Background

The affordable housing Program in the Boston area is designed to help people with limited incomes find affordable housing. There are many types of housing in the Boston area, and housing prices are not evenly distributed. We hope to use some of the techniques of data science to help the project find more suitable homes for people with limited incomes. In addition, we intend to conduct a summary of complaints about homes in the Boston area.

Motivation

We chose this project because we want to help a certain group of people with low income to find and live in suitable and affordable houses or apartments. Based on our analysis, we hope it would be possible to create a path between affordable housing and qualified tenants. We hope to make some contribution to this project through our efforts.
For the extension part, our group members all have experience renting in the Boston area. We have encountered some problems in our life so we wanted to look into the landlord complaints of houses in the Boston area and the main reasons behind the data.

Data collection

base project:

1. We use three dataset
   BostonAssessorsDataCleaned.csv
   income-restricted-inventory-2021.csv
   boston-neighborhood-data.csv

2. Using google API to get the detailed address for the unit in the income-restricted dataset and then separate the address to get some new attributes. Through the same address to merge BostonAssessorsDataCleaned and income-restricted-inventory-2021

3. We did some “groupby” operations on the data in this dataset according to some fields such as zip code and also divided the dataset into affordable housing and non-affordable housing.

extension project:

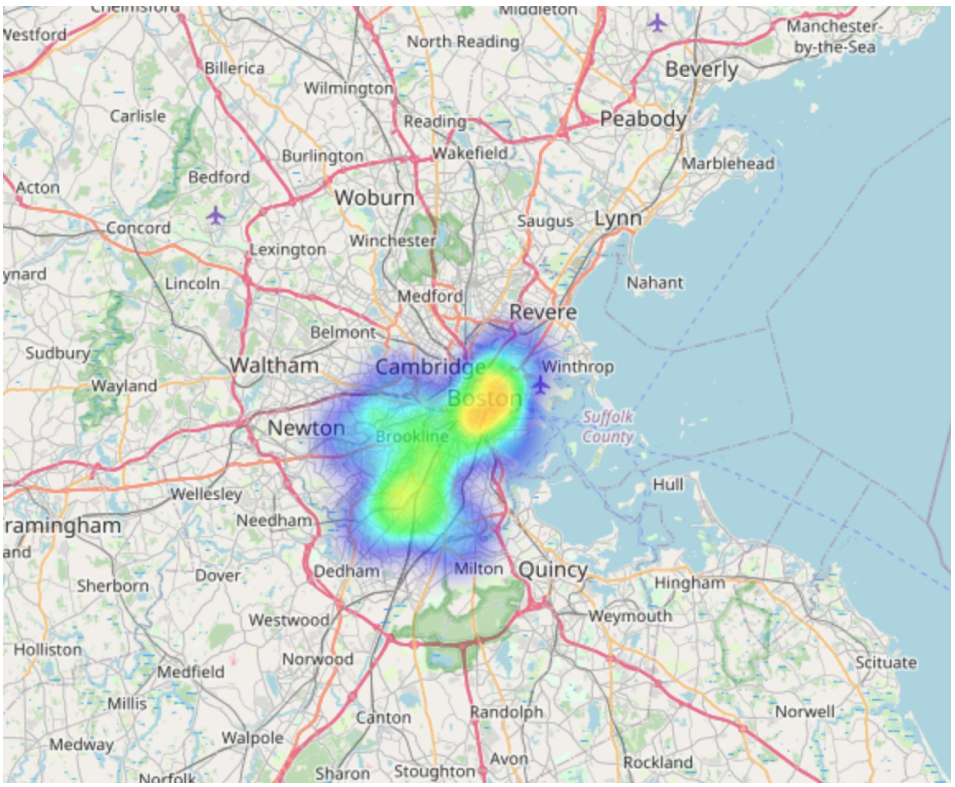
1. We use two datasets which are Problem Properties and Rent Smart.
2. In RentSmart, we use the Address column to merge into our main dataset. (Join on address in the main dataset) In Building And Property Violation dataset, we combine Violation_street and Violation_stno to generate addresses. Like the Rentsmart dataset, we join the combined address with the address in the Problem Properties dataset.
3. Although both datasets have latitude and longitude, we are not going to use them because, in our previous work, we used google API to locate addresses using latitude and longitude. However, Google API failed distinguish the same street name which belongs to different cities.

