	0.040000	0.00	0.000000
27	0.02	0.00	0.000000	0.020000	0.020000	0.00	0.000000
28	0.00	0.00	0.000000	0.000000	0.000000	0.00	0.000000
29	0.02	0.00	0.000000	0.020000	0.080000	0.00	0.000000
30	0.00	0.00	0.000000	0.000000	0.000000	0.00	0.200000
31	0.00	0.00	0.000000	0.100000	0.020000	0.00	0.000000
32	0.00	0.00	0.000000	0.000000	0.060000	0.00	0.000000
33	0.00	0.00	0.000000	0.020000	0.000000	0.00	0.000000
34	0.00	0.00	0.000000	0.000000	0.000000	0.00	0.000000
35	0.00	0.00	0.000000	0.040000	0.020000	0.00	0.000000
36	0.02	0.00	0.000000	0.020000	0.060000	0.00	0.000000
37	0.00	0.00	0.000000	0.000000	0.040000	0.00	0.000000
38	0.00	0.02	0.020000	0.000000	0.020000	0.00	0.020000
39	0.00	0.00	0.000000	0.020000	0.040000	0.00	0.020000

	Brazilian	Breakfast	Burgers	Burritos	Cafeteria	Café	\
0	0.00	0.000000	0.062500	0.03125	0.000000	0.031250	
1	0.00	0.020000	0.000000	0.00000	0.000000	0.100000	
2	0.00	0.021739	0.021739	0.00000	0.021739	0.021739	
3	0.00	0.020000	0.000000	0.00000	0.000000	0.080000	
4	0.00	0.020000	0.000000	0.00000	0.000000	0.000000	
5	0.00	0.000000	0.000000	0.02000	0.000000	0.060000	
6	0.02	0.020000	0.020000	0.00000	0.000000	0.060000	
7	0.00	0.000000	0.040816	0.00000	0.000000	0.061224	
8	0.00	0.000000	0.000000	0.00000	0.000000	0.020000	
9	0.00	0.000000	0.000000	0.00000	0.000000	0.080000	
10	0.00	0.000000	0.020000	0.04000	0.000000	0.020000	
11	0.00	0.000000	0.000000	0.00000	0.000000	0.040000	
12	0.00	0.000000	0.000000	0.00000	0.000000	0.080000	
13	0.00	0.000000	0.020000	0.00000	0.000000	0.080000	
14	0.00	0.022222	0.044444	0.00000	0.000000	0.088889	
15	0.00	0.000000	0.020408	0.00000	0.000000	0.081633	
16	0.00	0.020000	0.040000	0.00000	0.000000	0.040000	
17	0.00	0.000000	0.020000	0.00000	0.000000	0.160000	
18	0.00	0.020000	0.000000	0.00000	0.000000	0.080000	
19	0.00	0.000000	0.000000	0.00000	0.000000	0.041667	
20	0.00	0.000000	0.022727	0.00000	0.000000	0.045455	
21	0.00	0.000000	0.022222	0.00000	0.000000	0.022222	
22	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	
23	0.00	0.000000	0.040000	0.02000	0.000000	0.020000	
24	0.00	0.000000	0.020000	0.00000	0.000000	0.020000	
25	0.00	0.000000	0.071429	0.00000	0.000000	0.071429	

26	0.00	0.000000	0.020000	0.00000	0.000000	0.040000
27	0.00	0.020000	0.020000	0.00000	0.000000	0.020000
28	0.00	0.000000	0.000000	0.00000	0.000000	0.083333
29	0.00	0.000000	0.000000	0.00000	0.000000	0.120000
30	0.00	0.000000	0.000000	0.00000	0.000000	0.000000
31	0.00	0.000000	0.040000	0.02000	0.000000	0.020000
32	0.00	0.000000	0.060000	0.00000	0.000000	0.060000
33	0.00	0.000000	0.020000	0.00000	0.000000	0.120000
34	0.00	0.000000	0.000000	0.00000	0.000000	0.120000
35	0.00	0.000000	0.060000	0.00000	0.000000	0.000000
36	0.00	0.040000	0.000000	0.02000	0.000000	0.040000
37	0.00	0.020000	0.000000	0.00000	0.000000	0.040000
38	0.02	0.040000	0.040000	0.00000	0.000000	0.040000
39	0.00	0.000000	0.020000	0.00000	0.000000	0.020000

	Cajun / Creole	Caribbean	Caucasian	Chinese	Creperie	Cuban	Czech	\
0	0.00	0.000000	0.000000	0.093750	0.00	0.000000	0.00	
1	0.00	0.000000	0.000000	0.040000	0.00	0.000000	0.00	
2	0.00	0.065217	0.000000	0.086957	0.00	0.000000	0.00	
3	0.00	0.020000	0.000000	0.020000	0.02	0.000000	0.00	
4	0.00	0.000000	0.000000	0.240000	0.00	0.000000	0.00	
5	0.02	0.000000	0.000000	0.000000	0.00	0.020000	0.00	
6	0.00	0.020000	0.020000	0.000000	0.02	0.000000	0.00	
7	0.00	0.000000	0.000000	0.020408	0.00	0.020408	0.00	
8	0.00	0.000000	0.000000	0.020000	0.00	0.000000	0.00	
9	0.00	0.000000	0.000000	0.020000	0.00	0.020000	0.00	
10	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00	
11	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00	
12	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00	
13	0.00	0.040000	0.000000	0.080000	0.00	0.000000	0.00	
14	0.00	0.000000	0.022222	0.000000	0.00	0.000000	0.00	
15	0.00	0.040816	0.000000	0.040816	0.00	0.000000	0.00	
16	0.00	0.000000	0.000000	0.040000	0.00	0.020000	0.02	
17	0.00	0.000000	0.000000	0.040000	0.00	0.000000	0.00	
18	0.00	0.000000	0.000000	0.080000	0.00	0.000000	0.00	
19	0.00	0.000000	0.000000	0.083333	0.00	0.000000	0.00	
20	0.00	0.022727	0.000000	0.045455	0.00	0.000000	0.00	
21	0.00	0.022222	0.000000	0.111111	0.00	0.022222	0.00	
22	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00	
23	0.00	0.000000	0.000000	0.020000	0.02	0.000000	0.00	
24	0.00	0.020000	0.000000	0.000000	0.00	0.000000	0.00	
25	0.00	0.000000	0.000000	0.047619	0.00	0.000000	0.00	
26	0.00	0.000000	0.000000	0.040000	0.00	0.000000	0.00	
27	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00	
28	0.00	0.000000	0.000000	0.083333	0.00	0.000000	0.00	
29	0.00	0.000000	0.000000	0.020000	0.00	0.000000	0.00	
30	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00	

31	0.00	0.000000	0.000000	0.060000	0.00	0.000000	0.00
32	0.00	0.000000	0.000000	0.040000	0.00	0.000000	0.00
33	0.00	0.000000	0.000000	0.040000	0.00	0.000000	0.00
34	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00
35	0.00	0.000000	0.000000	0.020000	0.00	0.000000	0.00
36	0.00	0.000000	0.000000	0.020000	0.00	0.000000	0.00
37	0.00	0.020000	0.000000	0.060000	0.00	0.000000	0.00
38	0.00	0.000000	0.000000	0.000000	0.00	0.000000	0.00
39	0.00	0.000000	0.000000	0.060000	0.00	0.000000	0.00

