



# Battle of the Neighborhoods

# The Problem & Background.

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- A friend is considering moving to a new city and wants help determining the right fit for her.
- Background:
  - She does not want to own a car.
  - She currently lives in the East Village of NYC and enjoys the neighborhood immensely. She would like to live in a similar neighborhood.

# Data

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# Data

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- A list of the cities with the best public transportation and my friend's input was used to narrow down to 5 major cities: San Francisco, Boston, Philadelphia, Chicago and Portland, OR.
- A list of neighborhoods for the 5 cities (including the East Village) with Latitude and Longitude was be compiled from Wikipedia, [www.usgs.gov](http://www.usgs.gov), and Google.
- FourSquare venue data was be pulled for each of these neighborhoods (500m around Latitude and Longitude).
- This data will be used to find neighborhoods with similar venues as the East Village.

# US News – Public Transportation Data

## The 10 Best Cities for Public Transportation

These metro areas offer numerous transportation options for commuters.



By **Casey Leins**, Staff Writer April 3, 2019, at 3:30 p.m.



In 2017, Americans took 10.1 billion trips on public transportation, with 34 million trips each day, according to the [American Public Transportation Association](#). Still, 45 percent of Americans do not have access to public transportation.

AllTransit, the largest source of transit data in the nation, created a [ranking](#) to identify which cities offer the best public transportation systems, based on factors including the number of jobs accessible within a 30 minute trip and frequency of service.



Out of all U.S. cities with a population above 250,000, these metro areas made the top 10:

### 1. (Tie) San Francisco, California

Score: 9.6

Jobs accessible within a 30 minute trip: 653,730

Transit routes within a half mile: 26

Commuters who use transit: 36.5 percent

### 3. Boston, Massachusetts

Score: 9.4

Jobs accessible in 30 minute trip: 645,907

Transit routes within a half mile: 16

Commuters who use transit: 34.8 percent

# Neighborhood Data

- Started with a list from Wikipedia and based on matching names, added Latitude and Longitude from [www.usgs.gov](http://www.usgs.gov). Filled any unfound neighborhoods using Google.

## Neighborhoods in Boston

From Wikipedia, the free encyclopedia

Boston's diverse [neighborhoods](#) serve as a political and cultural organizing mechanism. The City of Boston's Office of Neighborhood Services has designated 23 Neighborhoods in the city:

- Allston
- Back Bay
- Bay Village
- Beacon Hill
- Brighton
- Charlestown
- Chinatown/Leather District



FEATURE_NAME	FEATURE_CLASS	PRIM_LAT_DEC	PRIM_LONG_DEC
Aberdeen	Populated Place	42.3445416	-71.1494977
Allston	Populated Place	42.3584304	-71.1258861
Ashmont	Populated Place	42.2834319	-71.0689393
Back Bay	Populated Place	42.3500974	-71.0869961
Bay Village	Populated Place	42.3506531	-71.0697734
Beachmont	Populated Place	42.3959305	-70.986994
Beacon Hill	Populated Place	42.3587085	-71.067829
Bellevue	Populated Place	42.2875981	-71.1453304
Boston	Populated Place	42.3584308	-71.0597732
Brighton	Populated Place	42.3500971	-71.1564423
Cedar Grove	Populated Place	42.2806543	-71.0578279
Charlestown	Populated Place	42.3778749	-71.0619957
Chelsea	Populated Place	42.3917638	-71.0328284
Chinatown	Populated Place	0	0
City Point	Populated Place	42.3362091	-71.0286611
Clarendon Hills	Populated Place	42.2750984	-71.1244964
Cottage Hill	Populated Place	42.3681534	-70.9689376
Cottage Park	Populated Place	42.3709309	-70.9869937
Court Park	Populated Place	42.3728754	-70.9947717

# FourSquare Data

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- FourSquare venue data was be pulled for each of the neighborhoods and unneeded data was removed leaving the data below.

	City	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
11	Philadelphia	Allegheny West	40.008446	-75.177956	Mimmo's Pizza	40.004747	-75.178731	Pizza Place
27	Philadelphia	Allegheny West	40.008446	-75.177956	Good Garden	40.004439	-75.176965	Chinese Restaurant
31	Philadelphia	Bella Vista	39.935391	-75.157122	Anastasi Seafood	39.936190	-75.158336	Seafood Restaurant
32	Philadelphia	Bella Vista	39.935391	-75.157122	Ba Le Bakery	39.935134	-75.154342	Vietnamese Restaurant
33	Philadelphia	Bella Vista	39.935391	-75.157122	Prima Pizza Taquiera Mexicana	39.936130	-75.158627	Mexican Restaurant
35	Philadelphia	Bella Vista	39.935391	-75.157122	Rim Cafe	39.934280	-75.158928	Café
37	Philadelphia	Bella Vista	39.935391	-75.157122	Talluto's	39.937667	-75.158147	Italian Restaurant
38	Philadelphia	Bella Vista	39.935391	-75.157122	Taqueria La Veracruzana	39.936409	-75.158924	Mexican Restaurant
40	Philadelphia	Bella Vista	39.935391	-75.157122	Italian Market	39.937675	-75.158052	Farmers Market
42	Philadelphia	Bella Vista	39.935391	-75.157122	South Philly Barbacoa	39.934987	-75.158697	Mexican Restaurant
43	Philadelphia	Bella Vista	39.935391	-75.157122	Di Bruno Bros.	39.938001	-75.158206	Cheese Shop
44	Philadelphia	Bella Vista	39.935391	-75.157122	Garage	39.933507	-75.158887	Bar

# Methodology

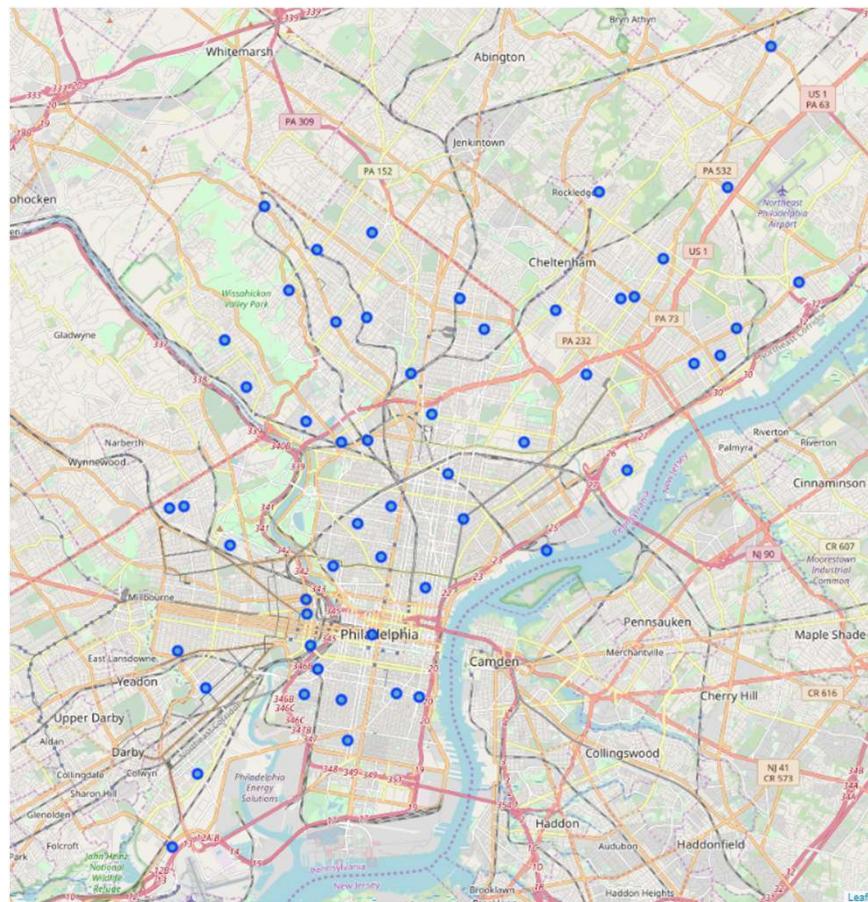
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# Methodology - Summary

