

# Capstone Project - The Battle of Neighborhoods (Week 2): Analyzing grocery store presence and accessibility in San Francisco's Outer Richmond Neighborhood

## A. Introduction

### A.1. Description & Discussion of the Background

## Introduction

San Francisco is located along Northern California's majestic coastline and inhabited by an economically and culturally diverse population. A relatively small city with a population of about 884,000, San Francisco is roughly 7 miles x 7 miles and largely walkable. That is, if you don't mind climbing hills. The City's 37 neighborhoods are uniquely distinct, and the presence or absence of basic services such as public transportation and grocery stores can have enormous impacts on the living experiences and sense of community among local residents. As the cost of living in the city has skyrocketed over the last decade there has been an exodus of local residents and shops, and many neighborhoods are unrecognizable. The privatization of social experiences (Uber instead of the development of an expansive metro system, grocery delivery apps instead of community grocery stores, etc) has further unraveled the social cohesion and perceived livability of certain neighborhoods.

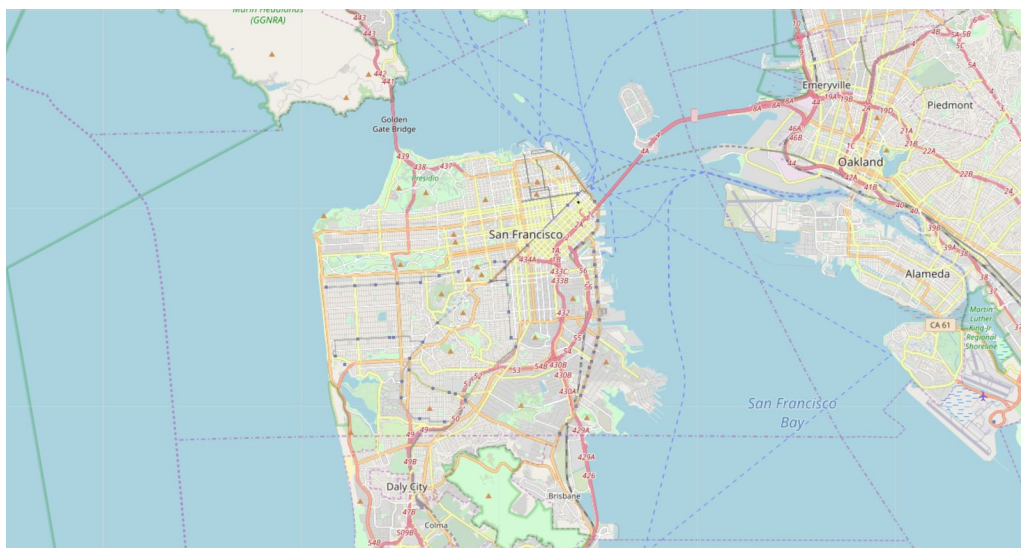


Fig. 1. San Francisco

# Business Problem and Background

Overlooking the beach in the northwest corner of the city, the Outer Richmond neighborhood is known for its views, Asian cuisine, and laid-back feel. While there are many restaurants, grocery stores are few and far between.

A group of neighbors from the Outer Richmond have reached out to their district Representative at City Hall with regard to challenges faced by those without cars who are struggling to regularly reach grocery stores on foot due to steep hills and inconvenient bus routes.

## A.2. Data Description

To deal with this problem, the City has created a task force to study the presence of existing grocery stores, accessibility using public transportation, and surrounding venues.

Note: There is overlap between certain neighborhoods within districts in San Francisco as well as variation depending on source, so for the purpose of this study I will define the parameters of the Outer Richmond neighborhood as within the Richmond District and west of 19th Avenue, a 30 block stretch.

## Description of the data and how it will be used to solve the problem

To approach this problem, I used data from the following sources:

- DataSF: I downloaded and imported SF bus stops location data contained in a csv file using pandas read\_csv() method, from <https://datasf.org>, the city of San Francisco's open data publishing platform. Then I created a folium map to display the location information in the Outer Richmond neighborhood.
- FourSquare API to analyze the presence of existing grocery stores in the Outer Richmond Neighborhood, as well as their ratings, related tips, and surrounding venues.