	Deli / Bodega	Dim Sum	Diner	Donuts	Dumplings	Eastern European	\
0	0.000000	0.000000	0.000000	0.031250	0.000000	0.00	
1	0.020000	0.000000	0.040000	0.000000	0.000000	0.00	
2	0.108696	0.000000	0.000000	0.000000	0.000000	0.00	
3	0.020000	0.000000	0.000000	0.000000	0.000000	0.00	
4	0.040000	0.020000	0.000000	0.000000	0.080000	0.00	
5	0.040000	0.000000	0.040000	0.000000	0.000000	0.00	
6	0.160000	0.000000	0.000000	0.020000	0.000000	0.00	
7	0.102041	0.000000	0.000000	0.020408	0.000000	0.00	
8	0.040000	0.000000	0.000000	0.000000	0.020000	0.02	
9	0.040000	0.000000	0.000000	0.020000	0.000000	0.00	
10	0.000000	0.000000	0.000000	0.020000	0.000000	0.00	
11	0.100000	0.000000	0.060000	0.000000	0.000000	0.00	
12	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	
13	0.140000	0.000000	0.000000	0.060000	0.000000	0.00	
14	0.044444	0.000000	0.000000	0.000000	0.000000	0.00	
15	0.040816	0.000000	0.040816	0.040816	0.020408	0.00	
16	0.100000	0.000000	0.020000	0.000000	0.000000	0.00	
17	0.040000	0.020000	0.020000	0.000000	0.000000	0.00	
18	0.000000	0.000000	0.000000	0.000000	0.020000	0.00	
19	0.104167	0.020833	0.041667	0.000000	0.000000	0.00	
20	0.045455	0.000000	0.022727	0.000000	0.000000	0.00	
21	0.088889	0.000000	0.022222	0.022222	0.022222	0.00	
22	0.153846	0.000000	0.076923	0.076923	0.000000	0.00	
23	0.080000	0.000000	0.000000	0.000000	0.000000	0.00	
24	0.080000	0.000000	0.000000	0.000000	0.000000	0.00	
25	0.119048	0.000000	0.023810	0.000000	0.000000	0.00	
26	0.020000	0.000000	0.020000	0.000000	0.000000	0.00	
27	0.020000	0.000000	0.020000	0.000000	0.000000	0.00	
28	0.166667	0.000000	0.000000	0.000000	0.000000	0.00	
29	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	
30	0.200000	0.000000	0.000000	0.000000	0.000000	0.00	
31	0.020000	0.000000	0.020000	0.000000	0.000000	0.02	
32	0.060000	0.000000	0.020000	0.000000	0.000000	0.00	
33	0.120000	0.000000	0.040000	0.000000	0.000000	0.00	
34	0.080000	0.000000	0.020000	0.000000	0.000000	0.00	
35	0.000000	0.000000	0.060000	0.020000	0.000000	0.00	

36	0.000000	0.000000	0.000000	0.000000	0.000000	0.00
37	0.180000	0.000000	0.020000	0.020000	0.000000	0.00
38	0.040000	0.000000	0.000000	0.000000	0.000000	0.00
39	0.100000	0.000000	0.000000	0.000000	0.000000	0.00

	Egyptian Restaurant	Empanada	English	Ethiopian	Falafel	Fast Food	\
0	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
1	0.00	0.000000	0.00	0.000000	0.000000	0.020000	
2	0.00	0.000000	0.00	0.021739	0.000000	0.000000	
3	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
4	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
5	0.00	0.000000	0.00	0.000000	0.020000	0.000000	
6	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
7	0.00	0.000000	0.00	0.000000	0.000000	0.040816	
8	0.00	0.000000	0.00	0.020000	0.000000	0.000000	
9	0.00	0.000000	0.00	0.000000	0.020000	0.000000	
10	0.00	0.000000	0.02	0.000000	0.000000	0.000000	
11	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
12	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
13	0.00	0.000000	0.00	0.000000	0.020000	0.020000	
14	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
15	0.00	0.020408	0.00	0.000000	0.000000	0.020408	
16	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
17	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
18	0.02	0.000000	0.00	0.000000	0.000000	0.000000	
19	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
20	0.00	0.000000	0.00	0.022727	0.022727	0.000000	
21	0.00	0.000000	0.00	0.000000	0.022222	0.022222	
22	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
23	0.00	0.000000	0.00	0.000000	0.000000	0.020000	
24	0.00	0.000000	0.00	0.000000	0.000000	0.040000	
25	0.00	0.000000	0.00	0.023810	0.023810	0.000000	
26	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
27	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
28	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
29	0.02	0.000000	0.00	0.000000	0.000000	0.000000	
30	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
31	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
32	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
33	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
34	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
35	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
36	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
37	0.00	0.000000	0.00	0.000000	0.000000	0.020000	
38	0.00	0.000000	0.00	0.000000	0.000000	0.000000	
39	0.00	0.000000	0.00	0.000000	0.000000	0.000000	

	Filipino	Food	Food Court	Food Truck	French	Fried Chicken	\
0	0.000000	0.00	0.062500	0.000000	0.000000	0.000000	
1	0.000000	0.00	0.000000	0.000000	0.060000	0.000000	
2	0.000000	0.00	0.000000	0.000000	0.043478	0.086957	
3	0.000000	0.00	0.000000	0.000000	0.040000	0.000000	
4	0.000000	0.02	0.000000	0.000000	0.000000	0.000000	
5	0.000000	0.00	0.020000	0.000000	0.080000	0.000000	
6	0.000000	0.00	0.020000	0.020000	0.040000	0.020000	
7	0.000000	0.00	0.000000	0.000000	0.020408	0.020408	
8	0.040000	0.00	0.000000	0.000000	0.020000	0.000000	
9	0.000000	0.00	0.000000	0.060000	0.020000	0.020000	
10	0.000000	0.00	0.000000	0.000000	0.040000	0.000000	
11	0.020000	0.00	0.000000	0.020000	0.000000	0.000000	
12	0.000000	0.00	0.000000	0.040000	0.120000	0.000000	
13	0.000000	0.00	0.000000	0.020000	0.000000	0.040000	
14	0.000000	0.00	0.022222	0.022222	0.000000	0.000000	
15	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	
16	0.000000	0.00	0.000000	0.020000	0.020000	0.000000	
17	0.000000	0.02	0.020000	0.140000	0.060000	0.000000	
18	0.000000	0.00	0.000000	0.000000	0.040000	0.000000	
19	0.020833	0.00	0.000000	0.000000	0.020833	0.020833	
20	0.000000	0.00	0.000000	0.000000	0.045455	0.022727	
21	0.000000	0.00	0.022222	0.022222	0.000000	0.044444	
22	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	
23	0.000000	0.00	0.020000	0.080000	0.040000	0.000000	
24	0.000000	0.02	0.020000	0.000000	0.020000	0.020000	
25	0.000000	0.00	0.000000	0.142857	0.000000	0.000000	
26	0.000000	0.00	0.020000	0.000000	0.000000	0.020000	
27	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	
28	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	
29	0.000000	0.00	0.000000	0.000000	0.120000	0.000000	
30	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	
31	0.000000	0.00	0.000000	0.040000	0.020000	0.020000	
32	0.000000	0.00	0.020000	0.020000	0.040000	0.000000	
33	0.000000	0.00	0.000000	0.060000	0.000000	0.000000	
34	0.000000	0.00	0.000000	0.080000	0.020000	0.000000	
35	0.000000	0.00	0.000000	0.020000	0.060000	0.000000	
36	0.000000	0.00	0.000000	0.000000	0.040000	0.000000	
37	0.000000	0.02	0.000000	0.040000	0.000000	0.000000	
38	0.000000	0.00	0.000000	0.020000	0.020000	0.000000	
39	0.000000	0.00	0.000000	0.040000	0.000000	0.000000	