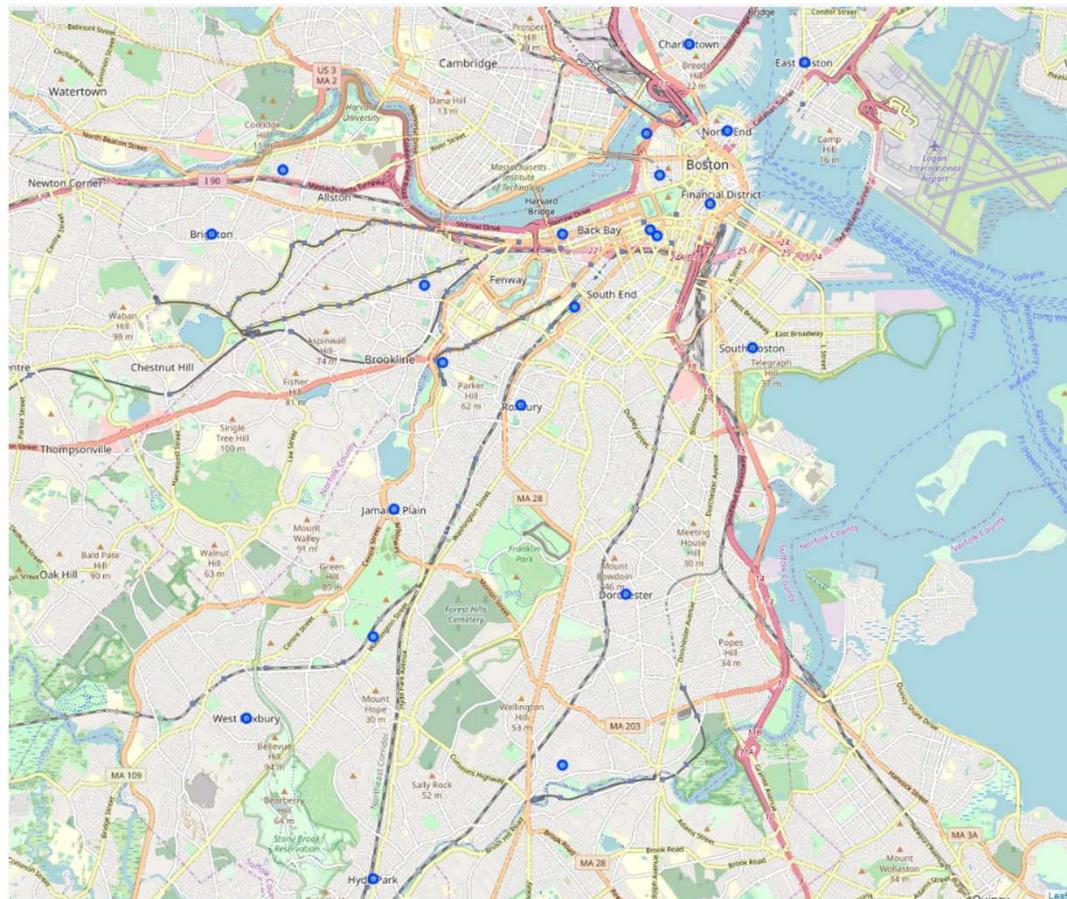
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- Pulled in Neighborhood list and add Latitude and Longitude.
- FourSquare venue data was be pulled for each of these neighborhoods (500m around Latitude and Longitude).
- For each neighborhood, venue categories was listed, weighing them based on quantity.
- For each neighborhood, the top 10 venue categories was used to cluster the neighborhoods into 10 groupings.
- All the neighborhoods that fall within the same cluster as the East Village, was presented to my friend.