## B. Methodology

I created this project with a Jupyter Notebook on IBM Watson Studio. First, I used Foursquare to find latitude and longitude coordinates for the Richmond Neighborhood Center, which is centrally located in the Outer Richmond neighborhood. Then I defined a query to search for grocery stores within the parameters of the neighborhood and transformed the relevant venues

into a pandas dataframe with location coordinates. I then defined information of interest and removed 12 rows that were not relevant to the study.

	name	categories	postalCode	lat	lng
0	Safeway	Grocery Store	94121	37.772492	-122.509666
1	Balboa Produce Market	Market	94121	37.775496	-122.497962
2	25th & Clement Produce Market	Grocery Store	94121	37.782069	-122.484907
3	El Grande Produce	Grocery Store	94121	37.782132	-122.483037
4	Richmond Produce Market	Grocery Store	94121	37.780264	-122.478902
5	Grocery Outlet Bargain Market	Grocery Store	94121	53.273000	-7.778320

Because community perceptions of grocery accessibility was important for the study, I used venue IDs to check the Foursquare ratings of each grocery store and added a column with the information.

	name	categories	postalCode	lat	lng	Rating
0	Safeway	Grocery Store	94121	37.772492	-122.509666	5.9
1	Balboa Produce Market	Market	94121	37.775496	-122.497962	Nan
2	25th & Clement Produce Market	Grocery Store	94121	37.782069	-122.484907	7.1
3	El Grande Produce	Grocery Store	94121	37.782132	-122.483037	6.6
4	Richmond Produce Market	Grocery Store	94121	37.780264	-122.478902	6.1
5	Grocery Outlet Bargain Market	Grocery Store	94121	53.273000	-7.778320	7.5

Using folium maps I created a visual of the data frame centered around the Outer Richmond neighborhood. I added a red circle marker to represent the Richmond Neighborhood Center, and the grocery stores as blue circle markers.

