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# IBM Data Science Capstone - Battle of Neighborhoods

## Finding Viable Food Waste Management Center Locations in San Francisco, CA USA

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# Introduction

## The Problem - Food Waste in the U.S.

In the United States, food waste is estimated to be between **30–40 percent of the food supply**.

This loss is due to inefficiency at almost every level of the food retail and production chain and **results in massive losses of money, energy, water, and labor, as well as the food that could be used to feed the hungry**.



# Introduction

## The Problem - Food Waste in the U.S.

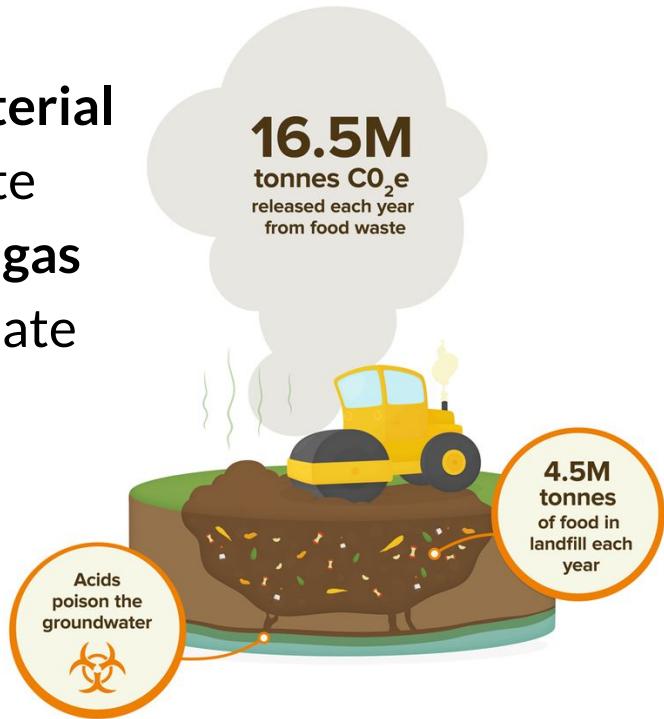
In 2010 alone, based on the USDA's Economic Research Service, 31 percent food loss occurred at the retail and consumer levels, corresponding to approximately **133 billion pounds and \$161 billion worth of food.** (1)



# Introduction

## The Result?

This wasted food is the largest category of material placed in landfills (2) and the rotting food waste contributes a large part to global greenhouse gas emissions resulting in global warming and climate change.



# Introduction

## What can we do?

By more efficiently managing our food supply chains and wasted foods, **we can save money, water, and energy, mitigate climate change, and reduce our impact on the environment, all while feeding more people, reducing poverty, and improving impoverished communities.**





# Let's Talk Food Waste

"Food losses" are inefficiencies that occur before the food reaches the consumer (issues in the production, storage, processing, distribution, etc.) whereas **"food waste" refers to food that is fit for consumption but consciously discarded** at the retail or consumption phases. (3) This report will focus primarily on food waste.

## Sources of Food Waste:

- **Residential** (Homes, apartments, dwellings): Primarily rotten food and kitchen scraps
- **Restaurant-based** (Restaurants, cafes): Primarily rotten food and kitchen scraps
- **Retail-based** (Supermarkets, convenience stores): Primarily foods that are still viable for consumption, but near expiration date (which are mostly arbitrarily set)



# Food Waste Solutions

## Commonly Employed Solutions of Food Waste:

- **Composting** to create fertilizer (On-site and/or mass composting via composting centers)
- **Anaerobic digestion**, which uses microorganisms to break down biodegradable material as opposed to dumping in landfills
- Using the food waste to **create animal feed**
- Recycling the food waste to use in creation of **bio-fuels**
- **Selling still-viable food** (fruits, vegetables, canned goods) to lower income people at a heavily discounted price or **giving it away to homeless**
- **Selling cooked/prepared food** made from no-cost, still-viable food waste at low-cost

# The All-In-One Solution: Food Waste Management Centers

At present, the US is not doing nearly enough to manage food waste.

The optimal solution would be for individuals and companies to self-regulate their own waste, but this is a slow process that requires education and a cultural shift to more conscientious waste management practices.



### Tip

Don't wait till the end of the presentation to give the bottom line.

Reveal your product or idea (in this case a translation app) up front.



Rather than trying to educate every individual and immediately enact change across business, if we were able to **centralize the food waste**, a few experts and specialists could manage the various types of food waste much more effectively and efficiently.

**Food Waste Management Centers** could be placed throughout our most populated cities in the areas where the most food waste is created.



# Let's Talk Food Waste

"Food losses" are inefficiencies that occur before the food reaches the consumer (issues in the production, storage, processing, distribution, etc.) whereas "**food waste**" refers to food that is fit for consumption but consciously discarded at the retail or consumption phases. (3) This report will focus primarily on food waste.

## Sources of Food Waste:

Highlight what's new, unusual, or surprising.

### → Emotional

Give people a reason to care.

### → Simple

Provide a simple unifying message for what is to come

# FWMC Within the Community

These centers can become integral parts of the community: **supporting the lower income people and homeless** with discount food, **reducing food waste volume** which will maintain a **cleaner neighborhood**, educating the community in reducing food waste, and **reducing the waste disposal costs** to businesses.



Analysis to be Performed:  
**Selecting Food Waste  
Management Center (FWMC)  
Locations**

# FWMC Functions

Let's assume our FWMC will...