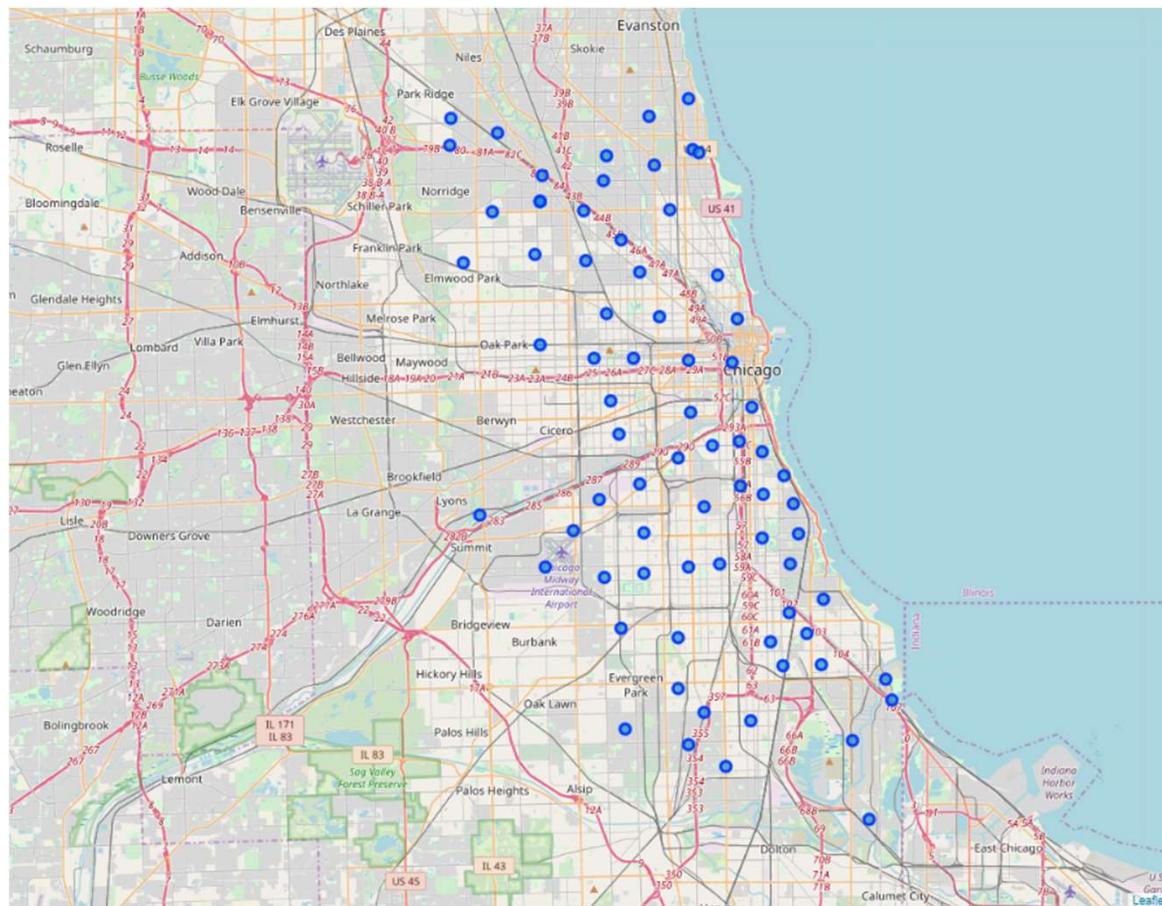
# 53 Neighborhoods of Philadelphia



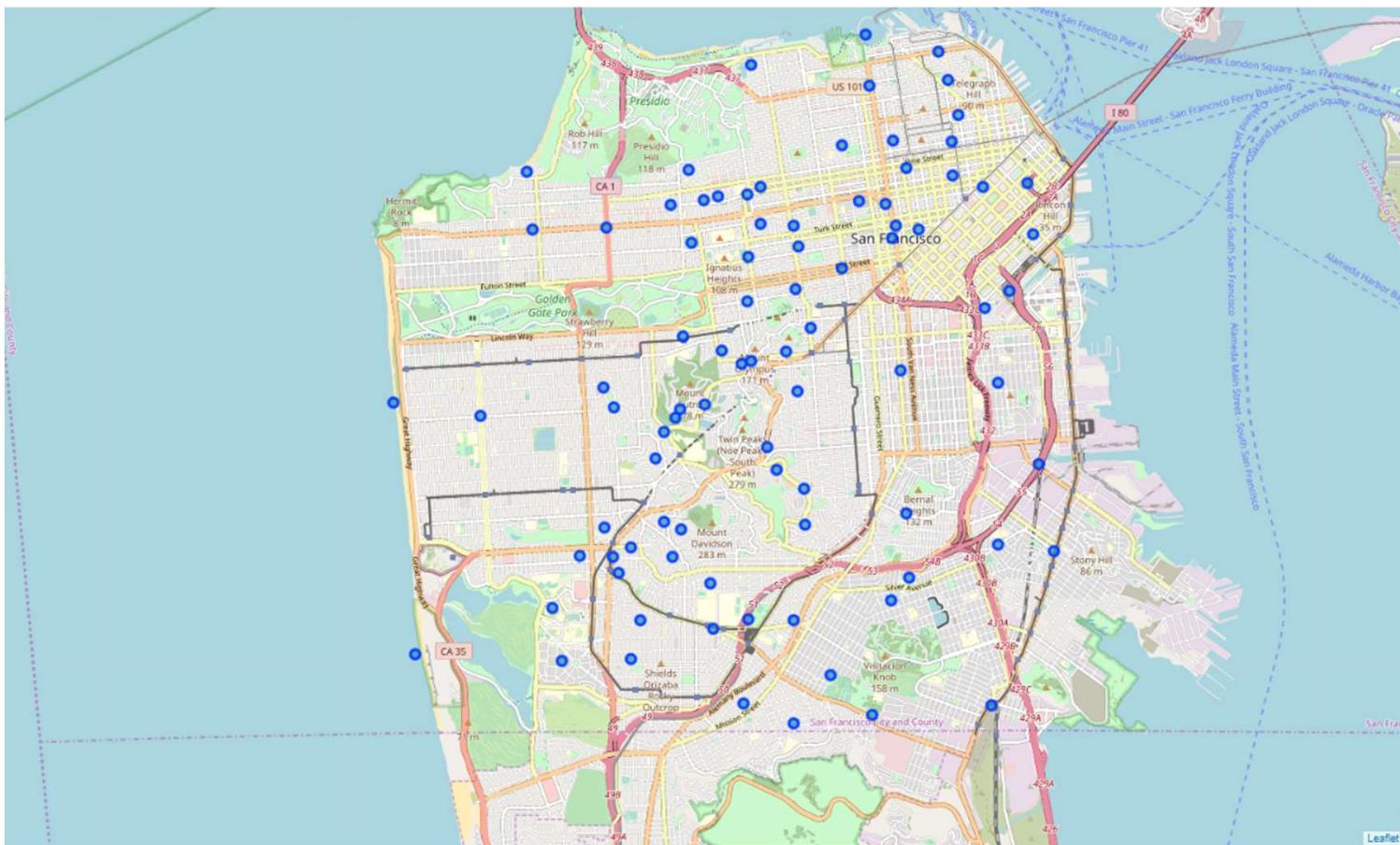
# 22 Neighborhoods of Boston



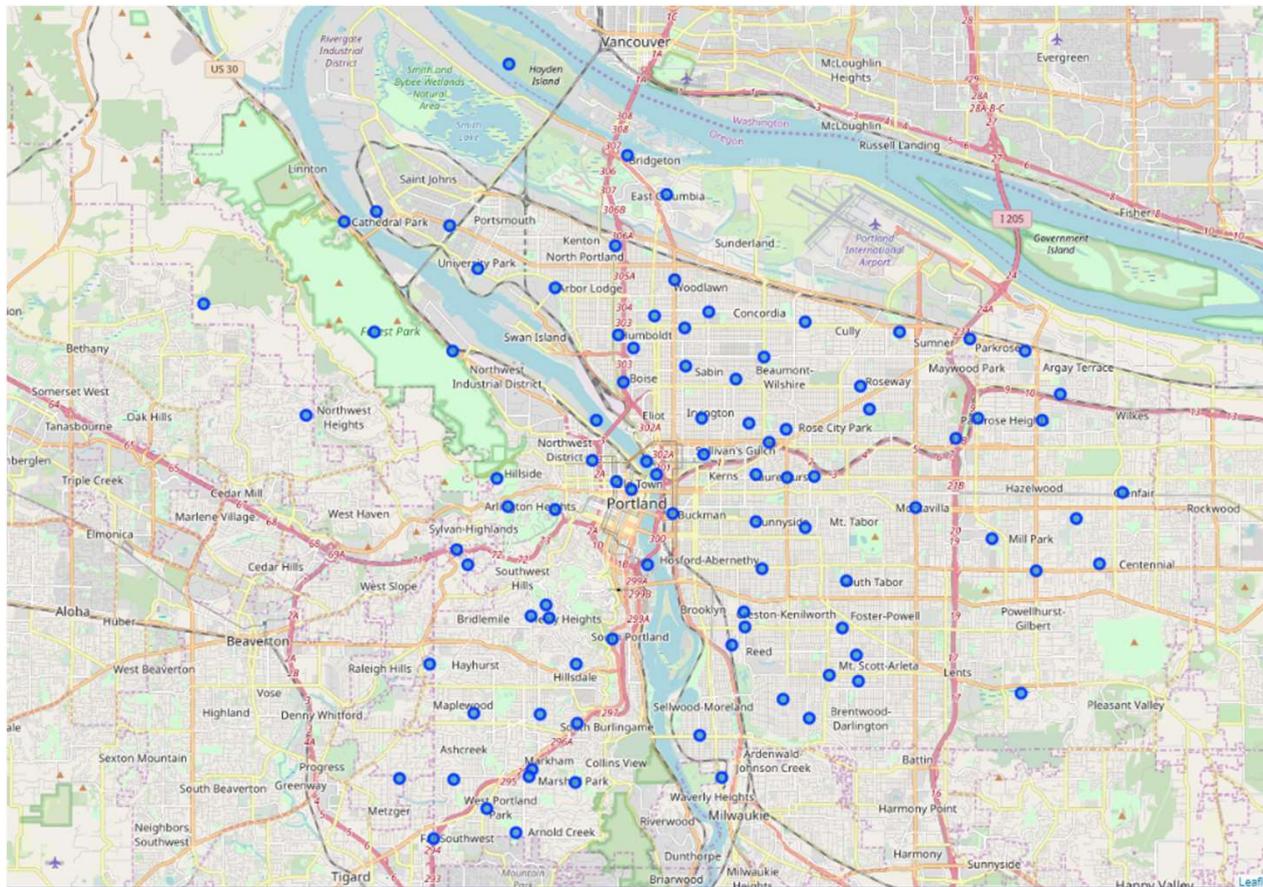
# 75 Neighborhoods of Chicago



# 88 Neighborhoods of San Francisco



# 94 Neighborhoods of Portland, OR



# FourSquare Venue Location Data

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8,583 Venues were brought in for the 5 cities plus the East Village.

	City	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Philadelphia	Allegheny West	40.008446	-75.177956	Planet Fitness	40.008568	-75.176718	Gym / Fitness Center
1	Philadelphia	Allegheny West	40.008446	-75.177956	PA Wine & Spirits	40.009335	-75.175383	Liquor Store
2	Philadelphia	Allegheny West	40.008446	-75.177956	ShopRite	40.009783	-75.174842	Grocery Store
3	Philadelphia	Allegheny West	40.008446	-75.177956	SHARE Food Program	40.006206	-75.177470	Grocery Store
4	Philadelphia	Allegheny West	40.008446	-75.177956	Restaurant Depot	40.009997	-75.177746	Kitchen Supply Store
5	Philadelphia	Allegheny West	40.008446	-75.177956	Philadelphia Rock Gyms	40.008428	-75.183449	Climbing Gym
6	Philadelphia	Allegheny West	40.008446	-75.177956	Dunkin'	40.007803	-75.174371	Donut Shop
7	Philadelphia	Allegheny West	40.008446	-75.177956	Wingstop	40.010768	-75.177072	Wings Joint
8	Philadelphia	Allegheny West	40.008446	-75.177956	Bakers Square	40.009786	-75.174875	Shopping Plaza
9	Philadelphia	Allegheny West	40.008446	-75.177956	Subway	40.010724	-75.176284	Sandwich Place

# FourSquare Venues – East Village Venues Only

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- There are 57 venue categories in the East Village. To find neighborhoods similar to the East Village, the venue list will be reduced to venues only in the 57 categories.
- Checked that the data had enough entries for each venue. Below is the number of venues for the first 12 categories.

Venue Category	City	Neighborhood	Neighborhood Latitude	Neighborhood Longitude
American Restaurant	147	147	147	147
Arepa Restaurant	1	1	1	1
Argentinian Restaurant	7	7	7	7
Art Gallery	54	54	54	54
Arts & Crafts Store	42	42	42	42
Bagel Shop	13	13	13	13
Bakery	135	135	135	135
Bar	199	199	199	199
Beer Bar	25	25	25	25
Beer Store	14	14	14	14
Burger Joint	68	68	68	68
Café	171	171	171	171

# Insufficient Data for Neighborhoods

- Determine neighborhoods with less than 5 venues. Below is the neighborhoods in Boston.

City	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Boston	Dorchester	3	3	3	3	3	3
	Mission Hill	4	4	4	4	4	4
	Roslindale	2	2	2	2	2	2
	Roxbury	2	2	2	2	2	2

- Researched a few neighborhoods to see if the data is enough to categorize accurately.