	Gastropub	German	Gluten-free	Greek	Hawaiian	Himalayan	Hot Dogs	\
0	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00	
1	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.02	
2	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00	
3	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00	

4	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
5	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
6	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
7	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
8	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.02
9	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
10	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
11	0.000000	0.02	0.00	0.000000	0.000000	0.00	0.00
12	0.000000	0.00	0.02	0.000000	0.000000	0.00	0.00
13	0.020000	0.00	0.00	0.000000	0.000000	0.00	0.00
14	0.000000	0.00	0.00	0.044444	0.000000	0.00	0.00
15	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
16	0.000000	0.00	0.00	0.060000	0.000000	0.00	0.00
17	0.000000	0.00	0.00	0.020000	0.000000	0.00	0.00
18	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
19	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
20	0.022727	0.00	0.00	0.000000	0.022727	0.00	0.00
21	0.022222	0.00	0.00	0.000000	0.000000	0.00	0.00
22	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
23	0.020000	0.02	0.00	0.020000	0.000000	0.00	0.00
24	0.020000	0.02	0.00	0.000000	0.000000	0.00	0.00
25	0.000000	0.00	0.00	0.023810	0.000000	0.00	0.00
26	0.020000	0.00	0.00	0.020000	0.020000	0.00	0.00
27	0.000000	0.00	0.00	0.000000	0.000000	0.02	0.00
28	0.000000	0.00	0.00	0.083333	0.000000	0.00	0.00
29	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
30	0.000000	0.20	0.00	0.000000	0.000000	0.00	0.00
31	0.000000	0.00	0.00	0.020000	0.000000	0.00	0.00
32	0.000000	0.00	0.00	0.020000	0.000000	0.00	0.00
33	0.000000	0.00	0.00	0.060000	0.020000	0.00	0.00
34	0.000000	0.00	0.00	0.040000	0.000000	0.00	0.00
35	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
36	0.000000	0.00	0.00	0.020000	0.000000	0.00	0.00
37	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00
38	0.060000	0.00	0.00	0.020000	0.000000	0.00	0.00
39	0.000000	0.00	0.00	0.000000	0.000000	0.00	0.00

	Hotpot	Indian	Indonesian	Irish	Israeli	Italian	Japanese	\
0	0.00	0.000000	0.00	0.00	0.00	0.125000	0.000000	
1	0.00	0.040000	0.00	0.00	0.00	0.040000	0.040000	
2	0.00	0.000000	0.00	0.00	0.00	0.000000	0.000000	
3	0.00	0.020000	0.00	0.00	0.02	0.100000	0.060000	
4	0.02	0.000000	0.00	0.00	0.00	0.060000	0.000000	
5	0.00	0.040000	0.00	0.00	0.00	0.100000	0.000000	
6	0.00	0.020000	0.00	0.00	0.00	0.100000	0.000000	
7	0.00	0.000000	0.00	0.00	0.00	0.000000	0.000000	
8	0.00	0.000000	0.00	0.00	0.00	0.080000	0.100000	

9	0.00	0.020000	0.00	0.00	0.00	0.060000	0.060000
10	0.00	0.020000	0.00	0.00	0.02	0.160000	0.020000
11	0.00	0.000000	0.00	0.02	0.00	0.100000	0.000000
12	0.00	0.040000	0.00	0.00	0.00	0.180000	0.020000
13	0.00	0.040000	0.00	0.00	0.00	0.000000	0.020000
14	0.00	0.022222	0.00	0.00	0.00	0.088889	0.000000
15	0.00	0.000000	0.00	0.00	0.00	0.020408	0.000000
16	0.00	0.020000	0.00	0.00	0.00	0.160000	0.040000
17	0.00	0.020000	0.00	0.00	0.00	0.100000	0.000000
18	0.00	0.000000	0.02	0.00	0.00	0.140000	0.000000
19	0.00	0.000000	0.00	0.00	0.00	0.020833	0.041667
20	0.00	0.068182	0.00	0.00	0.00	0.022727	0.022727
21	0.00	0.022222	0.00	0.00	0.00	0.044444	0.000000
22	0.00	0.000000	0.00	0.00	0.00	0.000000	0.000000
23	0.00	0.040000	0.00	0.00	0.00	0.020000	0.040000
24	0.00	0.000000	0.00	0.00	0.00	0.020000	0.120000
25	0.00	0.023810	0.00	0.00	0.00	0.023810	0.000000
26	0.00	0.020000	0.00	0.00	0.00	0.040000	0.040000
27	0.00	0.020000	0.00	0.00	0.00	0.160000	0.080000
28	0.00	0.000000	0.00	0.00	0.00	0.000000	0.083333
29	0.00	0.020000	0.02	0.00	0.00	0.160000	0.000000
30	0.00	0.000000	0.00	0.00	0.00	0.000000	0.000000
31	0.00	0.040000	0.00	0.02	0.00	0.080000	0.040000
32	0.00	0.020000	0.00	0.00	0.00	0.100000	0.000000
33	0.00	0.000000	0.00	0.00	0.00	0.040000	0.000000
34	0.00	0.040000	0.00	0.00	0.00	0.120000	0.060000
35	0.00	0.000000	0.00	0.00	0.00	0.200000	0.020000
36	0.00	0.040000	0.00	0.00	0.02	0.140000	0.020000
37	0.00	0.000000	0.00	0.00	0.00	0.020000	0.000000
38	0.00	0.040000	0.00	0.00	0.00	0.140000	0.020000
39	0.00	0.040000	0.00	0.00	0.00	0.120000	0.040000

	Japanese Curry	Korean	Kosher	Latin American	Mac & Cheese	\
0	0.000000	0.000000	0.000000	0.000000	0.00	
1	0.000000	0.000000	0.020000	0.000000	0.00	
2	0.000000	0.000000	0.000000	0.000000	0.00	
3	0.000000	0.000000	0.000000	0.000000	0.00	
4	0.000000	0.020000	0.000000	0.000000	0.00	
5	0.000000	0.040000	0.000000	0.000000	0.00	
6	0.000000	0.020000	0.000000	0.000000	0.00	
7	0.000000	0.000000	0.000000	0.081633	0.00	
8	0.000000	0.000000	0.000000	0.000000	0.00	
9	0.000000	0.000000	0.000000	0.020000	0.00	
10	0.000000	0.060000	0.000000	0.000000	0.00	
11	0.000000	0.000000	0.000000	0.000000	0.00	
12	0.000000	0.020000	0.000000	0.000000	0.00	
13	0.000000	0.000000	0.000000	0.020000	0.00	

14	0.000000	0.000000	0.000000	0.000000	0.00
15	0.000000	0.000000	0.000000	0.040816	0.00
16	0.000000	0.000000	0.000000	0.000000	0.00
17	0.000000	0.000000	0.000000	0.000000	0.00
18	0.000000	0.020000	0.000000	0.000000	0.00
19	0.000000	0.000000	0.000000	0.041667	0.00
20	0.000000	0.022727	0.000000	0.022727	0.00
21	0.022222	0.000000	0.000000	0.000000	0.00
22	0.000000	0.000000	0.000000	0.000000	0.00
23	0.000000	0.000000	0.000000	0.000000	0.00
24	0.000000	0.160000	0.000000	0.000000	0.00
25	0.000000	0.047619	0.000000	0.000000	0.00
26	0.000000	0.000000	0.000000	0.020000	0.00
27	0.000000	0.000000	0.000000	0.020000	0.00
28	0.000000	0.000000	0.083333	0.000000	0.00
29	0.000000	0.020000	0.000000	0.020000	0.00
30	0.000000	0.000000	0.000000	0.000000	0.00
31	0.000000	0.000000	0.000000	0.020000	0.00
32	0.000000	0.020000	0.000000	0.000000	0.00
33	0.000000	0.000000	0.000000	0.020000	0.00
34	0.020000	0.000000	0.000000	0.000000	0.00
35	0.000000	0.000000	0.000000	0.000000	0.00
36	0.000000	0.000000	0.000000	0.020000	0.00
37	0.000000	0.000000	0.000000	0.060000	0.00
38	0.000000	0.000000	0.000000	0.020000	0.02
39	0.000000	0.000000	0.000000	0.020000	0.00