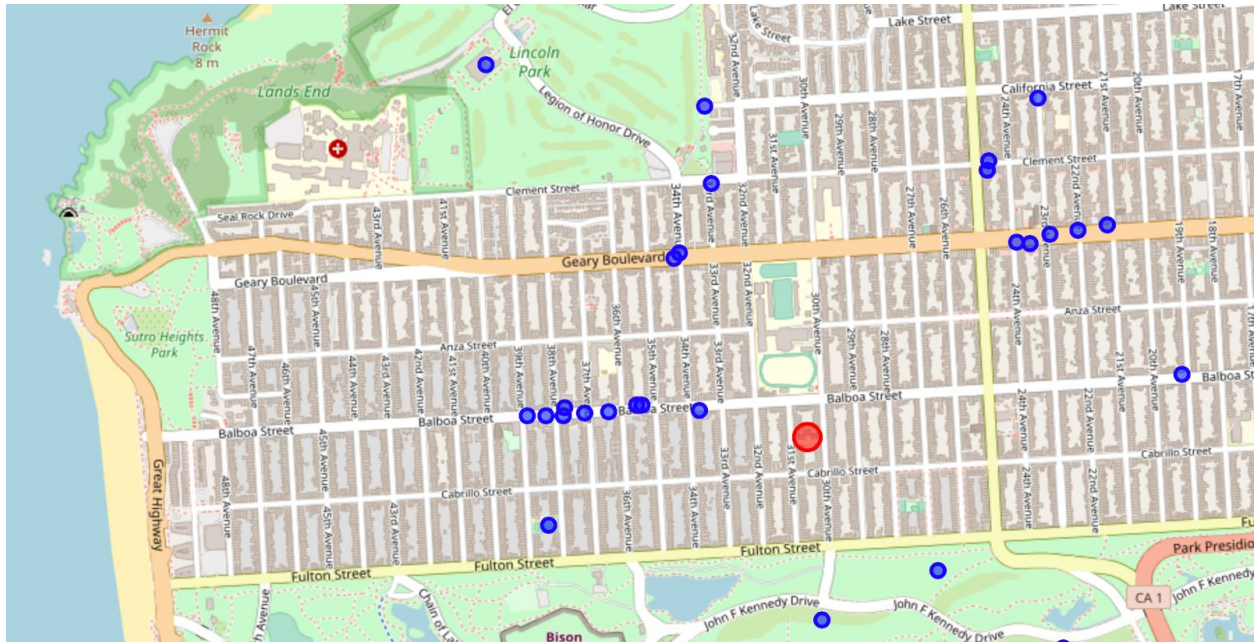








I then explored the location around the Richmond Neighborhood Center, which is located centrally in the neighborhood but not close to any grocery stores. After converting the JSON file to a clean dataframe, I visualized the surrounding venues on the map around Richmond Neighborhood Center (the red dot).



I analyzed the venues that were trending at the time, as this could reveal information about places with the highest foot traffic.

```
In [96]: # display trending venues
trending_venues_df

Out[96]: 'No trending venues are available at the moment!'
```

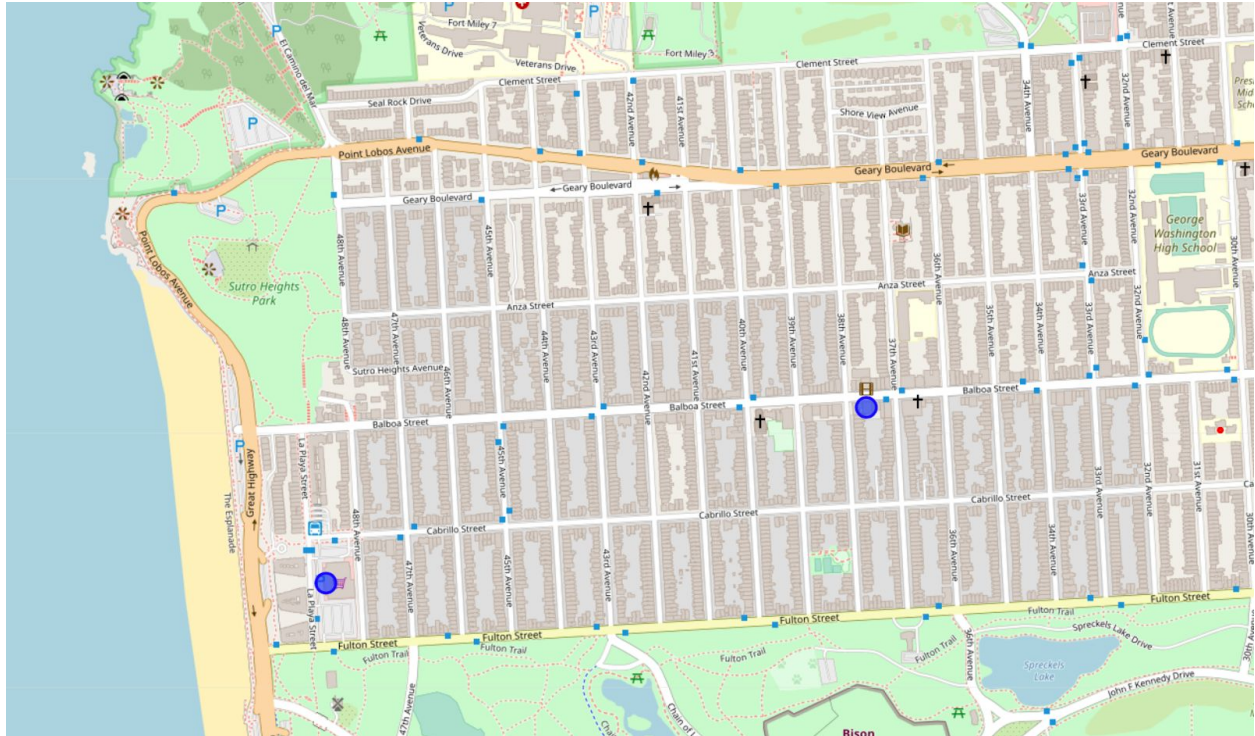
Because trending venues are live on Foursquare, I checked again the next day at different hours.