City	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	
5279	Boston	Roxbury	42.325098	-71.095329	Diablo Glass School	42.328085	-71.098262	Art Gallery
5283	Boston	Roxbury	42.325098	-71.095329	Parker Hill Park	42.327526	-71.099479	Park
City	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	
4974	Boston	Dorchester	42.297321	-71.074495	Four Corners Pizza	42.299380	-71.073196	Pizza Place
4975	Boston	Dorchester	42.297321	-71.074495	Oasis Vegan Veggie Parlor	42.299572	-71.073852	Vegetarian / Vegan Restaurant

- Base on the above information, less than 5 venues is not enough information to categorize

# Insufficient Data for Neighborhoods

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- Determined if number of neighborhoods with less than 5 venues would diminish the city's relevance.

City	Number of Neighborhoods with less than 5 Venues	Number of Neighborhoods by City	Number of Neighborhoods with more than 4 Venues
Boston	4	20	16
Chicago	31	69	38
Philadelphia	27	50	23
Portland OR	46	77	31
San Francisco	16	81	65

- Based on above, ample neighborhoods would remain if neighborhoods with less than 5 venues were removed, so they were removed.

# Compiling Venue Data

- Create a list by neighborhood that marks the venue categories by percentage. Below is a snippet for a few neighborhoods in Boston.
  - For the highlighted neighborhood Bay Village, 2.7027 percent of the venues are in the category Arts & Crafts Store.

# Compiling Venue Data

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- Create a list by neighborhood with the top 10 most common venue categories.
- Below is a snippet from Boston. For the highlighted row, Bay Village, Spa is the most common venue followed by American Restaurant and so on.

City	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	Boston	Allston	Bar	Pizza Place	American Restaurant	Burger Joint	Coffee Shop	Cocktail Bar	Gourmet Shop	Gift Shop	Garden Center	French Restaurant
1	Boston	Back Bay	American Restaurant	Ice Cream Shop	Italian Restaurant	Bar	Coffee Shop	Vietnamese Restaurant	Burger Joint	Seafood Restaurant	Mexican Restaurant	Bakery
2	Boston	Bay Village	Spa	American Restaurant	Seafood Restaurant	Italian Restaurant	Park	Bakery	Coffee Shop	French Restaurant	Mexican Restaurant	Arts & Crafts Store
3	Boston	Beacon Hill	Italian Restaurant	American Restaurant	Pizza Place	French Restaurant	Gift Shop	Ice Cream Shop	Korean Restaurant	Mexican Restaurant	Dessert Shop	Park
4	Boston	Brighton	Pizza Place	Bakery	Chinese Restaurant	Coffee Shop	Wine Shop	Bar	Dessert Shop	Greek Restaurant	American Restaurant	Spa

# K Means Clustering

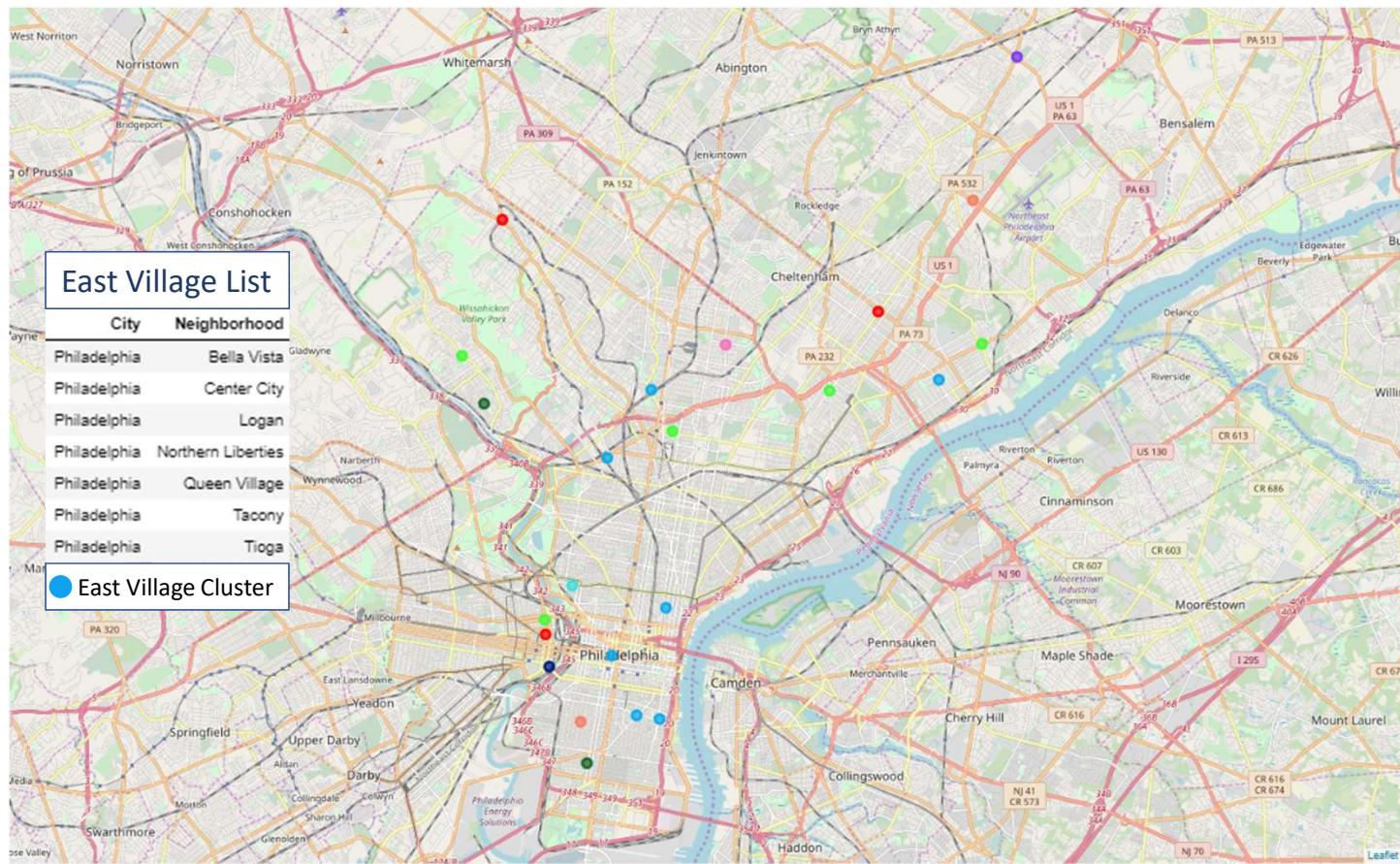
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- K Means was used to cluster the neighborhoods into 10 clusters.
- The clusters labels were added to the top 10 list by neighborhood.