	Malay	Mediterranean	Mexican	Middle Eastern	Modern European	\
0	0.000000	0.031250	0.031250	0.00	0.00	
1	0.000000	0.020000	0.020000	0.00	0.00	
2	0.000000	0.000000	0.000000	0.00	0.00	
3	0.000000	0.020000	0.020000	0.00	0.00	
4	0.060000	0.000000	0.040000	0.00	0.00	
5	0.000000	0.000000	0.020000	0.00	0.02	
6	0.000000	0.000000	0.040000	0.02	0.00	
7	0.000000	0.000000	0.142857	0.00	0.00	
8	0.000000	0.000000	0.060000	0.04	0.00	
9	0.000000	0.020000	0.040000	0.02	0.00	
10	0.000000	0.020000	0.020000	0.00	0.00	
11	0.000000	0.000000	0.080000	0.00	0.00	
12	0.000000	0.000000	0.040000	0.00	0.00	
13	0.000000	0.020000	0.080000	0.00	0.00	
14	0.000000	0.000000	0.000000	0.00	0.00	
15	0.000000	0.000000	0.081633	0.00	0.00	
16	0.000000	0.000000	0.040000	0.02	0.00	
17	0.000000	0.040000	0.020000	0.00	0.00	
18	0.040000	0.040000	0.000000	0.02	0.00	

19	0.000000	0.020833	0.062500	0.00	0.00
20	0.022727	0.000000	0.113636	0.00	0.00
21	0.000000	0.000000	0.066667	0.00	0.00
22	0.000000	0.000000	0.000000	0.00	0.00
23	0.000000	0.040000	0.040000	0.00	0.00
24	0.000000	0.000000	0.000000	0.00	0.00
25	0.000000	0.023810	0.023810	0.00	0.00
26	0.000000	0.040000	0.040000	0.00	0.00
27	0.000000	0.020000	0.040000	0.00	0.00
28	0.000000	0.000000	0.000000	0.00	0.00
29	0.020000	0.060000	0.020000	0.00	0.00
30	0.000000	0.000000	0.000000	0.00	0.00
31	0.000000	0.000000	0.040000	0.00	0.00
32	0.000000	0.000000	0.000000	0.00	0.02
33	0.000000	0.020000	0.100000	0.00	0.00
34	0.000000	0.000000	0.000000	0.00	0.00
35	0.000000	0.020000	0.040000	0.00	0.00
36	0.000000	0.040000	0.040000	0.02	0.00
37	0.000000	0.000000	0.060000	0.00	0.00
38	0.000000	0.020000	0.000000	0.00	0.00
39	0.000000	0.000000	0.040000	0.00	0.00

	Molecular Gastronomy	Moroccan	New American	Noodles	North Indian	\
0	0.00	0.00	0.000000	0.000000	0.00	
1	0.00	0.00	0.040000	0.000000	0.00	
2	0.00	0.00	0.000000	0.000000	0.00	
3	0.00	0.00	0.000000	0.000000	0.00	
4	0.00	0.00	0.000000	0.040000	0.00	
5	0.02	0.00	0.020000	0.000000	0.00	
6	0.00	0.00	0.020000	0.000000	0.00	
7	0.00	0.00	0.000000	0.000000	0.00	
8	0.00	0.02	0.000000	0.000000	0.00	
9	0.00	0.00	0.020000	0.000000	0.00	
10	0.00	0.00	0.040000	0.020000	0.00	
11	0.00	0.00	0.000000	0.000000	0.00	
12	0.00	0.00	0.020000	0.000000	0.00	
13	0.00	0.00	0.000000	0.000000	0.00	
14	0.00	0.00	0.022222	0.000000	0.00	
15	0.00	0.00	0.000000	0.000000	0.00	
16	0.00	0.00	0.000000	0.000000	0.00	
17	0.00	0.00	0.000000	0.000000	0.00	
18	0.00	0.00	0.000000	0.000000	0.00	
19	0.00	0.00	0.020833	0.000000	0.00	
20	0.00	0.00	0.000000	0.022727	0.00	
21	0.00	0.00	0.000000	0.022222	0.00	
22	0.00	0.00	0.000000	0.000000	0.00	
23	0.00	0.00	0.000000	0.000000	0.00	

24	0.00	0.00	0.020000	0.000000	0.00
25	0.00	0.00	0.047619	0.000000	0.00
26	0.00	0.00	0.020000	0.000000	0.00
27	0.00	0.00	0.000000	0.000000	0.00
28	0.00	0.00	0.000000	0.083333	0.00
29	0.00	0.00	0.000000	0.000000	0.00
30	0.00	0.00	0.000000	0.000000	0.00
31	0.00	0.00	0.000000	0.000000	0.00
32	0.00	0.00	0.020000	0.020000	0.00
33	0.00	0.00	0.000000	0.000000	0.00
34	0.00	0.00	0.000000	0.020000	0.00
35	0.00	0.00	0.000000	0.000000	0.02
36	0.00	0.00	0.020000	0.000000	0.00
37	0.00	0.00	0.020000	0.000000	0.00
38	0.00	0.00	0.020000	0.000000	0.00
39	0.00	0.00	0.040000	0.000000	0.00

	Paella	Pakistani	Peruvian	Pet Café	Pizza	Poke Place	Ramen	\
0	0.00	0.000000	0.000000	0.000000	0.125000	0.00	0.000000	
1	0.00	0.000000	0.000000	0.000000	0.120000	0.00	0.000000	
2	0.00	0.000000	0.000000	0.000000	0.065217	0.00	0.000000	
3	0.02	0.000000	0.000000	0.000000	0.060000	0.02	0.020000	
4	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.000000	
5	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.000000	
6	0.00	0.020000	0.000000	0.000000	0.040000	0.02	0.000000	
7	0.00	0.000000	0.000000	0.000000	0.102041	0.00	0.000000	
8	0.00	0.000000	0.000000	0.000000	0.120000	0.00	0.040000	
9	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.000000	
10	0.00	0.000000	0.000000	0.000000	0.060000	0.02	0.020000	
11	0.00	0.000000	0.000000	0.000000	0.080000	0.00	0.000000	
12	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.020000	
13	0.00	0.000000	0.000000	0.000000	0.140000	0.00	0.000000	
14	0.00	0.022222	0.022222	0.000000	0.022222	0.00	0.000000	
15	0.00	0.000000	0.000000	0.000000	0.102041	0.00	0.000000	
16	0.00	0.000000	0.000000	0.000000	0.100000	0.00	0.000000	
17	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.000000	
18	0.00	0.000000	0.000000	0.000000	0.060000	0.00	0.000000	
19	0.00	0.000000	0.000000	0.020833	0.125000	0.00	0.062500	
20	0.00	0.000000	0.022727	0.000000	0.090909	0.00	0.000000	
21	0.00	0.000000	0.000000	0.000000	0.022222	0.00	0.022222	
22	0.00	0.000000	0.000000	0.000000	0.076923	0.00	0.000000	
23	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	
24	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.020000	
25	0.00	0.000000	0.000000	0.000000	0.095238	0.00	0.000000	
26	0.00	0.000000	0.020000	0.000000	0.020000	0.00	0.000000	
27	0.00	0.000000	0.000000	0.000000	0.140000	0.00	0.020000	
28	0.00	0.000000	0.000000	0.000000	0.083333	0.00	0.000000	