## C. Results

I identified 6 grocery markets of varying sizes (some quite small) in the Outer Richmond neighborhood. They were: Safeway, Balboa Produce Market, Grocery Outlet Bargain Market, El Grande Produce, Richmond Produce Market, and 25th & Clement Produce Market. The Foursquare ratings for the grocery markets ranged from 5.9 (Safeway) to 7.5 (Grocery Outlet Bargain Market). One market, Balboa Produce Market, didn't have any ratings.

I visualized the grocery stores using a folium map. The northwest corner of the neighborhood (located on top of a hill) was found to have the greatest distance from a grocery store, with some people living up to 11 blocks from a store.





The biggest store in the neighborhood, Safeway located on 48th avenue, had the lowest Foursquare user ratings and a total of 17 tips posted between 2010-2018. The stand-out words visualised in the word cloud were location-centric, including “beach”.

In a different neighborhood, for comparison, I analyzed the tips of Rainbow Grocery, one of San Francisco’s highest rating grocery store (9.3/10). Between 2013-2019 there were 139 Foursquare user tips. The stand-out words visualised in the word cloud were ingredient-specific, including “cheese” and “spices”. Also “meat” was a frequent word, but in this case it was because users were advising that there is “no meat” at this store.

The Outer Richmond neighborhood venues were analyzed. It was found that most were concentrated along the Balboa street corridor and were small restaurants. As the highest foot traffic are fetched live, they are expected to vary depending on time of day. I checked for trending venues at 9 pm and again at 9am. On neither occasion were there trending venues in the area.

The DataSF bus stop location data revealed bus stops from three lines (5, 31, 18) clustered around the largest grocery store, Safeway. These lines run parallel through the southern part of the neighborhood. Residents who live in the northern/ northwest parts of the neighborhood would have to transfer at least once onto a second bus, or walk a significant distance (20 minutes from 45th avenue and Geary Blvd, going downhill).



## **D. Discussion**

San Francisco is a diverse city with a high population density and a lot of venues packed into a relatively small area. Some of the most important venues, including grocery stores, are absent in significant stretches of the city, including the northwestern part of the Outer Richmond neighborhood. There are only six grocery stores (some of which are quite small) serving a neighborhood of roughly 30,000 residents. This demonstrates that Residents don't appear to be particularly fond of the existing stores, as the average review from Foursquare users for these grocery stores was 6.64 / 10.

Data acquired from Foursquare API and DataSF was useful to perform location specific data analysis and visualisation. Recently, there are less tips by Foursquare users as compared to previous years, which likely contributed to the "no live trending venues" results, and lack of reviews at some venues in the neighborhood. I found numerous stores that have closed down but still are listed as open on Foursquare. In order to study community engagement and perceptions of certain venues it might be more revealing to study user data from other sources with more active reviewers, such as NextDoor, Yelp, Facebook, Instagram, or Google.

While there are numerous bus stops in the Outer Richmond neighborhood, and specifically three separate bus lines that serve its largest grocery store, residents who don't have access to a car are hindered by multiple bus transfers (if they don't live directly on a bus line) and or long walks. With groceries in hand, and steep inclines, this can be a challenge. Especially vulnerable are elderly residents and people with small children.

It is surprising that there is no train serving the Richmond District at large. Extending a BART (Bay Area Rapid Transit) train to the Outer Richmond- specifically on Geary all the way to the beach- (even better, all the way to Daly City) - would significantly improve the traveling time, congestion, and grocery store accessibility for neighbors in the northwest part of the city.

## **F. Conclusion**

In conclusion, there are large pockets of the Outer Richmond Neighborhood and the Outer Richmond District in general that are grocery store scarce. While some residents may bypass this challenge by ordering groceries online or driving to other districts or counties to go grocery shopping, the absence of grocery stores disproportionately puts residents who don't have a car or live directly on a bus line at a disadvantage. It also presents significant challenges for more vulnerable groups within the neighborhood, including elderly and families with small children.

More neighborhood grocery stores would not only contribute to the well-being of residents; they would also increase social interactions which might strengthen the community's safety and promote social cohesion.

## G. References

- DataSF: <https://datasf.org>
- Foursquare API