- **Receive shipments** of food waste from all nearby restaurants, supermarkets, residents, and food-service businesses.
- **Sell viable fresh food** such as fruits and vegetables at a discount.
- **Sell lunch boxes** made from recovered food at low-cost.
- **Package the rotting/unusable food** scraps for shipping to a composting center or biofuel production facility.
- **Work with and educate the community** on food waste reduction



## FOOD WASTE

### RECYCLING

YES SÍ



NO



**CRSR**

environmental services

800.826.9677

The force of a greener generation

# FWMC Functions

## What kind of location is optimal?

A FWMC needs to be placed in a location optimized to:

- Receive shipments from each restaurant and business in the area.
- Sell discounted food (both prepared and fresh) to the community.
- Be convenient to easily drop off food waste.
- Work well with the community.

### In short...

It needs to be placed in a central location where people and restaurants are!



In this analysis, I plan to determine optimal locations for a Food Waste Management Center (FWMC) within the city of **San Francisco, California, USA.**



# Why San Francisco, California?

California has the most densely populated cities in the USA, with San Francisco and Los Angeles having the densest populations in the country.

Because of the extremely high population density, food waste is concentrated into small areas, meaning more food waste in a small area; lower transportation costs, easier movement of food waste.



# Why San Francisco, California?

Also a state that is very green and environmentally conscious.

This means people are more likely to welcome a food waste management center.

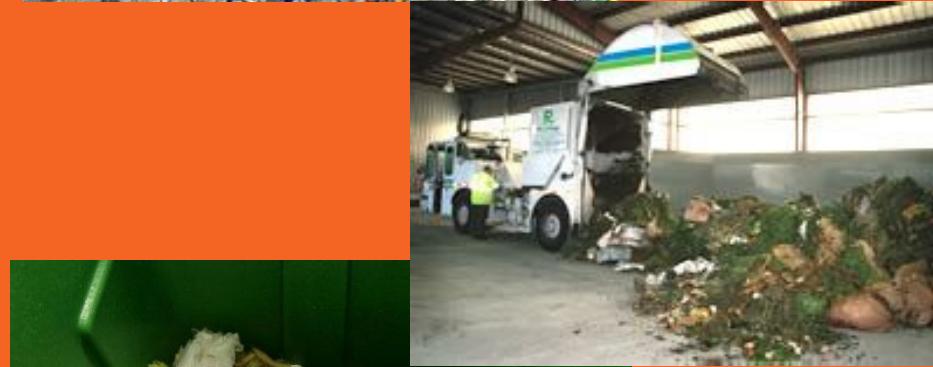


# Why San Francisco, California?

In California, food waste totals about **100 billion pounds per year**, and **40% of all food is thrown away** or plowed over in farms.

**5 billion pounds of prepared food from restaurants is also wasted.** (4)

Despite this, in California millions of people are hungry. Service organizations often want access to this wasted food, but there are some factors preventing it:



# Factors preventing service organizations from accessing wasted food:

- Not knowing **where** excess food is
- Not having **credentials** to show their legitimacy
- Lacking resources to get excess food

By implementing food management centers, we could attack all 3 of these problems in one centralized location.





# Who cares?

The **target audience** for this project is any government entity like the Environmental Protection Agency, the U.S. Department of Agriculture, or any business entrepreneur that may be looking to capitalize on food waste as an untapped resource.

## Potential Benefits of a FWMC:

- Both state and local government entities can incorporate food waste prevention and education campaigns as part of a **city-wide community development** effort.
- Having a centralized Food Waste Management Center means easier management and **collection of waste data**.
- **Cost reductions across the entire spectrum of waste management** (garbage collection decreases, less landfill space used, etc)
- Potential profitability in **sales of composted fertilizer**.
- Potential profitability in **sales of food** made from donated no-cost ingredients.
- Potential profitability in **sales to facilities producing biofuels**.



# Data Sources

## Required Data and Data Sources

- **Wikipedia: San Francisco, CA location data**

We will need to scrape data about the city of San Francisco, California so we can make the appropriate requests to Foursquare for venue data.



# Data Sources

## Required Data and Data Sources

- **Foursquare API: Supermarket, restaurant, food-service data**

In order to properly perform this analysis, we need to locate the high food waste production areas of San Francisco, CA. This can be done using the FourSquare API to find **high-density areas of restaurants, cafes, and supermarkets.**

We will assume for our analysis that areas with high densities of restaurants, cafes, and supermarkets are also commonly residential areas.

# - Methodology

1

First, we will **scrape the necessary location data** of San Francisco, California from the web using the JSON and BeautifulSoup Python packages. The data will be stored in a Pandas dataframe and visualized using Folium and Matplotlib.

2

Next, we will make the necessary requests for **venue information from the Foursquare API**. The data will be cleaned, stored, and sorted. We will need to group the venues into groups based on location (in our case, neighborhoods). Again, we will visualize the data using Folium.

# - Methodology

3

Next, we will use the **K-Means clustering algorithm** to cluster the neighborhoods to determine which are the high-density food waste producer neighborhoods.

4

Based on our K-Means clustering analysis, we will **examine and determine the best neighborhood** for a Food Waste Management Center.