29	0.00	0.000000	0.000000	0.000000	0.040000	0.02	0.000000
30	0.00	0.000000	0.000000	0.000000	0.000000	0.00	0.000000
31	0.00	0.000000	0.000000	0.000000	0.060000	0.00	0.000000
32	0.00	0.000000	0.000000	0.000000	0.020000	0.04	0.000000
33	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.000000
34	0.00	0.000000	0.000000	0.000000	0.020000	0.00	0.040000
35	0.00	0.000000	0.000000	0.000000	0.040000	0.00	0.000000
36	0.00	0.000000	0.020000	0.000000	0.040000	0.00	0.000000
37	0.00	0.000000	0.000000	0.020000	0.100000	0.00	0.020000
38	0.02	0.000000	0.000000	0.000000	0.020000	0.02	0.000000
39	0.00	0.000000	0.020000	0.000000	0.120000	0.00	0.000000

	Restaurant	Russian	Salad	Sandwiches	Scandinavian	Seafood	\
0	0.000000	0.00	0.031250	0.062500	0.00	0.062500	
1	0.040000	0.00	0.020000	0.000000	0.00	0.000000	
2	0.021739	0.00	0.000000	0.043478	0.00	0.065217	
3	0.020000	0.00	0.000000	0.000000	0.00	0.020000	
4	0.000000	0.00	0.000000	0.000000	0.00	0.000000	
5	0.000000	0.00	0.000000	0.120000	0.00	0.000000	
6	0.040000	0.00	0.000000	0.040000	0.00	0.020000	
7	0.020408	0.00	0.000000	0.020408	0.00	0.020408	
8	0.000000	0.00	0.000000	0.000000	0.00	0.000000	
9	0.020000	0.02	0.060000	0.100000	0.00	0.020000	
10	0.020000	0.02	0.060000	0.060000	0.00	0.020000	
11	0.040000	0.00	0.000000	0.060000	0.00	0.000000	
12	0.000000	0.00	0.020000	0.020000	0.00	0.040000	
13	0.000000	0.00	0.000000	0.040000	0.00	0.020000	
14	0.066667	0.00	0.044444	0.044444	0.00	0.000000	
15	0.081633	0.00	0.000000	0.020408	0.00	0.020408	
16	0.060000	0.00	0.000000	0.000000	0.00	0.020000	
17	0.040000	0.00	0.000000	0.000000	0.00	0.020000	
18	0.040000	0.00	0.000000	0.000000	0.00	0.020000	
19	0.020833	0.00	0.000000	0.041667	0.00	0.000000	
20	0.000000	0.00	0.000000	0.000000	0.00	0.000000	
21	0.000000	0.00	0.000000	0.044444	0.00	0.066667	
22	0.000000	0.00	0.000000	0.230769	0.00	0.076923	
23	0.040000	0.00	0.000000	0.100000	0.00	0.000000	
24	0.060000	0.00	0.020000	0.060000	0.00	0.000000	
25	0.000000	0.00	0.023810	0.047619	0.00	0.023810	
26	0.020000	0.00	0.020000	0.080000	0.04	0.000000	
27	0.040000	0.00	0.000000	0.020000	0.00	0.000000	
28	0.083333	0.00	0.000000	0.166667	0.00	0.000000	
29	0.020000	0.00	0.020000	0.000000	0.00	0.040000	
30	0.000000	0.00	0.000000	0.200000	0.00	0.000000	
31	0.000000	0.00	0.000000	0.020000	0.00	0.000000	
32	0.020000	0.00	0.020000	0.040000	0.00	0.020000	
33	0.020000	0.00	0.020000	0.020000	0.00	0.000000	

34	0.020000	0.00	0.000000	0.060000	0.00	0.020000
35	0.000000	0.00	0.020000	0.040000	0.00	0.040000
36	0.020000	0.00	0.020000	0.000000	0.00	0.040000
37	0.060000	0.00	0.020000	0.000000	0.00	0.040000
38	0.000000	0.00	0.000000	0.020000	0.00	0.040000
39	0.000000	0.00	0.000000	0.080000	0.00	0.000000