Data visualization and exploration

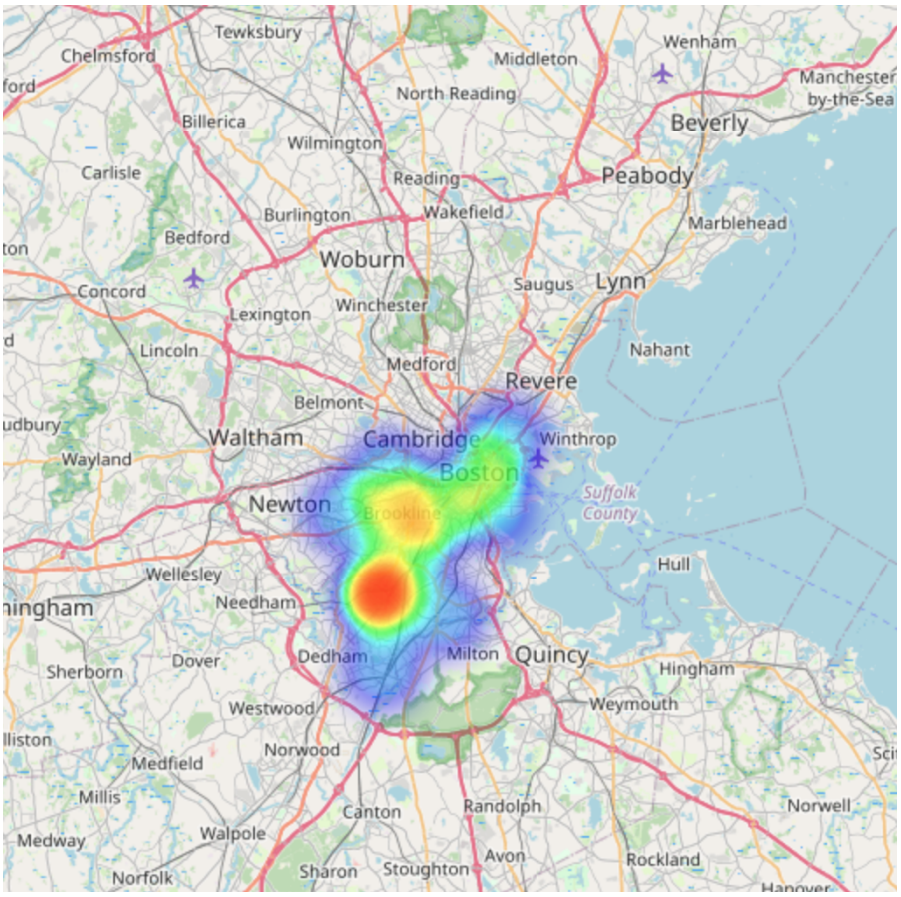
1. **base project:**

	OWNER1	UNITS
0	MILLENNIUM TOWER TRUST	442
1	HARBOR TOWERS 1 CONDO TR	308
2	SOUTH END 10 LLC	273
3	MILLENIUM AVERY CONDOMINIUM TRUST	256
4	ONE CHARLES CONDOMINIUM	233
...	...	...
32391	FRANCOIS CHRISTIAN	0
32392	FRANCOIS CAMILLE	0
32393	FRANCOIS ACHILLE S	0
32394	FRANCO NICHOLAS R	0
32395	ZZI REALTY TRUST	0

Above is a chart of the number of housing landlords in affordable housing in the Boston area.