# Data Collection: Neighborhoods, Geo-coordinates, and Venue Data

# Neighborhood and Geocoordinates

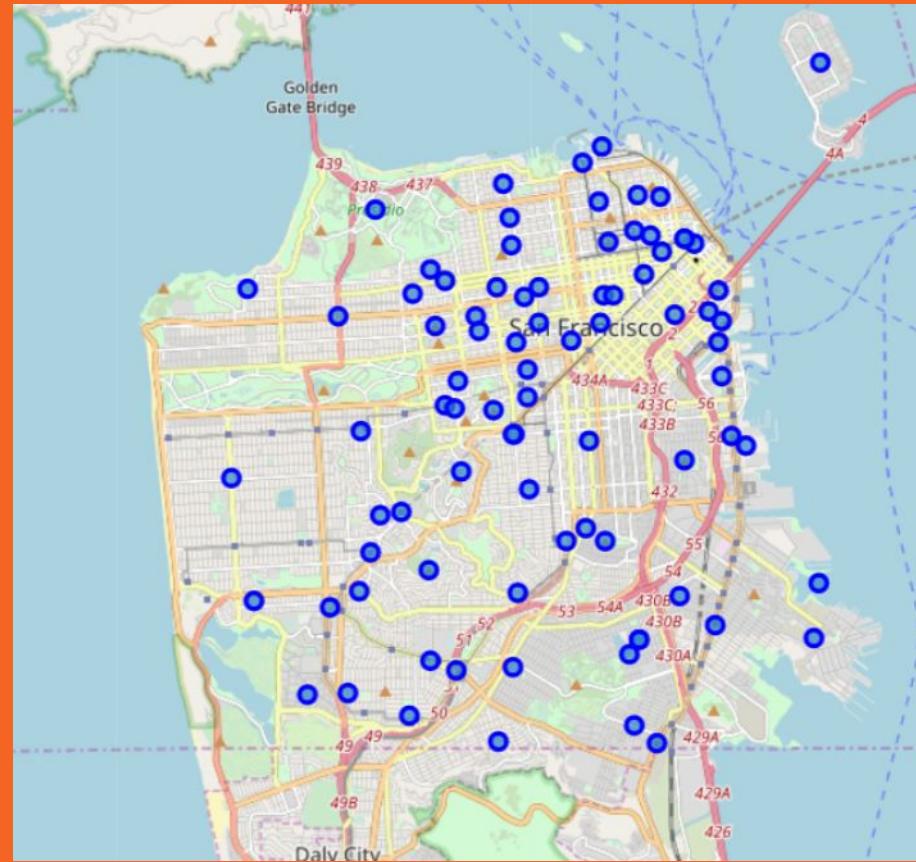
A list of neighborhoods was scraped from Wikipedia.

Using the Geocoder package, a dataframe of neighborhoods and their respective latitude and longitude coordinates was found.

	Neighborhood	Latitude	Longitude
0	Alamo Square	37.776360	-122.434689
1	Anza Vista	37.780836	-122.443149
2	Balboa Park	37.721427	-122.447547
3	Bayview	37.728889	-122.392500
4	Belden Place	37.791744	-122.403886
5	Bernal Heights	37.742986	-122.415804
6	Buena Vista	37.806532	-122.420648
7	Castro	37.760856	-122.434957
8	China Basin	37.776330	-122.391839
9	Chinatown	37.794301	-122.406376
10	Civic Center	37.779594	-122.416794
11	Cole Valley	37.765813	-122.449962
12	Corona Heights	37.764886	-122.439368
13	Cow Hollow	37.797262	-122.436248
14	Crocker-Amazon	37.709378	-122.438587
15	Dogpatch	37.760698	-122.389202
16	Dolores Heights	37.743038	-122.424248
17	Duboce Triangle	37.767138	-122.432230
18	Embarcadero	37.792864	-122.396912
19	Eureka Valley	37.760956	-122.435509
20	Excelsior	37.721794	-122.435382
21	Fillmore	37.784083	-122.433085
22	Financial District	37.793647	-122.398938
23	Financial District South	37.793647	-122.398938
24	Fisherman's Wharf	37.809167	-122.416599
25	Forest Hill	37.747431	-122.463583
26	Glen Park	37.734281	-122.434470
27	Haight-Ashbury	37.770015	-122.446952
28	Hayes Valley	37.776685	-122.422936
29	Hunters Point	37.726771	-122.371572

# San Francisco Neighborhoods: Visualized

The locations of each coordinate latitude/longitude pair were mapped onto a map of San Francisco. These are the neighborhoods to be clustered.



# Foursquare Venue Data

For each latitude/longitude pair,  
all venues within a 200m radius  
were requested and stored in a  
dataframe.