	Shanghai	Snacks	Soup	South Indian	Southern / Soul	Spanish	\
0	0.00	0.00	0.00	0.00	0.000000	0.000000	
1	0.00	0.00	0.00	0.00	0.000000	0.000000	
2	0.00	0.00	0.00	0.00	0.065217	0.000000	
3	0.00	0.00	0.00	0.00	0.000000	0.020000	
4	0.04	0.02	0.00	0.00	0.000000	0.000000	
5	0.00	0.00	0.00	0.00	0.000000	0.000000	
6	0.00	0.00	0.00	0.00	0.000000	0.000000	
7	0.00	0.00	0.00	0.00	0.000000	0.040816	
8	0.00	0.00	0.00	0.02	0.000000	0.000000	
9	0.00	0.02	0.02	0.00	0.000000	0.000000	
10	0.00	0.00	0.00	0.00	0.000000	0.020000	
11	0.00	0.00	0.00	0.02	0.000000	0.000000	
12	0.00	0.00	0.00	0.00	0.000000	0.000000	
13	0.00	0.00	0.00	0.00	0.000000	0.020000	
14	0.00	0.00	0.00	0.00	0.000000	0.066667	
15	0.00	0.00	0.00	0.00	0.000000	0.040816	
16	0.00	0.00	0.00	0.00	0.000000	0.000000	
17	0.00	0.00	0.00	0.00	0.000000	0.000000	
18	0.04	0.00	0.02	0.00	0.000000	0.020000	
19	0.00	0.00	0.00	0.00	0.000000	0.000000	
20	0.00	0.00	0.00	0.00	0.000000	0.000000	
21	0.00	0.00	0.00	0.00	0.000000	0.022222	
22	0.00	0.00	0.00	0.00	0.000000	0.000000	
23	0.00	0.02	0.00	0.00	0.000000	0.000000	
24	0.00	0.02	0.02	0.00	0.000000	0.000000	
25	0.00	0.00	0.00	0.00	0.000000	0.000000	
26	0.00	0.00	0.00	0.00	0.000000	0.000000	
27	0.00	0.00	0.00	0.00	0.020000	0.000000	
28	0.00	0.00	0.00	0.00	0.000000	0.000000	
29	0.00	0.00	0.02	0.00	0.000000	0.020000	
30	0.00	0.00	0.00	0.00	0.000000	0.000000	
31	0.00	0.00	0.00	0.00	0.000000	0.000000	
32	0.00	0.00	0.00	0.00	0.000000	0.020000	
33	0.00	0.00	0.00	0.00	0.000000	0.020000	
34	0.00	0.00	0.00	0.00	0.000000	0.020000	
35	0.00	0.02	0.00	0.00	0.000000	0.000000	
36	0.00	0.00	0.00	0.02	0.020000	0.000000	
37	0.00	0.00	0.00	0.00	0.000000	0.040000	
38	0.00	0.00	0.00	0.00	0.000000	0.000000	

```
39      0.00    0.00  0.00          0.00         0.000000  0.000000

    Steakhouse     Sushi  Szechuan     Tacos  Taiwanese     Tapas   Tex-Mex  \
0     0.031250  0.031250  0.000000  0.000000       0.00  0.000000  0.000000
1     0.000000  0.060000  0.000000  0.040000       0.00  0.000000  0.000000
2     0.000000  0.000000  0.000000  0.000000       0.00  0.021739  0.021739
3     0.000000  0.060000  0.000000  0.000000       0.00  0.040000  0.000000
4     0.000000  0.000000  0.000000  0.020000       0.02  0.000000  0.000000
5     0.020000  0.060000  0.000000  0.020000       0.00  0.000000  0.000000
6     0.020000  0.000000  0.000000  0.040000       0.00  0.000000  0.000000
7     0.040816  0.000000  0.000000  0.020408       0.00  0.000000  0.000000
8     0.000000  0.020000  0.000000  0.020000       0.00  0.020000  0.000000
9     0.020000  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
10    0.000000  0.000000  0.000000  0.020000       0.00  0.020000  0.000000
11    0.000000  0.020000  0.000000  0.040000       0.00  0.000000  0.000000
12    0.000000  0.080000  0.000000  0.000000       0.00  0.000000  0.000000
13    0.000000  0.040000  0.000000  0.000000       0.00  0.000000  0.000000
14    0.022222  0.000000  0.000000  0.000000       0.00  0.022222  0.000000
15    0.020408  0.000000  0.000000  0.020408       0.00  0.000000  0.000000
16    0.020000  0.020000  0.000000  0.000000       0.00  0.000000  0.000000
17    0.000000  0.000000  0.000000  0.020000       0.00  0.000000  0.000000
18    0.000000  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
19    0.000000  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
20    0.000000  0.022727  0.045455  0.000000       0.00  0.000000  0.000000
21    0.000000  0.044444  0.000000  0.000000       0.00  0.000000  0.000000
22    0.076923  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
23    0.020000  0.040000  0.020000  0.000000       0.00  0.000000  0.000000
24    0.000000  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
25    0.000000  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
26    0.000000  0.020000  0.000000  0.000000       0.00  0.000000  0.000000
27    0.000000  0.020000  0.000000  0.000000       0.00  0.000000  0.000000
28    0.000000  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
29    0.000000  0.000000  0.000000  0.000000       0.00  0.000000  0.000000
30    0.000000  0.200000  0.000000  0.000000       0.00  0.000000  0.000000
31    0.040000  0.020000  0.020000  0.000000       0.00  0.000000  0.000000
32    0.040000  0.020000  0.000000  0.000000       0.00  0.000000  0.000000
33    0.000000  0.060000  0.000000  0.000000       0.00  0.000000  0.000000
34    0.060000  0.040000  0.000000  0.020000       0.00  0.000000  0.000000
35    0.020000  0.060000  0.000000  0.000000       0.00  0.020000  0.000000
36    0.000000  0.020000  0.000000  0.000000       0.00  0.000000  0.000000
37    0.000000  0.020000  0.000000  0.000000       0.00  0.020000  0.000000
38    0.040000  0.040000  0.000000  0.020000       0.00  0.020000  0.000000
39    0.000000  0.060000  0.000000  0.020000       0.00  0.000000  0.000000

        Thai  Tonkatsu  Turkish  Udon  Vegetarian / Vegan  Vietnamese  \
0   0.000000      0.00     0.00  0.00            0.000000    0.000000
1   0.020000      0.00     0.02  0.00            0.000000    0.000000
```

2	0.000000	0.00	0.00	0.00	0.021739	0.000000
3	0.020000	0.00	0.00	0.00	0.020000	0.020000
4	0.020000	0.00	0.00	0.00	0.060000	0.020000
5	0.000000	0.00	0.00	0.00	0.000000	0.000000
6	0.000000	0.00	0.00	0.00	0.020000	0.000000
7	0.061224	0.00	0.00	0.00	0.000000	0.000000
8	0.040000	0.00	0.00	0.02	0.060000	0.040000
9	0.000000	0.00	0.00	0.00	0.000000	0.000000
10	0.000000	0.00	0.02	0.00	0.000000	0.000000
11	0.100000	0.00	0.00	0.00	0.000000	0.040000
12	0.000000	0.00	0.00	0.00	0.040000	0.060000
13	0.000000	0.00	0.00	0.00	0.000000	0.000000
14	0.044444	0.00	0.00	0.00	0.022222	0.000000
15	0.040816	0.00	0.00	0.00	0.000000	0.000000
16	0.000000	0.00	0.02	0.00	0.020000	0.000000
17	0.000000	0.00	0.00	0.00	0.000000	0.000000
18	0.040000	0.00	0.02	0.00	0.020000	0.020000
19	0.020833	0.00	0.00	0.00	0.000000	0.020833
20	0.045455	0.00	0.00	0.00	0.000000	0.022727
21	0.000000	0.00	0.00	0.00	0.000000	0.000000
22	0.000000	0.00	0.00	0.00	0.000000	0.000000
23	0.000000	0.02	0.02	0.02	0.000000	0.020000
24	0.000000	0.00	0.00	0.00	0.020000	0.000000
25	0.000000	0.00	0.00	0.00	0.000000	0.000000
26	0.040000	0.00	0.02	0.00	0.040000	0.000000
27	0.000000	0.00	0.00	0.02	0.080000	0.020000
28	0.000000	0.00	0.00	0.00	0.000000	0.000000
29	0.020000	0.00	0.00	0.00	0.020000	0.000000
30	0.000000	0.00	0.00	0.00	0.000000	0.000000
31	0.040000	0.00	0.00	0.00	0.000000	0.020000
32	0.000000	0.00	0.00	0.00	0.000000	0.020000
33	0.040000	0.00	0.00	0.00	0.000000	0.000000
34	0.020000	0.00	0.04	0.00	0.000000	0.000000
35	0.020000	0.00	0.02	0.00	0.000000	0.000000
36	0.040000	0.00	0.02	0.00	0.040000	0.000000
37	0.000000	0.00	0.00	0.00	0.000000	0.000000
38	0.000000	0.00	0.00	0.00	0.040000	0.000000
39	0.020000	0.00	0.02	0.00	0.000000	0.020000

	Wings
0	0.000000
1	0.000000
2	0.000000
3	0.000000
4	0.000000
5	0.020000
6	0.000000

```
7   0.000000
8   0.000000
9   0.000000
10  0.000000
11  0.000000
12  0.000000
13  0.000000
14  0.000000
15  0.000000
16  0.000000
17  0.000000
18  0.000000
19  0.000000
20  0.022727
21  0.000000
22  0.000000
23  0.000000
24  0.000000
25  0.000000
26  0.000000
27  0.000000
28  0.000000
29  0.000000
30  0.000000
31  0.000000
32  0.000000
33  0.020000
34  0.000000
35  0.000000
36  0.000000
37  0.000000
38  0.000000
39  0.020000
```