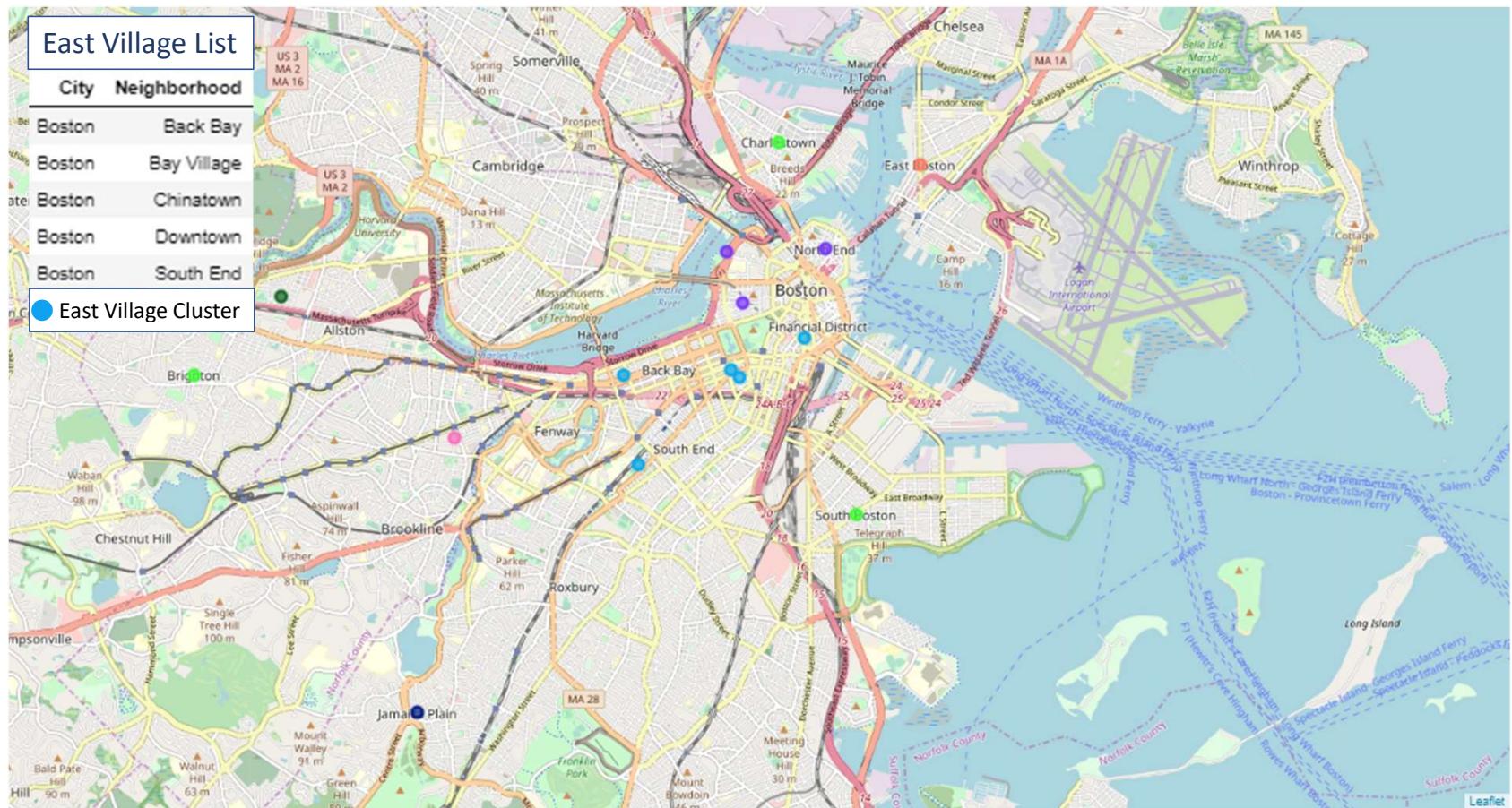
City	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
Boston	Allston	42.359489	-71.142382	7	Bar	Pizza Place	American Restaurant	Burger Joint	Coffee Shop	Cocktail Bar	Gourmet Shop
Boston	Back Bay	42.350097	-71.086996	3	American Restaurant	Ice Cream Shop	Italian Restaurant	Bar	Coffee Shop	Vietnamese Restaurant	Burger Joint
Boston	Bay Village	42.350653	-71.069773	3	Spa	American Restaurant	Seafood Restaurant	Italian Restaurant	Park	Bakery	Coffee Shop
Boston	Beacon Hill	42.358708	-71.067829	1	Italian Restaurant	American Restaurant	Pizza Place	French Restaurant	Gift Shop	Ice Cream Shop	Korean Restaurant
Boston	Brighton	42.350097	-71.156442	5	Pizza Place	Bakery	Chinese Restaurant	Coffee Shop	Wine Shop	Bar	Dessert Shop

- East Village was in cluster 3.
- The next maps will show all the neighborhoods like East Village in blue.