# Foursquare Venue Data

For the 5,536 venues found, there were 357 unique categories.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Alamo Square	37.77636	-122.434689	Alamo Square	37.776045	-122.434363	Park
1	Alamo Square	37.77636	-122.434689	Alamo Square Dog Park	37.775878	-122.435740	Dog Run
2	Alamo Square	37.77636	-122.434689	Painted Ladies	37.776120	-122.433389	Historic Site
3	Alamo Square	37.77636	-122.434689	The Independent	37.775573	-122.437835	Rock Club
4	Alamo Square	37.77636	-122.434689	The Mill	37.776425	-122.437970	Bakery
5	Alamo Square	37.77636	-122.434689	Fool's Errand	37.775512	-122.437961	Bar
6	Alamo Square	37.77636	-122.434689	Bar Crudo	37.775707	-122.438019	Seafood Restaurant
7	Alamo Square	37.77636	-122.434689	Nopa	37.774971	-122.437716	New American Restaurant
8	Alamo Square	37.77636	-122.434689	Rare Device	37.775052	-122.437762	Gift Shop
9	Alamo Square	37.77636	-122.434689	4505 Burgers & BBQ	37.776125	-122.438142	BBQ Joint
10	Alamo Square	37.77636	-122.434689	Bi-Rite Market	37.774796	-122.437739	Market
11	Alamo Square	37.77636	-122.434689	Bi-Rite Creamery	37.774735	-122.437689	Ice Cream Shop
12	Alamo Square	37.77636	-122.434689	Topo Designs	37.775674	-122.438006	Boutique
13	Alamo Square	37.77636	-122.434689	Souvla	37.774577	-122.437809	Souvlaki Shop
14	Alamo Square	37.77636	-122.434689	Boba Guys	37.777440	-122.438191	Bubble Tea Shop
15	Alamo Square	37.77636	-122.434689	Little Star Pizza	37.777489	-122.438281	Pizza Place
16	Alamo Square	37.77636	-122.434689	Horsefeather	37.774516	-122.437678	Cocktail Bar
17	Alamo Square	37.77636	-122.434689	jū-ni	37.776743	-122.438770	Sushi Restaurant
18	Alamo Square	37.77636	-122.434689	Originals Vinyl	37.775835	-122.431227	Record Shop
19	Alamo Square	37.77636	-122.434689	Divisadero Farmers' Market	37.775935	-122.438368	Farmers Market

# Mathematical Analysis: One Hot Encoding, Silhouette Score, and K-Means Clustering

Using one hot encoding, the top venue types for each neighborhood were calculated.

## Top Venues

### ----Alamo Square----

	Venue	Freq
0	Bar	0.05
1	Coffee Shop	0.04
2	Record Shop	0.04
3	Sushi Restaurant	0.04
4	Dive Bar	0.03

### ----Anza Vista----

	Venue	Freq
0	Café	0.07
1	Health & Beauty Service	0.05
2	Grocery Store	0.05
3	Sandwich Place	0.05
4	Bar	0.05

## Top Venues

### ----Balboa Park----

	Venue	Freq
0	Juice Bar	0.06
1	Asian Restaurant	0.06
2	College Cafeteria	0.06
3	College Gym	0.06
4	Flower Shop	0.06

### ----Bayview----

	Venue	Freq
0	Bakery	0.09
1	Light Rail Station	0.09
2	Southern / Soul Food Restaurant	0.09
3	Grocery Store	0.09
4	Home Service	0.05

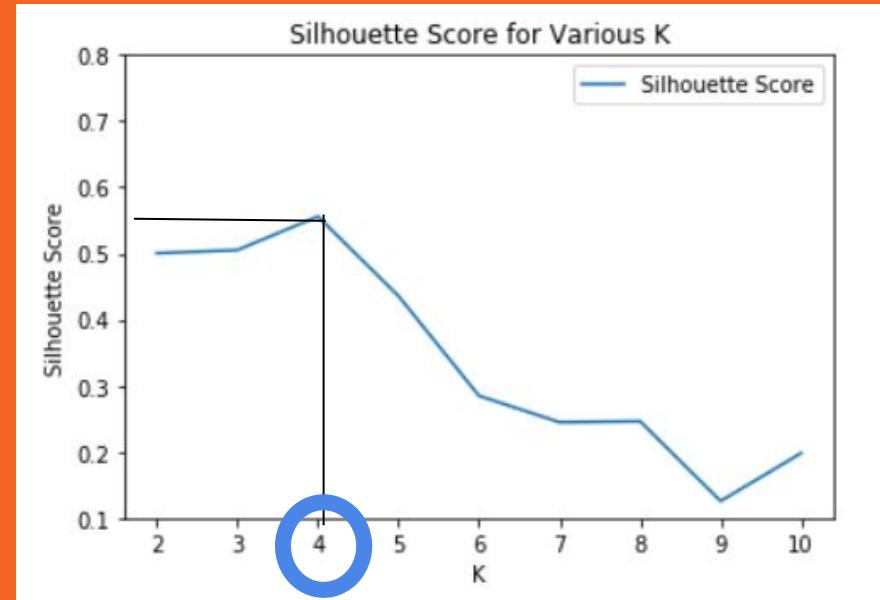
All neighborhoods' top-10 venue types were stored in a dataframe to be used in our clustering analysis.



	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Alamo Square	Bar	Coffee Shop	Sushi Restaurant	Record Shop	Pizza Place
1	Anza Vista	Café	Grocery Store	Liquor Store	Sandwich Place	Health & Beauty Service
2	Balboa Park	Gas Station	Light Rail Station	Public Art	Poke Place	College Gym
3	Bayview	Bakery	Light Rail Station	Southern / Soul Food Restaurant	Grocery Store	Garden
4	Belden Place	Coffee Shop	Gym	French Restaurant	Sushi Restaurant	Men's Store
5	Bernal Heights	Coffee Shop	Mexican Restaurant	Park	Cocktail Bar	Playground
6	Buena Vista	Seafood Restaurant	Park	Historic Site	Ice Cream Shop	Chocolate Shop
7	Castro	Gay Bar	Coffee Shop	Thai Restaurant	New American Restaurant	Juice Bar
8	China Basin	Baseball Stadium	Coffee Shop	New American Restaurant	Wine Bar	Athletics & Sports
9	Chinatown	Coffee Shop	Chinese Restaurant	Bakery	Men's Store	New American Restaurant

