

# Capstone Project :Worcester Neighborhoods



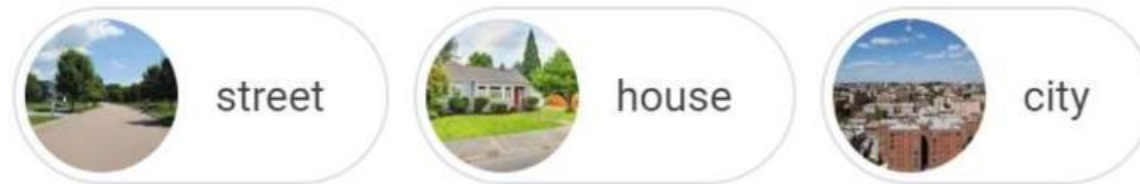


# CONTENTS

- ✓ Introduction
- ✓ Data
- ✓ Methodology
- ✓ Results
- ✓ Discussion

# Introduction

- A description of the background
- In Worcester County, MA. I recently get a dream job in Boylston and the new office is located almost 15 miles away from home. This means my daily travel time is close to 1.5 hours. I am considering moving closer to the office to avoid wasting time. I and my family currently stay in the neighborhood of the city of Worcester, which is in the west of Worcester County, and the job office is in Boylston, which is in the east of Worcester County. Since I don't have to consider to stay in Boylston where has a relatively high rent price. But I prefer moving to a neighborhood closer to my workplace and similar to our current neighborhood of Worcester.



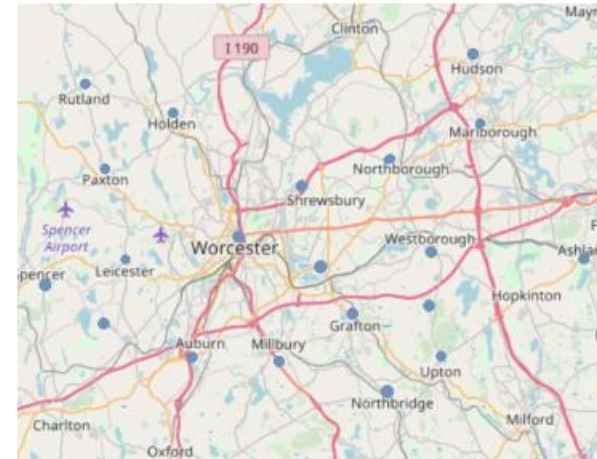
# Introduction

- A discussion of the problems
- Which neighborhoods in Worcester County are good choices for our family to move to?
- These candidate neighborhoods should be both close to my new office and similar to our current living environment.

# Data

- To address this problem, we need:
- Geographical Data of Worcester County neighborhoods - latitude and longitude details
- of the cities in Worcester County
- Neighborhoods Environment Data - data describing interests and venues within a given radius

|   | City         | Latitude  | Longitude  |
|---|--------------|-----------|------------|
| 0 | Southborough | 42.305556 | -71.525000 |
| 1 | Bolton       | 42.433333 | -71.608333 |
| 2 | Harvard      | 42.500000 | -71.583333 |
| 3 | Northborough | 42.319444 | -71.641667 |
| 4 | Westborough  | 42.269444 | -71.616667 |