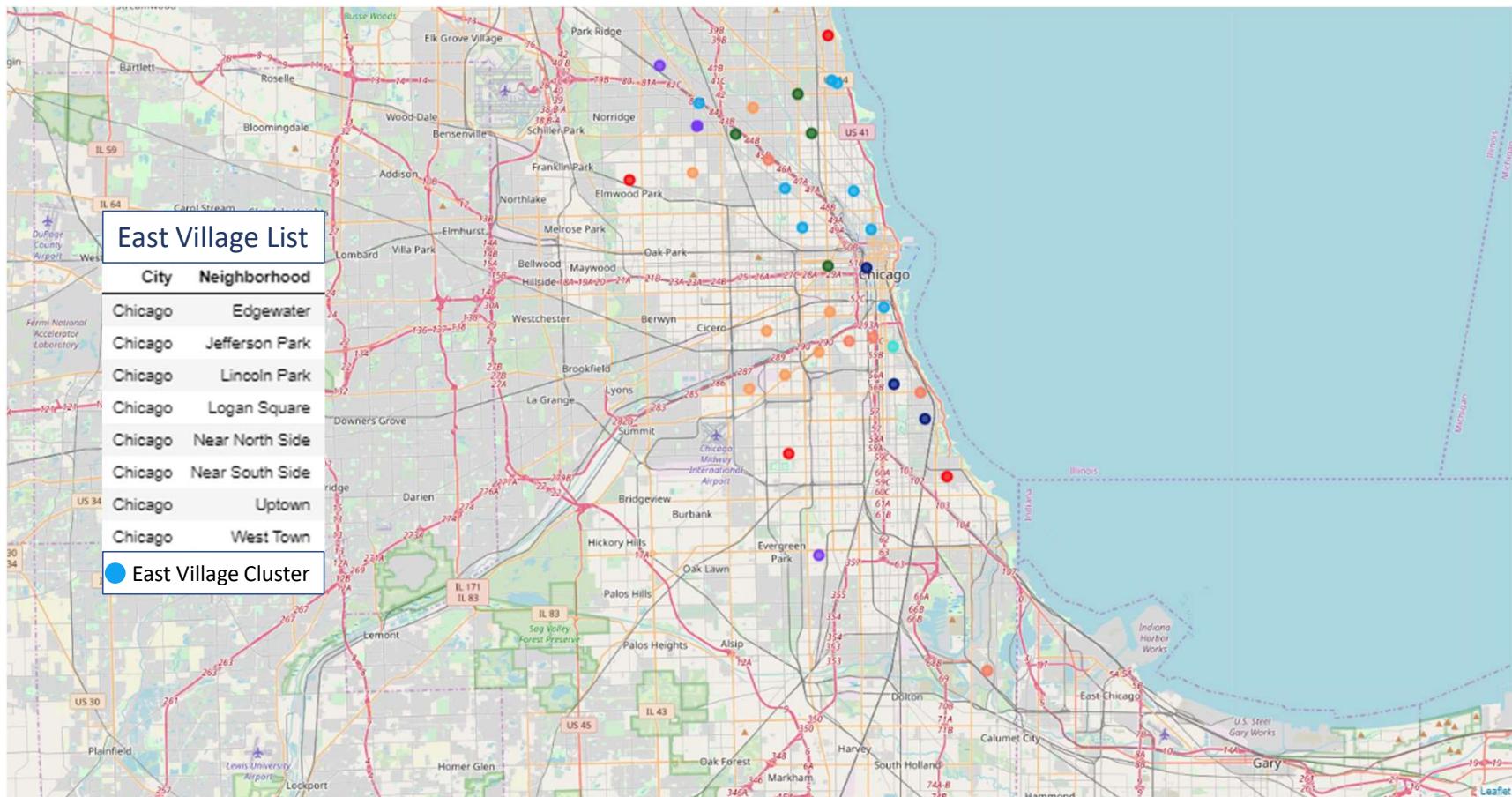
# Philadelphia with K Means Clusters



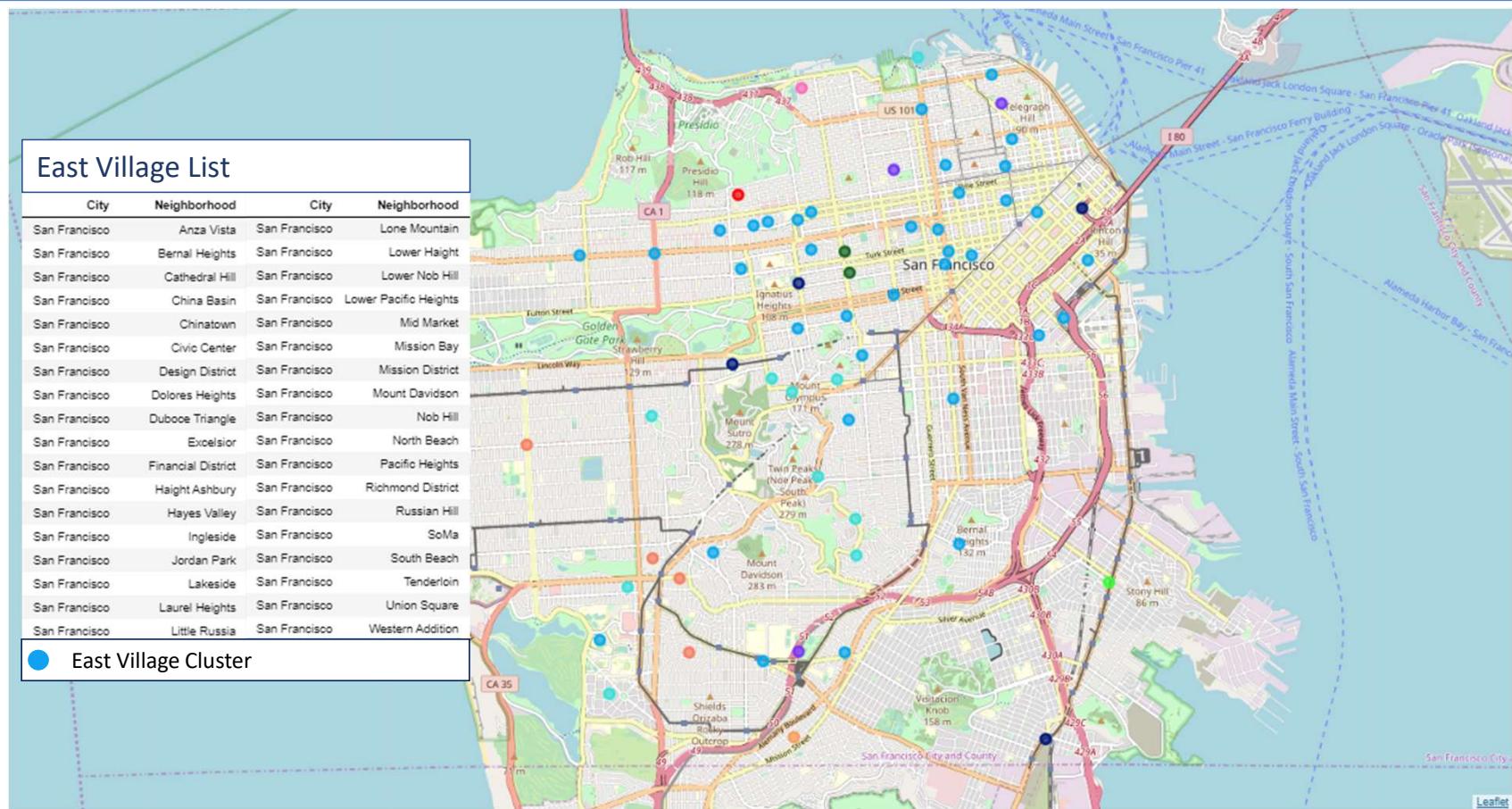
# Boston with K Means Clusters



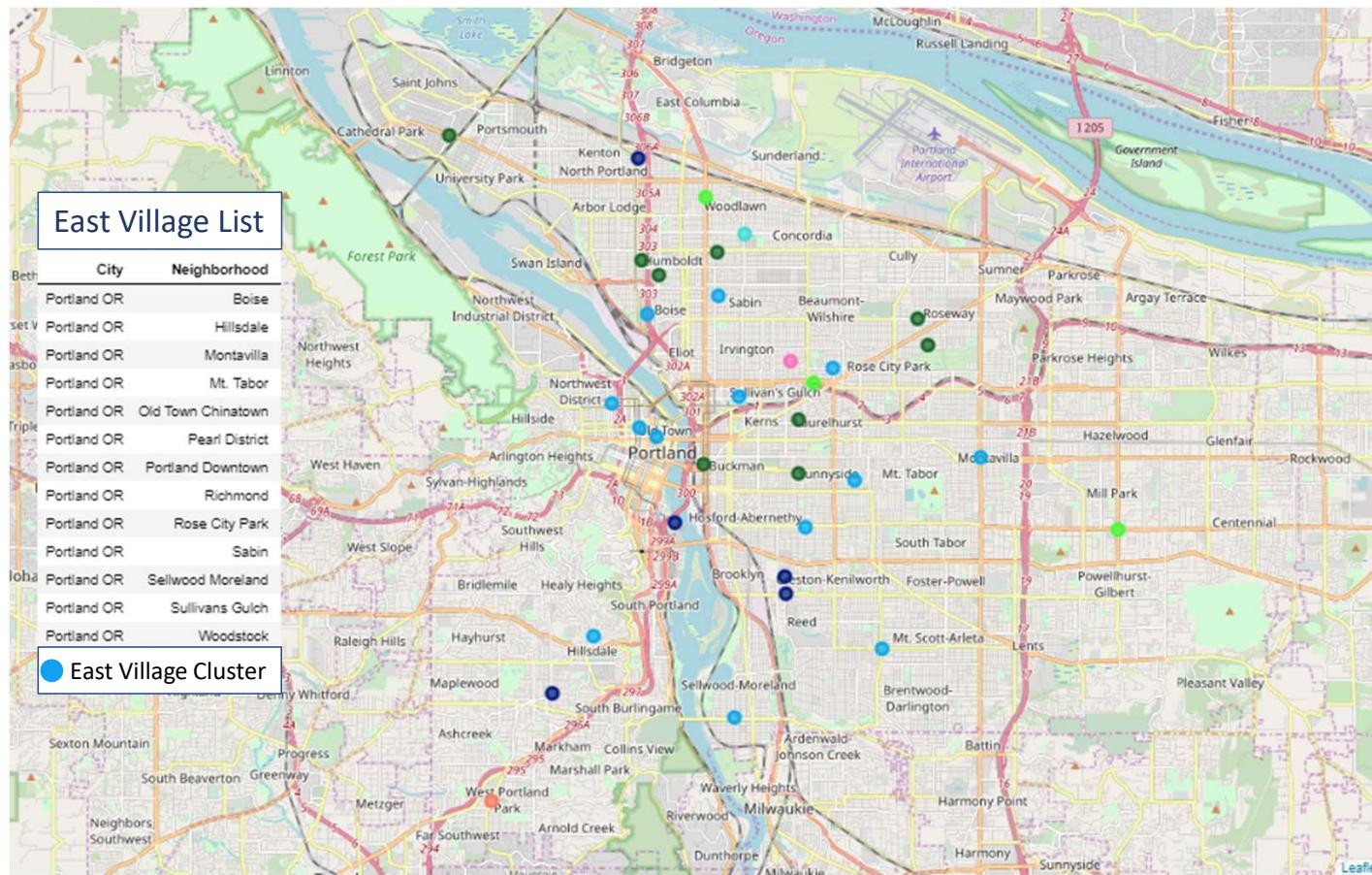
# Chicago with K Means Clusters



# San Francisco with K Means Clusters



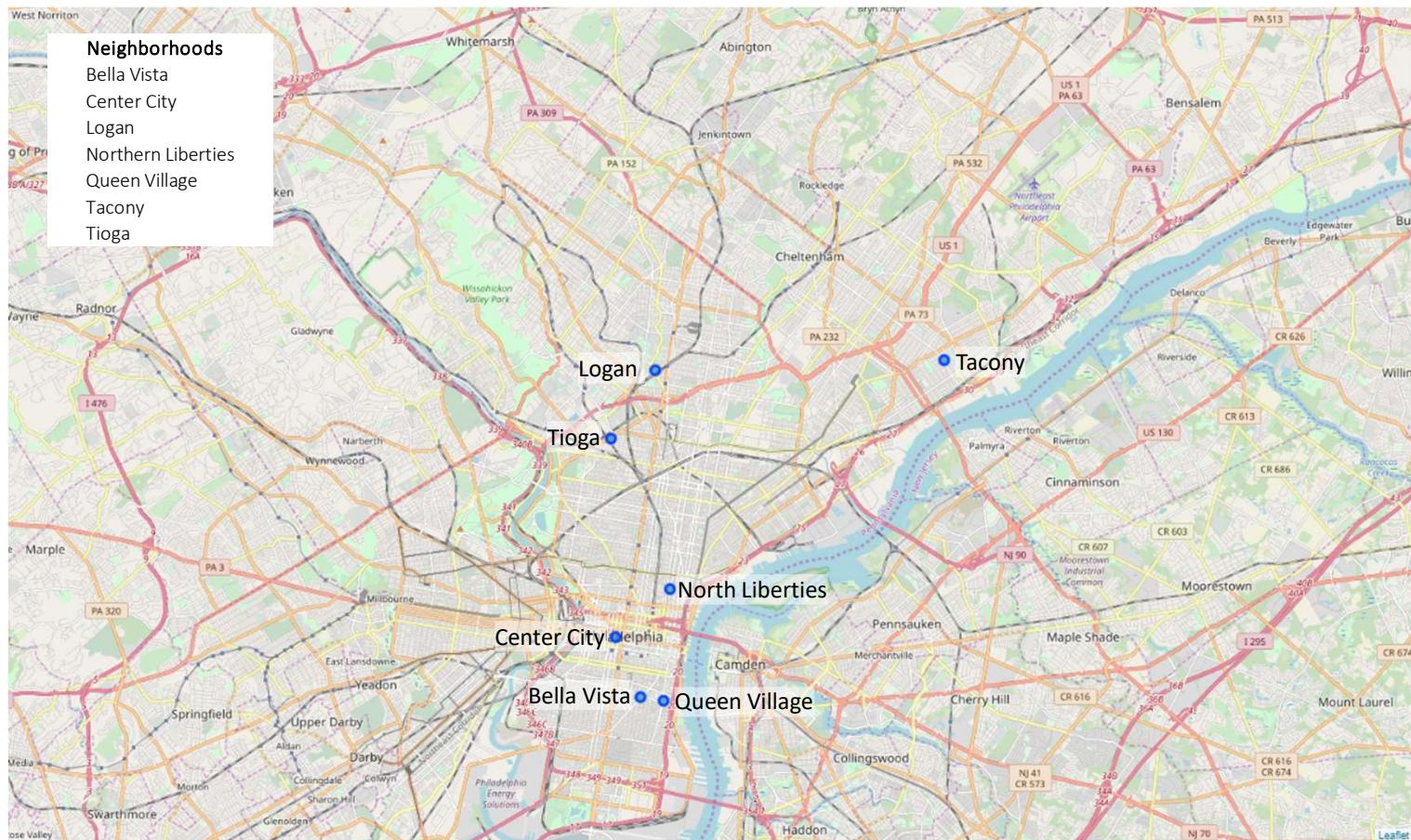