## Using the Silhouette Method to determine K for K-Means

The silhouette value measures how similar a point is to its own cluster compared to other clusters. The range of the Silhouette value is between +1 and -1. A high value is desirable and indicates that the point is placed in the correct cluster. If many points have a negative Silhouette value, it may indicate that we have created too many or too few clusters. (5)

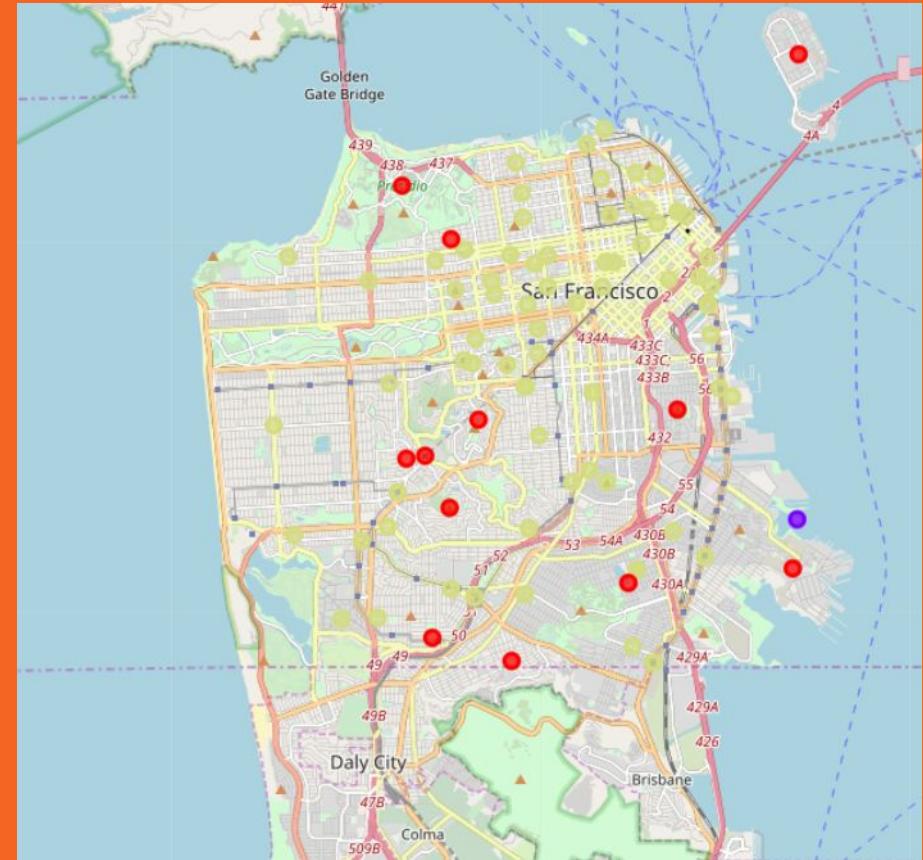


	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Alamo Square	37.776360	-122.434689	3	Bar	Coffee Shop	Sushi Restaurant	Record Shop	Pizza Place
1	Anza Vista	37.780836	-122.443149	3	Café	Grocery Store	Liquor Store	Sandwich Place	Health & Beauty Service
2	Balboa Park	37.721427	-122.447547	3	Gas Station	Light Rail Station	Public Art	Poke Place	College Gym
3	Bayview	37.728889	-122.392500	3	Bakery	Light Rail Station	Southern / Soul Food Restaurant	Grocery Store	Garden
4	Belden Place	37.791744	-122.403886	3	Coffee Shop	Gym	French Restaurant	Sushi Restaurant	Men's Store
5	Bernal Heights	37.742986	-122.415804	3	Coffee Shop	Mexican Restaurant	Park	Cocktail Bar	Playground
6	Buena Vista	37.806532	-122.420648	3	Seafood Restaurant	Park	Historic Site	Ice Cream Shop	Chocolate Shop
7	Castro	37.760856	-122.434957	3	Gay Bar	Coffee Shop	Thai Restaurant	New American Restaurant	Juice Bar
8	China Basin	37.776330	-122.391839	3	Baseball Stadium	Coffee Shop	New American Restaurant	Wine Bar	Athletics & Sports
9	Chinatown	37.794301	-122.406376	3	Coffee Shop	Chinese Restaurant	Bakery	Men's Store	New American Restaurant

Using a K of 4, and a Randomization State of 1, the machine learning algorithm grouped each neighborhood into one of 4 categories.

# San Francisco Neighborhoods: Clustered

By coloring the neighborhood coordinates, we can group each neighborhood into a category. But to determine why each neighborhood fits into a category we need to examine the venues in each category.