[40]:
```
num_top_venues = 5

for hood in manhattan_grouped['Neighborhood']:
    print("----"+hood+"----")
    temp = manhattan_grouped[manhattan_grouped['Neighborhood'] == hood].T.
 ↪reset_index()
    temp.columns = ['venue','freq']
    temp = temp.iloc[1:]
    temp['freq'] = temp['freq'].astype(float)
    temp = temp.round({'freq': 2})
    print(temp.sort_values('freq', ascending=False).reset_index(drop=True).
 ↪head(num_top_venues))
    print('\n')
```

```
----Battery Park City----
        venue  freq
0       Pizza  0.12
1     Italian  0.12
2     Chinese  0.09
3  Food Court  0.06
4     Burgers  0.06


----Carnegie Hill----
    venue  freq
0  Bakery  0.12
1   Pizza  0.12
2    Café  0.10
3  French  0.06
4   Sushi  0.06


----Central Harlem----
           venue  freq
0  Deli / Bodega  0.11
1  Fried Chicken  0.09
2        Chinese  0.09
3        African  0.07
4          Pizza  0.07


----Chelsea----
      venue  freq
0    Bakery  0.10
1   Italian  0.10
2      Café  0.08
3     Sushi  0.06
4  American  0.06


----Chinatown----
                venue  freq
0             Chinese  0.24
1           Dumplings  0.08
2  Vegetarian / Vegan  0.06
3             Italian  0.06
4              Bakery  0.06


----Civic Center----
        venue  freq
0  Sandwiches  0.12
```

```
1     Italian  0.10
2      French  0.08
3    American  0.08
4      Bakery  0.06


----Clinton----
           venue  freq
0  Deli / Bodega  0.16
1        Italian  0.10
2           Café  0.06
3        Mexican  0.04
4         French  0.04


----East Harlem----
            venue  freq
0         Mexican  0.14
1   Deli / Bodega  0.10
2           Pizza  0.10
3          Bakery  0.10
4  Latin American  0.08


----East Village----
                venue  freq
0               Pizza  0.12
1            Japanese  0.10
2             Italian  0.08
3  Vegetarian / Vegan  0.06
4            American  0.06


----Financial District----
        venue  freq
0  Sandwiches  0.10
1        Café  0.08
2    American  0.08
3  Food Truck  0.06
4       Salad  0.06


----Flatiron----
        venue  freq
0     Italian  0.16
1       Salad  0.06
2      Korean  0.06
3  Sandwiches  0.06
```

```
4       Pizza  0.06


----Gramercy----
           venue  freq
0  Deli / Bodega  0.10
1        Italian  0.10
2           Thai  0.10
3          Pizza  0.08
4        Mexican  0.08


----Greenwich Village----
        venue  freq
0     Italian  0.18
1      French  0.12
2       Sushi  0.08
3        Café  0.08
4  Vietnamese  0.06


----Hamilton Heights----
           venue  freq
0          Pizza  0.14
1  Deli / Bodega  0.14
2           Café  0.08
3        Chinese  0.08
4        Mexican  0.08


----Hudson Yards----
        venue  freq
0    American  0.11
1        Café  0.09
2     Italian  0.09
3     Spanish  0.07
4  Restaurant  0.07


----Inwood----
        venue  freq
0       Pizza  0.10
1  Restaurant  0.08
2     Mexican  0.08
3        Café  0.08
4      Bakery  0.06
```

```
----Lenox Hill----
           venue  freq
0        Italian  0.16
1          Pizza  0.10
2  Deli / Bodega  0.10
3     Restaurant  0.06
4          Greek  0.06


----Lincoln Square----
        venue  freq
0        Café  0.16
1  Food Truck  0.14
2     Italian  0.10
3    American  0.10
4      French  0.06


----Little Italy----
     venue  freq
0  Italian  0.14
1   Bakery  0.10
2  Chinese  0.08
3     Café  0.08
4    Pizza  0.06


----Lower East Side----
           venue  freq
0          Pizza  0.12
1  Deli / Bodega  0.10
2        Chinese  0.08
3         Bakery  0.06
4          Ramen  0.06


----Manhattan Valley----
      venue  freq
0   Mexican  0.11
1     Pizza  0.09
2    Indian  0.07
3  Szechuan  0.05
4   Chinese  0.05


----Manhattanville----
           venue  freq
0        Chinese  0.11
```

```
1  Deli / Bodega  0.09
2        Mexican  0.07
3        Seafood  0.07
4         Bakery  0.04


----Marble Hill----
           venue  freq
0     Sandwiches  0.23
1  Deli / Bodega  0.15
2         Donuts  0.08
3          Pizza  0.08
4        Seafood  0.08


----Midtown----
           venue  freq
0     Sandwiches  0.10
1     Food Truck  0.08
2  Deli / Bodega  0.08
3       American  0.06
4        Burgers  0.04


----Midtown South----
           venue  freq
0         Korean  0.16
1       Japanese  0.12
2         Bakery  0.10
3  Deli / Bodega  0.08
4     Sandwiches  0.06


----Morningside Heights----
           venue  freq
0     Food Truck  0.14
1  Deli / Bodega  0.12
2          Pizza  0.10
3       American  0.07
4           Café  0.07


----Murray Hill----
          venue  freq
0      American  0.12
1    Sandwiches  0.08
2  Scandinavian  0.04
3          Thai  0.04
```

```
4       Mexican  0.04


----Noho----
                venue  freq
0             Italian  0.16
1               Pizza  0.14
2  Vegetarian / Vegan  0.08
3            Japanese  0.08
4            American  0.04


----Roosevelt Island----
           venue  freq
0     Sandwiches  0.17
1  Deli / Bodega  0.17
2       Japanese  0.08
3           Café  0.08
4         Kosher  0.08


----Soho----
           venue  freq
0        Italian  0.16
1           Café  0.12
2         French  0.12
3         Bakery  0.08
4  Mediterranean  0.06


----Stuyvesant Town----
           venue  freq
0          Sushi   0.2
1     Sandwiches   0.2
2  Deli / Bodega   0.2
3         Bistro   0.2
4         German   0.2


----Sutton Place----
      venue  freq
0  American  0.10
1    Bagels  0.10
2   Italian  0.08
3     Pizza  0.06
4   Chinese  0.06
```

```
----Tribeca----
           venue  freq
0        Italian  0.10
1       American  0.10
2         Bakery  0.06
3           Café  0.06
4  Deli / Bodega  0.06


----Tudor City----
           venue  freq
0           Café  0.12
1  Deli / Bodega  0.12
2        Mexican  0.10
3          Sushi  0.06
4       American  0.06


----Turtle Bay----
           venue  freq
0           Café  0.12
1        Italian  0.12
2     Food Truck  0.08
3  Deli / Bodega  0.08
4     Sandwiches  0.06


----Upper East Side----
      venue  freq
0   Italian  0.20
1  American  0.08
2     Diner  0.06
3    French  0.06
4     Sushi  0.06


----Upper West Side----
      venue  freq
0   Italian  0.14
1    Bakery  0.06
2    French  0.04
3  American  0.04
4      Café  0.04


----Washington Heights----
            venue  freq
0   Deli / Bodega  0.18
```

```
1           Pizza  0.10
2  Latin American  0.06
3      Restaurant  0.06
4         Chinese  0.06


----West Village----
           venue  freq
0        Italian  0.14
1      Gastropub  0.06
2       American  0.06
3  Deli / Bodega  0.04
4          Sushi  0.04


----Yorkville----
           venue  freq
0        Italian  0.12
1          Pizza  0.12
2  Deli / Bodega  0.10
3     Sandwiches  0.08
4        Chinese  0.06
```

[41]:
```
def return_most_common_venues(row, num_top_venues):
    row_categories = row.iloc[1:]
    row_categories_sorted = row_categories.sort_values(ascending=False)

    return row_categories_sorted.index.values[0:num_top_venues]
```

[81]:
```
num_top_venues = 5

indicators = ['st', 'nd', 'rd']

# create columns according to number of top venues
columns = ['Neighborhood']
for ind in np.arange(num_top_venues):
    try:
        columns.append('{}{}'.format(ind+1, indicators[ind]))
    except:
        columns.append('{}th'.format(ind+1))

# create a new dataframe
neighborhoods_venues_sorted = pd.DataFrame(columns=columns)
neighborhoods_venues_sorted['Neighborhood'] = manhattan_grouped['Neighborhood']

for ind in np.arange(manhattan_grouped.shape[0]):
```

```
    neighborhoods_venues_sorted.iloc[ind, 1:] =␣
 ↪return_most_common_venues(manhattan_grouped.iloc[ind, :], num_top_venues)

neighborhoods_venues_sorted.head()
```