# Portland, OR with K Means Clusters



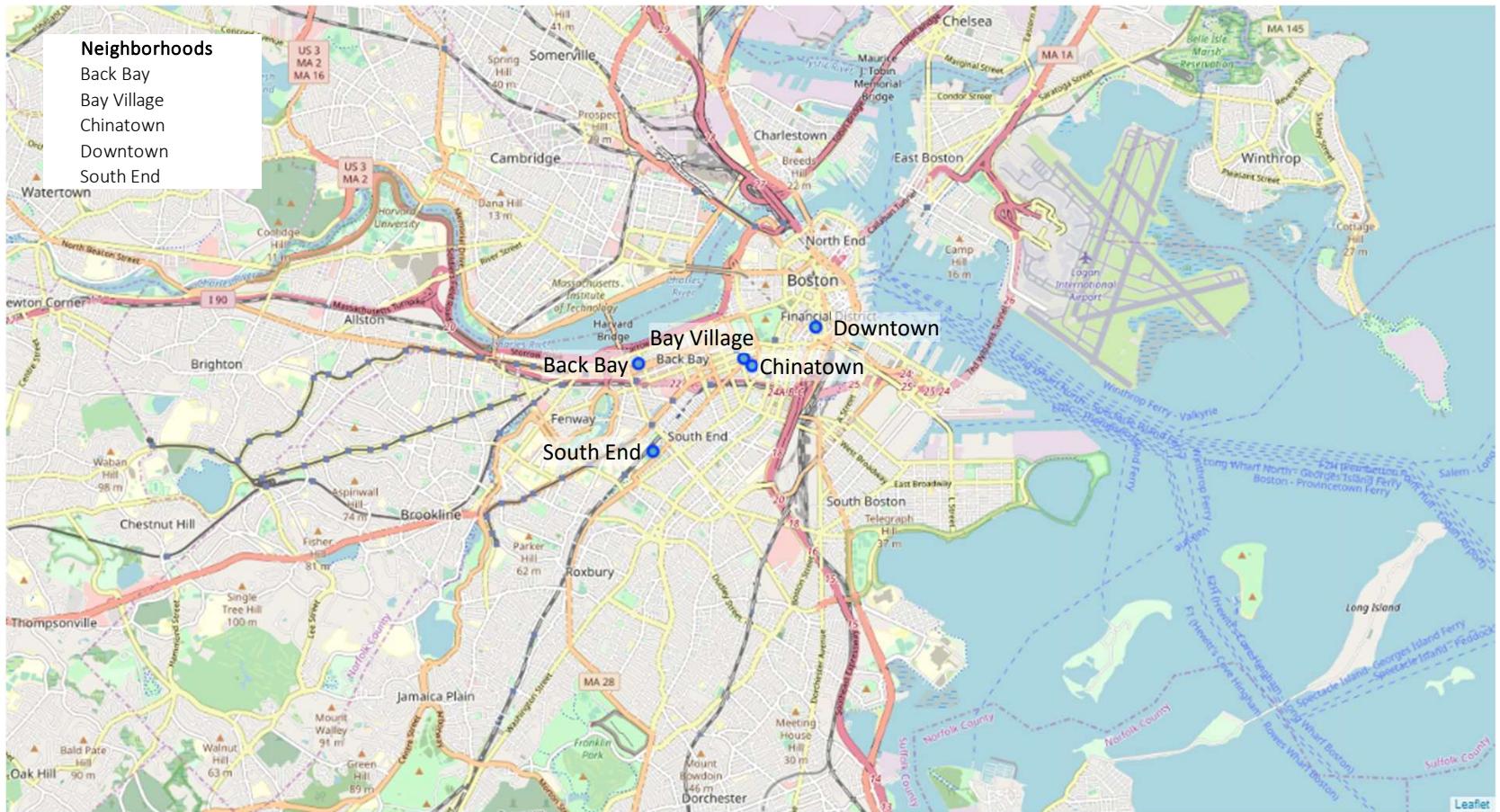
# Results

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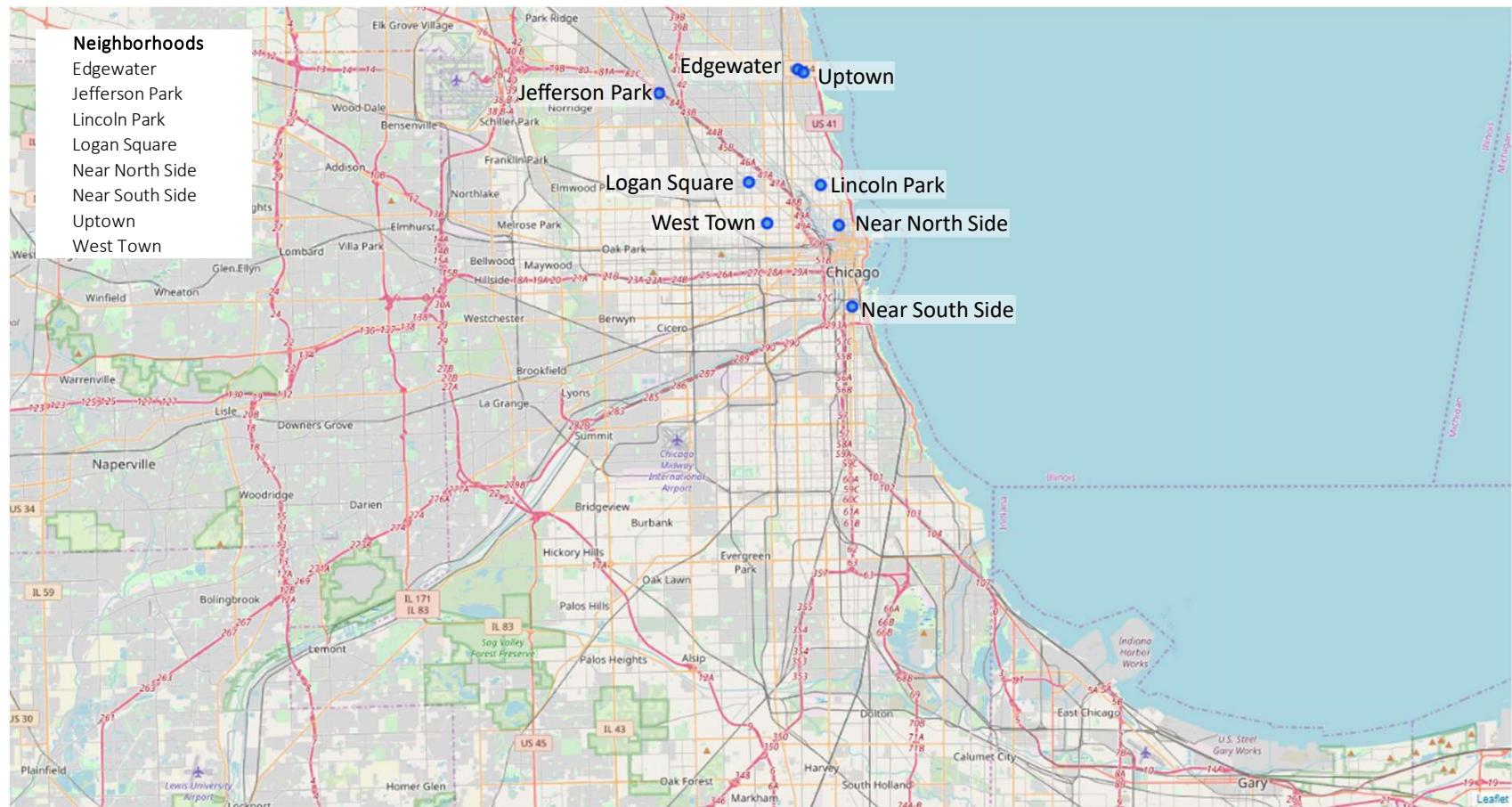
# Results – Philadelphia Neighborhoods like EV