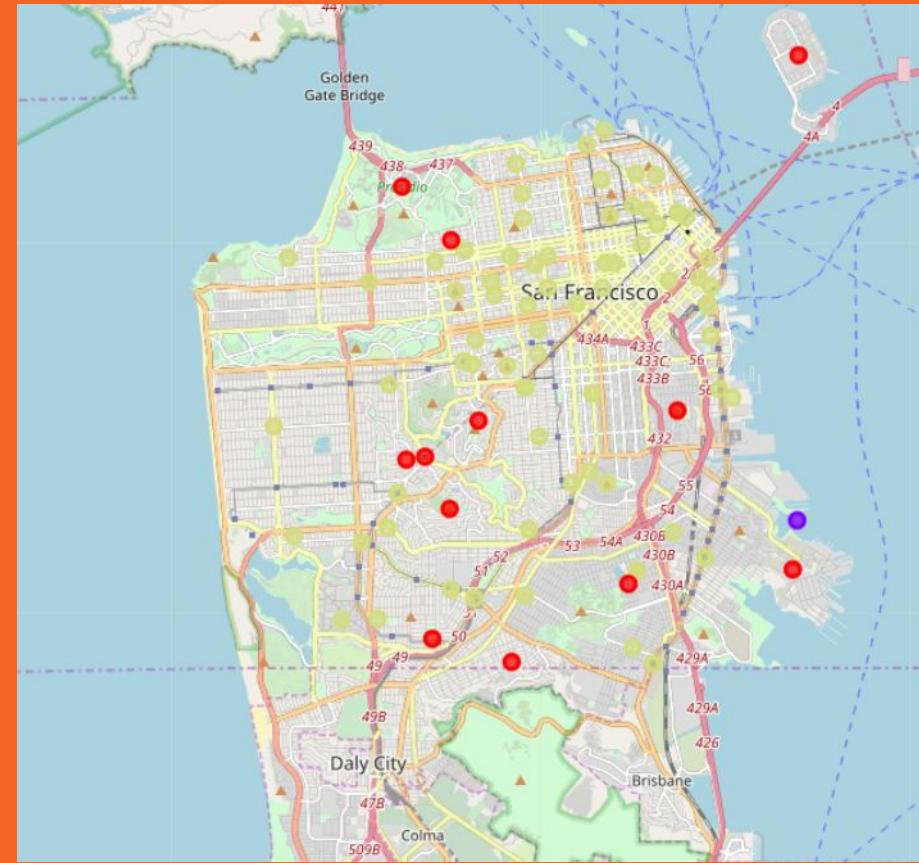
# Analysis: One Hot Encoding, Silhouette Score, and K-Means Clustering

# Visual Analysis

Unfortunately, by examination of the K-Means clustering results, we can see that there is little variety of venue types in San Francisco. Most neighborhoods fall into the same category (yellow circles)

This means that San Francisco's business types are relatively evenly spread out across the city.

Let's examine what variation there is and whether each cluster would be suitable for a FWMC.



# Neighborhood Cluster 1 (Yellow)

**FWMC Viability: Excellent. These are the areas of highest food waste production.**

These areas were the areas most highly populated by restaurants, and therefore by people. We can see that these neighborhoods by FAR contain the most restaurants, bars, cafes, and other food services. Because San Francisco is so densely packed, there are other businesses, services, and tourist spots dotting the area, restaurants and living space dominate these areas.

	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
0	Alamo Square	Bar	Coffee Shop	Sushi Restaurant	Record Shop	Pizza Place	Dive Bar	Boutique
1	Anza Vista	Café	Grocery Store	Liquor Store	Sandwich Place	Health & Beauty Service	Bar	Coffee Shop
2	Balboa Park	Gas Station	Light Rail Station	Public Art	Poke Place	College Gym	College Cafeteria	Coffee Shop
3	Bayview	Bakery	Light Rail Station	Southern / Soul Food Restaurant	Grocery Store	Garden	Food Truck	Mexican Restaurant
4	Belden Place	Coffee Shop	Gym	French Restaurant	Sushi Restaurant	Men's Store	Japanese Restaurant	Tea Room
5	Bernal Heights	Coffee Shop	Mexican Restaurant	Park	Cocktail Bar	Playground	Italian Restaurant	Yoga Studio
6	Buena Vista	Seafood Restaurant	Park	Historic Site	Ice Cream Shop	Chocolate Shop	Boat or Ferry	Bike Rental / Bike Share
7	Castro	Gay Bar	Coffee Shop	Thai Restaurant	New American Restaurant	Juice Bar	Pet Store	Gym
8	China Basin	Baseball Stadium	Coffee Shop	New American Restaurant	Wine Bar	Athletics & Sports	Gym / Fitness Center	Bar
9	Chinatown	Coffee Shop	Chinese Restaurant	Bakery	Men's Store	New American Restaurant	Dive Bar	Tea Room
10	Civic Center	Vietnamese Restaurant	Coffee Shop	Beer Bar	Theater	Performing Arts Venue	Marijuana Dispensary	Cocktail Bar

# Neighborhood Cluster 2 (Red)

**FWMC Viability: Average. Some restaurants, but not enough to be called a "high density" area. Parks and outdoor recreation means most likely NOT good areas for FWMCs.**

We can see this cluster is composed mainly of outdoors areas: parks, playgrounds, trees, hills, baseball fields, fields, and zoos. There are some cafes and restaurants sprinkled through the area, signifying that these are probably areas where people come to socialize.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
14	Crocker-Amazon	Bus Stop	Dog Run	Gastropub	Playground	Scenic Lookout
25	Forest Hill	Park	Hotpot Restaurant	Japanese Restaurant	French Restaurant	Playground
29	Hunters Point	Art Gallery	Recording Studio	Harbor / Marina	Grocery Store	Spa
37	Laguna Honda	Park	Hotpot Restaurant	Playground	Trail	French Restaurant
52	Mount Davidson	Bus Stop	Park	Mountain	Monument / Landmark	Tree
57	Oceanview	Playground	Intersection	Thai Restaurant	Liquor Store	Coffee Shop
65	Potrero Hill	Park	Deli / Bodega	Hill	Cosmetics Shop	Coffee Shop
66	Presidio	Food Truck	Asian Restaurant	Playground	Mexican Restaurant	Outdoor Sculpture
67	Presidio Heights	Park	American Restaurant	Playground	Cosmetics Shop	Baseball Field
78	Sunnyside	Park	Restaurant	Sandwich Place	Optical Shop	Bookstore
82	Treasure Island	Food Truck	Park	Athletics & Sports	Music Venue	Baseball Field
83	Twin Peaks	Trail	Scenic Lookout	Garden	Bus Station	Speakeasy
85	University Mound	Recreation Center	Shopping Mall	Playground	Library	Baseball Field