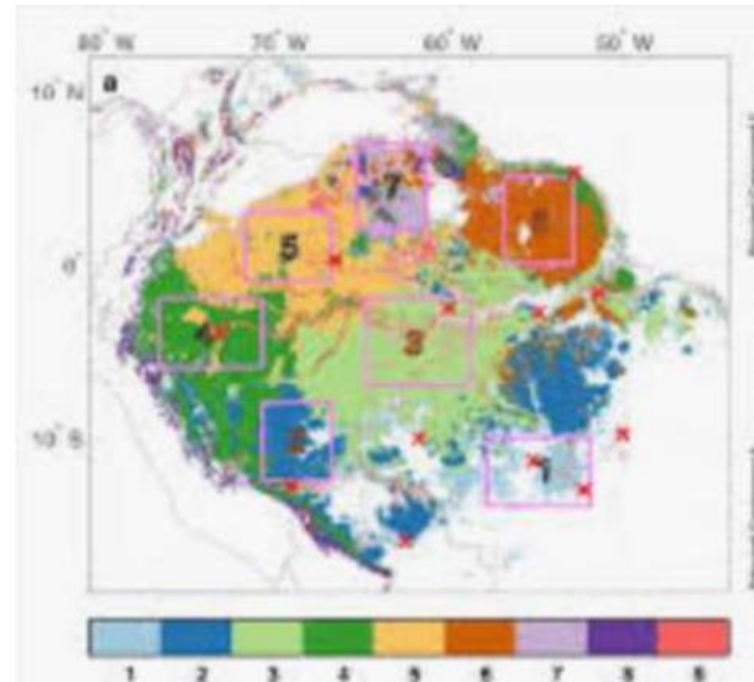


# Data

- Sources of Data:
  - For the latitude and longitude coordinates of neighborhoods, our primary source of information is the following Wikipedia page:  
[https://en.wikipedia.org/wiki/Worcester\\_County,\\_Massachusetts](https://en.wikipedia.org/wiki/Worcester_County,_Massachusetts)
  - For neighborhood environment details, we use the Foursquare database. Since we are
  - interested in the character and composition of each neighborhood, we use the 'explore' endpoint to learn about the popular venues in each neighborhood.
  - In the end, we will run an unsupervised k-means clustering model to look for similar locations as our current neighborhood.

# Methodology

- We will run a unsupervised k-means clustering model to look for similar locations as our current neighborhood.



# Results

- We get venues for every neighborhood by popularity and proximity

|   | Neighborhood | Neighborhood Latitude | Neighborhood Longitude | Venue   | Venue Latitude | Venue Longitude | Venue Category |
|---|--------------|-----------------------|------------------------|---|----------------|-----------------|----------------|
| 0 | Southborough | 42.305556             | -71.525                | Mauro's                                       | 42.305840      | -71.524282      | Breakfast Spot |
| 1 | Southborough | 42.305556             | -71.525                | Southborough House Of Pizza                   | 42.305947      | -71.524667      | Pizza Place    |
| 2 | Southborough | 42.305556             | -71.525                | Walgreens Pharmacy at Southboro Medical Group | 42.310020      | -71.525548      | Pharmacy       |
| 3 | Southborough | 42.305556             | -71.525                | Phaidra Nail Salon                            | 42.305849      | -71.524878      | Spa            |
| 4 | Southborough | 42.305556             | -71.525                | Santander Bank                                | 42.306135      | -71.526181      | Bank           |



# Results

- Group by neighborhood and calculate the mean value for type of venue.

|   | Neighborhood | Accessories Store | American Restaurant | Antique Shop | Art Gallery | Art Museum | Arts & Crafts Store | Asian Restaurant | BBQ Joint | Bakery | ... | Theater | Thrift / Vintage Store | Toy / Game Store | Train Station | Tree |
|---|--------------|-------------------|---------------------|--------------|-------------|------------|---------------------|------------------|-----------|--------|-----|---------|------------------------|------------------|---------------|------|
| 0 | Ashburnham   | 0.000000          | 0.000000            | 0.0          | 0.0         | 0.0        | 0.0                 | 0.0              | 0.0       | 0.0    | ... | 0.0     | 0.0                    | 0.000000         | 0.0           | 0.0  |
| 1 | Athol        | 0.000000          | 0.111111            | 0.0          | 0.0         | 0.0        | 0.0                 | 0.0              | 0.0       | 0.0    | ... | 0.0     | 0.0                    | 0.000000         | 0.0           | 0.0  |
| 2 | Auburn       | 0.028571          | 0.000000            | 0.0          | 0.0         | 0.0        | 0.0                 | 0.0              | 0.0       | 0.0    | ... | 0.0     | 0.0                    | 0.028571         | 0.0           | 0.0  |
| 3 | Barre        | 0.000000          | 0.000000            | 0.0          | 0.0         | 0.0        | 0.0                 | 0.0              | 0.0       | 0.1    | ... | 0.0     | 0.0                    | 0.000000         | 0.0           | 0.0  |
| 4 | Berlin       | 0.000000          | 0.000000            | 0.0          | 0.0         | 0.0        | 0.0                 | 0.0              | 0.0       | 0.0    | ... | 0.0     | 0.0                    | 0.000000         | 0.0           | 0.0  |