[81]:

	Neighborhood	1st	2nd	3rd	4th	5th
0	Battery Park City	Pizza	Italian	Chinese	Sandwiches	BBQ
1	Carnegie Hill	Bakery	Pizza	Café	French	Sushi
2	Central Harlem	Deli / Bodega	Fried Chicken	Chinese	African	Southern / Soul
3	Chelsea	Italian	Bakery	Café	Pizza	Sushi
4	Chinatown	Chinese	Dumplings	Malay	Vegetarian / Vegan	Italian

[45]:
```
with open('neighborhoods_venues.tex','w') as f:
    f.write(neighborhoods_venues_sorted.head().to_latex(index=False))
```

[82]:
```
# set number of clusters
kclusters = 4

manhattan_grouped_clustering = manhattan_grouped.drop('Neighborhood', 1)

# run k-means clustering
kmeans = KMeans(n_clusters=kclusters, random_state=0).
 ↪fit(manhattan_grouped_clustering)

# check cluster labels generated for each row in the dataframe
kmeans.labels_[0:10]
```

[82]:
```
array([0, 1, 1, 0, 1, 2, 2, 1, 1, 2], dtype=int32)
```

[83]:
```
# add clustering labels
neighborhoods_venues_sorted.insert(0, 'Cluster Labels', kmeans.
 ↪predict(manhattan_grouped_clustering))

manhattan_merged = manhattan_data

# merge toronto_grouped with toronto_data to add latitude/longitude for each␣
 ↪neighborhood
manhattan_merged = manhattan_merged.join(neighborhoods_venues_sorted.
 ↪set_index('Neighborhood'), on='Neighborhood')

manhattan_merged.head() # check the last columns!
```

[83]:
```
     Borough        Neighborhood   Latitude  Longitude  Cluster Labels  \
0  Manhattan         Marble Hill  40.876551 -73.910660               1
1  Manhattan           Chinatown  40.715618 -73.994279               1
2  Manhattan  Washington Heights  40.851903 -73.936900               1
3  Manhattan              Inwood  40.867684 -73.921210               1
4  Manhattan    Hamilton Heights  40.823604 -73.949688               1

             1st            2nd         3rd                4th         5th
0     Sandwiches  Deli / Bodega      Donuts            Seafood       Diner
1        Chinese      Dumplings       Malay  Vegetarian / Vegan     Italian
2  Deli / Bodega          Pizza     Mexican            Chinese  Restaurant
3          Pizza           Café  Restaurant            Mexican      Bakery
4          Pizza  Deli / Bodega        Café            Mexican     Chinese
```

[84]:
```
# create map
map_clusters = folium.Map(location=[latitude, longitude], zoom_start=11)

# set color scheme for the clusters
x = np.arange(kclusters)
ys = [i + x + (i*x)**2 for i in range(kclusters)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

# add markers to the map
markers_colors = []
for lat, lon, poi, cluster in zip(manhattan_merged['Latitude'],␣
 ↪manhattan_merged['Longitude'], manhattan_merged['Neighborhood'],␣
 ↪manhattan_merged['Cluster Labels']):
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=True)
    folium.CircleMarker(
        [lat, lon],
        radius=5,
        popup=label,
        color=rainbow[cluster-1],
        fill=True,
        fill_color=rainbow[cluster-1],
        fill_opacity=0.7).add_to(map_clusters)

map_clusters
```

[84]:
```
<folium.folium.Map at 0x7f6d4f7e4400>
```

[85]:
```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 0, manhattan_merged.
 ↪columns[[1] + list(range(5, manhattan_merged.shape[1]))]].head()
```

[85]:
```
         Neighborhood      1st            2nd     3rd      4th         5th
8     Upper East Side  Italian       American  French  Burgers       Sushi
10         Lenox Hill  Italian  Deli / Bodega   Pizza    Greek  Restaurant
12    Upper West Side  Italian         Bakery    Café  Mexican      French
```

```
17            Chelsea  Italian         Bakery    Café    Pizza       Sushi
18  Greenwich Village  Italian         French    Café    Sushi  Vietnamese
```

[86]:
```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1, manhattan_merged.
↪columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

[86]:
```
           Neighborhood            1st            2nd            3rd  \
0           Marble Hill     Sandwiches  Deli / Bodega         Donuts
1             Chinatown        Chinese      Dumplings          Malay
2    Washington Heights  Deli / Bodega          Pizza        Mexican
3               Inwood          Pizza           Café     Restaurant
4      Hamilton Heights          Pizza  Deli / Bodega           Café
5        Manhattanville        Chinese  Deli / Bodega        Seafood
6        Central Harlem  Deli / Bodega  Fried Chicken        Chinese
7           East Harlem        Mexican          Pizza  Deli / Bodega
9             Yorkville        Italian          Pizza  Deli / Bodega
11    Roosevelt Island  Deli / Bodega     Sandwiches           Café
19        East Village          Pizza       Japanese        Italian
20     Lower East Side          Pizza  Deli / Bodega        Chinese
25    Manhattan Valley        Mexican          Pizza         Indian
26  Morningside Heights     Food Truck  Deli / Bodega          Pizza
27            Gramercy  Deli / Bodega           Thai        Italian
30       Carnegie Hill         Bakery          Pizza           Café
33       Midtown South         Korean       Japanese         Bakery
36          Tudor City           Café  Deli / Bodega        Mexican

                 4th             5th
0            Seafood           Diner
1   Vegetarian / Vegan         Italian
2            Chinese      Restaurant
3            Mexican          Bakery
4            Mexican         Chinese
5            Mexican      Sandwiches
6            African  Southern / Soul
7             Bakery   Latin American
9          Sandwiches         Chinese
11             Pizza           Greek
19  Vegetarian / Vegan        American
20           Mexican           Ramen
25              Thai           Café
26          American           Café
27             Pizza         Mexican
30            French           Sushi
33      Deli / Bodega      Restaurant
36          American      Food Truck
```

[90]:
```
with open('mexican_cluster.tex','w') as f:
```

```
    f.write(manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1,␣
↪manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]].
↪to_latex(index=False))
```

[87]:
```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.
↪columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

[87]:

	Neighborhood	1st	2nd	3rd	4th	5th
13	Lincoln Square	Café	Food Truck	American	Italian	French
14	Clinton	Deli / Bodega	Italian	Café	Sandwiches	Restaurant
15	Midtown	Sandwiches	Food Truck	Deli / Bodega	American	Burgers
16	Murray Hill	American	Sandwiches	Chinese	Japanese	Scandinavian
21	Tribeca	Italian	American	Bakery	Café	Burgers
24	West Village	Italian	American	Gastropub	Burgers	Steakhouse
29	Financial District	Sandwiches	Café	American	Salad	Food Truck
32	Civic Center	Sandwiches	Italian	American	French	Bakery
34	Sutton Place	Bagels	American	Italian	Chinese	Pizza
35	Turtle Bay	Italian	Café	Deli / Bodega	Food Truck	Sandwiches
39	Hudson Yards	American	Café	Italian	Spanish	Restaurant

[88]:
```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 3, manhattan_merged.
↪columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

[88]:

	Neighborhood	1st	2nd	3rd	4th	5th
37	Stuyvesant Town	Deli / Bodega	Sandwiches	German	Bistro	Sushi