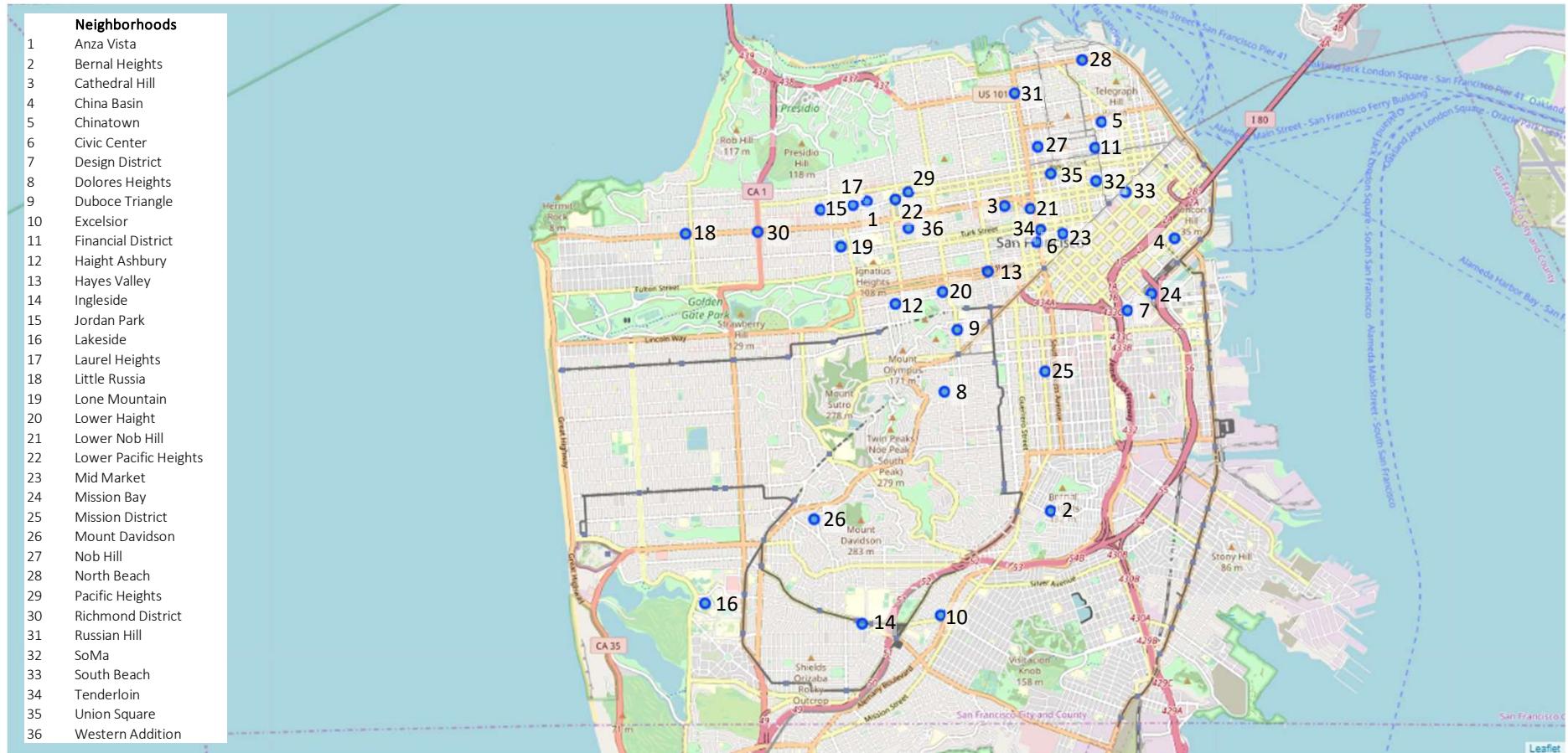
# Results – Boston Neighborhoods like EV



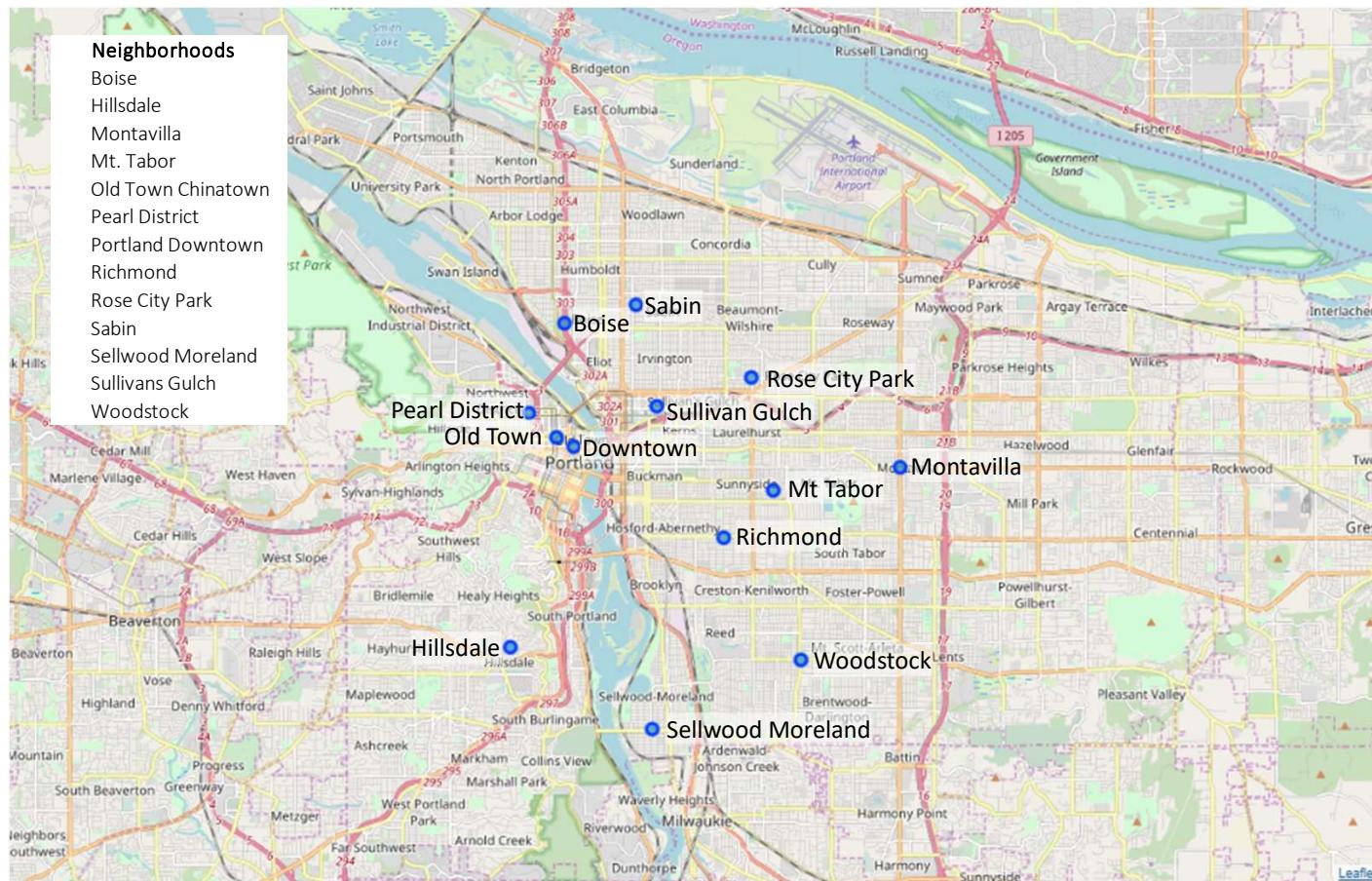
# Results – Chicago Neighborhoods like EV



# Results – San Francisco Neighborhoods like EV



# Results – Portland, OR Neighborhoods like EV



# Conclusions

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- Within the 5 cities on the top 10 public transportation list (San Francisco, Boston, Philadelphia, Chicago and Portland, OR), the method was able to analyze 8,583 venues to predict neighborhoods that are like the East Village in New York City.
- The process came back with 70 neighborhoods for my friend to consider.
- Future considerations:
  - Although 57 venue categories were used, data used from FourSquare might not have translated between the 5 cities since many venue categories were excluded.
  - More data would have been helpful such as age, rent/home costs, and median income. This data was not available, for free, at the granularity that was required.
  - Looking at preference data from FourSquare also could have made a stronger model.