# Results

- Identify the top ten venues for each neighborhood.

|   | 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 | Ashburnham   | Pizza Place           | Grocery Store         | Convenience Store     | Coffee Shop           | Baseball Field        | Liquor Store          | Gourmet Shop          | Fast Food Restaurant  | Discount Store        | Dive Bar               |
| 1 | Athol        | Pizza Place           | Baseball Field        | Breakfast Spot        | Chinese Restaurant    | Laundromat            | Gastropub             | Gym                   | American Restaurant   | Doctor's Office       | Donut Shop             |
| 2 | Auburn       | Clothing Store        | Shoe Store            | Kids Store            | Women's Store         | Jewelry Store         | Lingerie Store        | Snack Place           | Cosmetics Shop        | Department Store      | Doctor's Office        |
| 3 | Barre        | Pizza Place           | Massage Studio        | Flower Shop           | Bistro                | Restaurant            | Gas Station           | Bakery                | Italian Restaurant    | Breakfast Spot        | Dumpling Restaurant    |
| 4 | Berlin       | Deli / Bodega         | Performing Arts Venue | Design Studio         | Diner                 | Discount Store        | Dive Bar              | Doctor's Office       | Donut Shop            | Dumpling Restaurant   | Electronics Store      |

# Results

- Use the K-means Clustering to group similar neighborhoods.

Cluster 4:

|    | 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 |
|----|--------------|-----------------------|-----------------------|-------------------------|-----------------------|-----------------------|--------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 2  | Harvard      | Farmers Market        | Hobby Shop            | Gourmet Shop            | Moving Target         | Food                  | Diner                    | Discount Store        | Dive Bar              | Doctor's Office       | Donut Shop             |
| 5  | Sterling     | Pizza Place           | Grocery Store         | Mexican Restaurant      | Flower Shop           | Antique Shop          | American Restaurant      | Diner                 | Discount Store        | Dive Bar              | Food                   |
| 14 | Shrewsbury   | Pizza Place           | Donut Shop            | Pharmacy                | Steakhouse            | Plaza                 | Convenience Store        | Coffee Shop           | Liquor Store          | Flower Shop           | Italian Restaurant     |
| 15 | Sturbridge   | Park                  | Hotel                 | Arts & Crafts Store     | Bar                   | Gift Shop             | Bakery                   | Doctor's Office       | Donut Shop            | Dumpling Restaurant   | Food & Drink Shop      |
| 34 | Clinton      | Café                  | Sandwich Place        | Gym / Fitness Center    | Pizza Place           | Liquor Store          | Mediterranean Restaurant | Italian Restaurant    | Bar                   | Bank                  | Food & Drink Shop      |
| 44 | Leominster   | Pizza Place           | Gym / Fitness Center  | Sandwich Place          | Spa                   | Mexican Restaurant    | Donut Shop               | Liquor Store          | Pharmacy              | Plaza                 | Chinese Restaurant     |
| 45 | Phillipston  | Home Service          | Department Store      | Design Studio           | Diner                 | Discount Store        | Dive Bar                 | Doctor's Office       | Donut Shop            | Dumpling Restaurant   | Electronics Store      |
| 46 | Warren       | Bakery                | Bar                   | Women's Store           | French Restaurant     | Discount Store        | Dive Bar                 | Doctor's Office       | Donut Shop            | Dumpling Restaurant   | Electronics Store      |
| 47 | Petersham    | Scenic Lookout        | Convenience Store     | Nature Preserve         | Women's Store         | Flower Shop           | Diner                    | Discount Store        | Dive Bar              | Doctor's Office       | Donut Shop             |
| 52 | Gardner      | Liquor Store          | Gas Station           | Diner                   | Breakfast Spot        | Doctor's Office       | Pizza Place              | Donut Shop            | Convenience Store     | Pub                   | Restaurant             |
| 53 | Worcester    | American Restaurant   | Hotel                 | New American Restaurant | Bakery                | Art Gallery           | Pizza Place              | Mexican Restaurant    | Italian Restaurant    | Electronics Store     | Fast Food Restaurant   |

These are neighborhoods similar to Worcester.

Thanks for Watching