# Neighborhood Cluster 3 (Purple)

**FWMC Viability: Below-Average.**  
**Some food waste production, but mostly a tourist area.**

India Basin was singled out and can probably be counted as an outlier.

This neighborhood is a high-tourist area. It consists of a mix of event and tourist-oriented activity spaces. There are some restaurants in the area. It was most likely singled out because of this. Most likely an outlier that doesn't need to be considered in this analysis.

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	
30	India Basin	Park	Home Service	Food	Eye Doctor	Farmers Market	Fast Food Restaurant	Field	Filipino Restaurant

# Neighborhood Cluster 4

**FWMC Viability: Average.** Restaurants of any kind are a good sign of food waste production, but are too few.

Another outlier, this one neighborhood was most likely singled out because it is mostly a residential neighborhood with few venues.

Vista del Mar is a coastal, mostly-residential area with some restaurants and shops to serve the beach-goers. An average to low food waste would be created from this kind of area. It could potentially be grouped together with Cluster 1.

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
87 Vista del Mar	Event Service	BBQ Joint	Soccer Stadium	Flower Shop	Eye Doctor	Farmers Market	Fast Food Restaurant

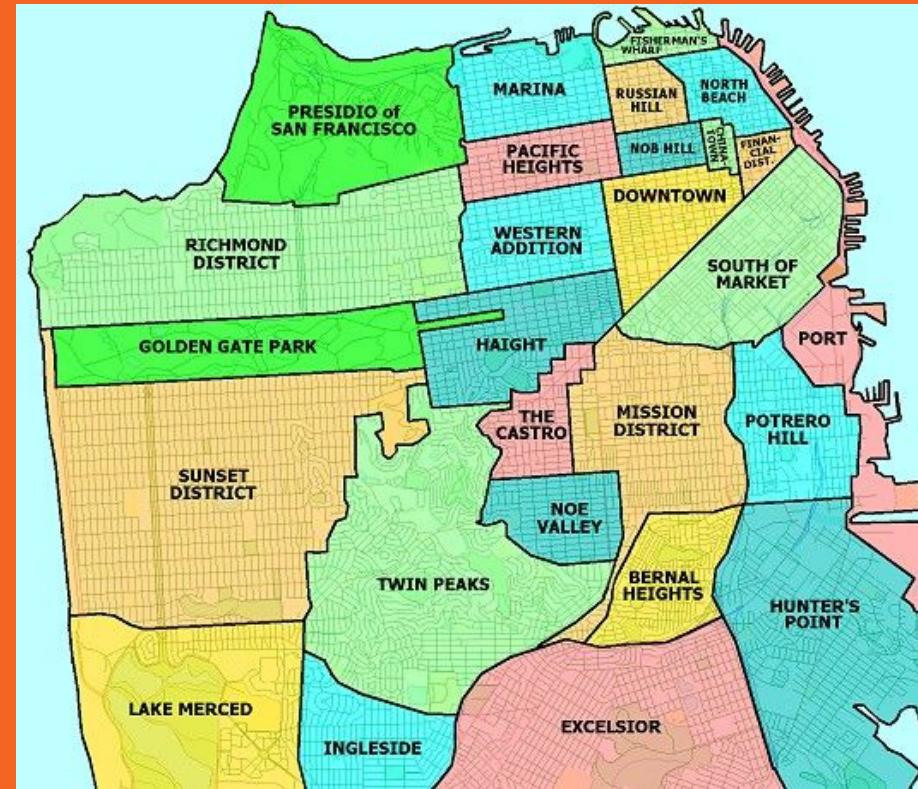
# **Conclusion and Recommendations: North-Eastern Financial District or Mission District**

# Analysis Conclusion

San Francisco is relatively uniform in its food waste producer density.

Restaurants and living space are both spread across the entire city.

High-food-waste-production areas were identified, but to further narrow down our options, the next factor to examine would be the population density.





# Assumptions:

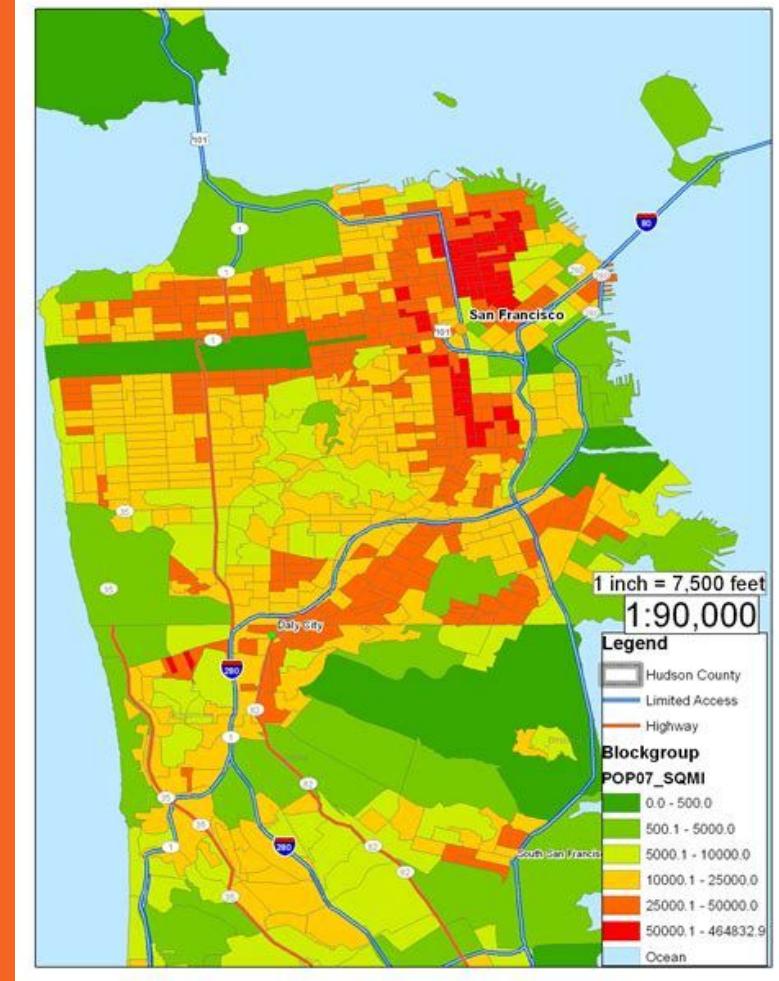
Note that some broad assumptions need to be made in our analysis:

- **Land in San Francisco is of equal value in any neighborhood.**  
San Francisco is one of the most expensive cities in America. In practice, it would most likely not be realistic to place a large food waste management center within the city limits.
- Without a proper cost-benefit analysis, we cannot know whether a food waste management center could actually produce profit. But with a large low-income and homeless population, the societal benefits could be profound.

# San Francisco: Population Density

The highest population densities:

- North-eastern corner; the financial districts and downtown area. Highly populated with high-rise apartment buildings and flush with restaurants to support the financial businesses.
- Second to this would be the Mission Districts, shown in the darkest red.



# Recommendation: **North-Eastern Downtown Region**

Based on our analysis, the most optimal location for a Food Waste Management Center (FWMC) would be in the north-eastern neighborhoods of San Francisco. They present excellent locations based on the following:

- This area is the most heavily populated, having an extremely high number of people, restaurants, and businesses.
- Lies along the Highway 101, a primary artery in and out of San Francisco, meaning that any transportation of food waste in and out of the city to possible composting/animal feed production facilities would be facilitated.
- Homeless and low-income areas exist in these areas and an FWMC would be best suited to assist the local communities.

# Secondary Recommendation: Mission District

Based on our analysis and population density, we can see that another good choice for a Food Waste Management Center would be the mission district:

- Has a very high population and high density of restaurants.
- The Mission district is not nearly as populated by high-rise buildings of the financial district, meaning securing space would be cheaper and more viable.
- Also has easy access to the main 101 highway.



# Thank you!

Thank you for viewing my project, and thank you to IBM and the teachers/staff for your informative course. I enjoyed it immensely and learned a lot. I look forward to using this knowledge in my future work.  
-EB



# This Project Around the Web

**This report and presentation can be found around the web at the following links:**

Report:

<https://docs.google.com/document/d/1O--SM4SMb6uCQYVVulrAyM7nRB1JhJPQQUvwURnt3k/edit?usp=sharing>

Presentation:

<https://docs.google.com/presentation/d/1zmBikl6vjaCyr7OqsK90qvDrEPHJvbeKRZVdEmSogh4/edit?usp=sharing>

# This Project Around the Web

**This project and code can be found around the web at the following links:**

IBM Watson Studio:

[https://jp-tok.dataplatform.cloud.ibm.com/analytics/notebooks/v2/cc31f32a-f0ad-43e4-a474-79f89ad0d697/view?access\\_token=7c49bbc42946e777c1a62d552c1ec7a420a235e0dcff5e74abfea2f27c3d35e2](https://jp-tok.dataplatform.cloud.ibm.com/analytics/notebooks/v2/cc31f32a-f0ad-43e4-a474-79f89ad0d697/view?access_token=7c49bbc42946e777c1a62d552c1ec7a420a235e0dcff5e74abfea2f27c3d35e2)

Github:

[https://github.com/Glitch852/Coursera\\_Capstone/blob/master/IBM%20Data%20Science%20Capstone%20-%20Final.ipynb](https://github.com/Glitch852/Coursera_Capstone/blob/master/IBM%20Data%20Science%20Capstone%20-%20Final.ipynb)

# References

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<https://www.fda.gov/food/consumers/food-waste-and-loss>
- 2) Jean C. Buzby, Hodan F. Wells, and Jeffrey Hyman (United States Department of Agriculture), "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States", [https://www.ers.usda.gov/webdocs/publications/43833/43680\\_eib121.pdf](https://www.ers.usda.gov/webdocs/publications/43833/43680_eib121.pdf)
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<https://www.hsph.harvard.edu/nutritionsource/sustainability/food-waste/>
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