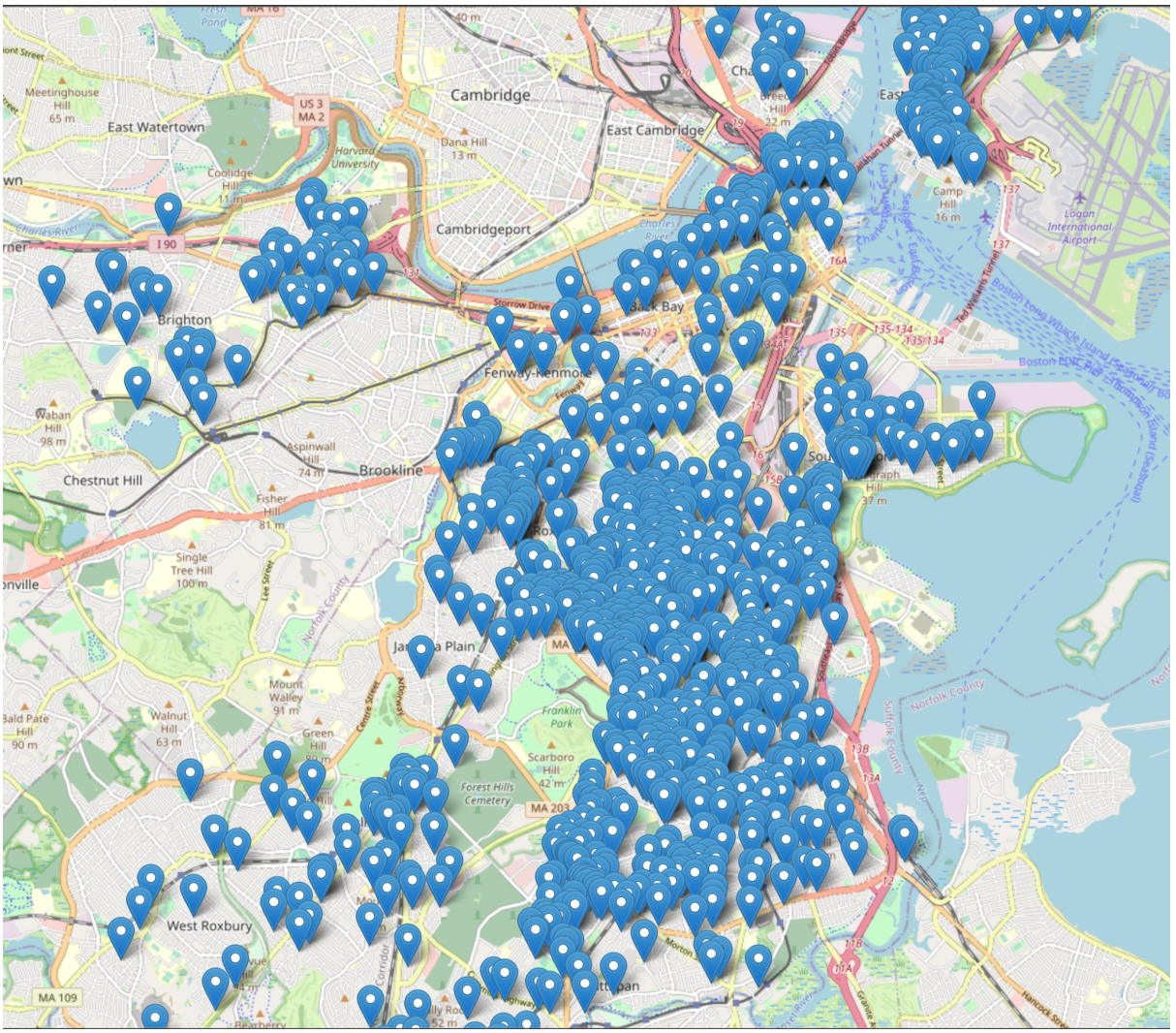
distribution of affordable housing heatmap



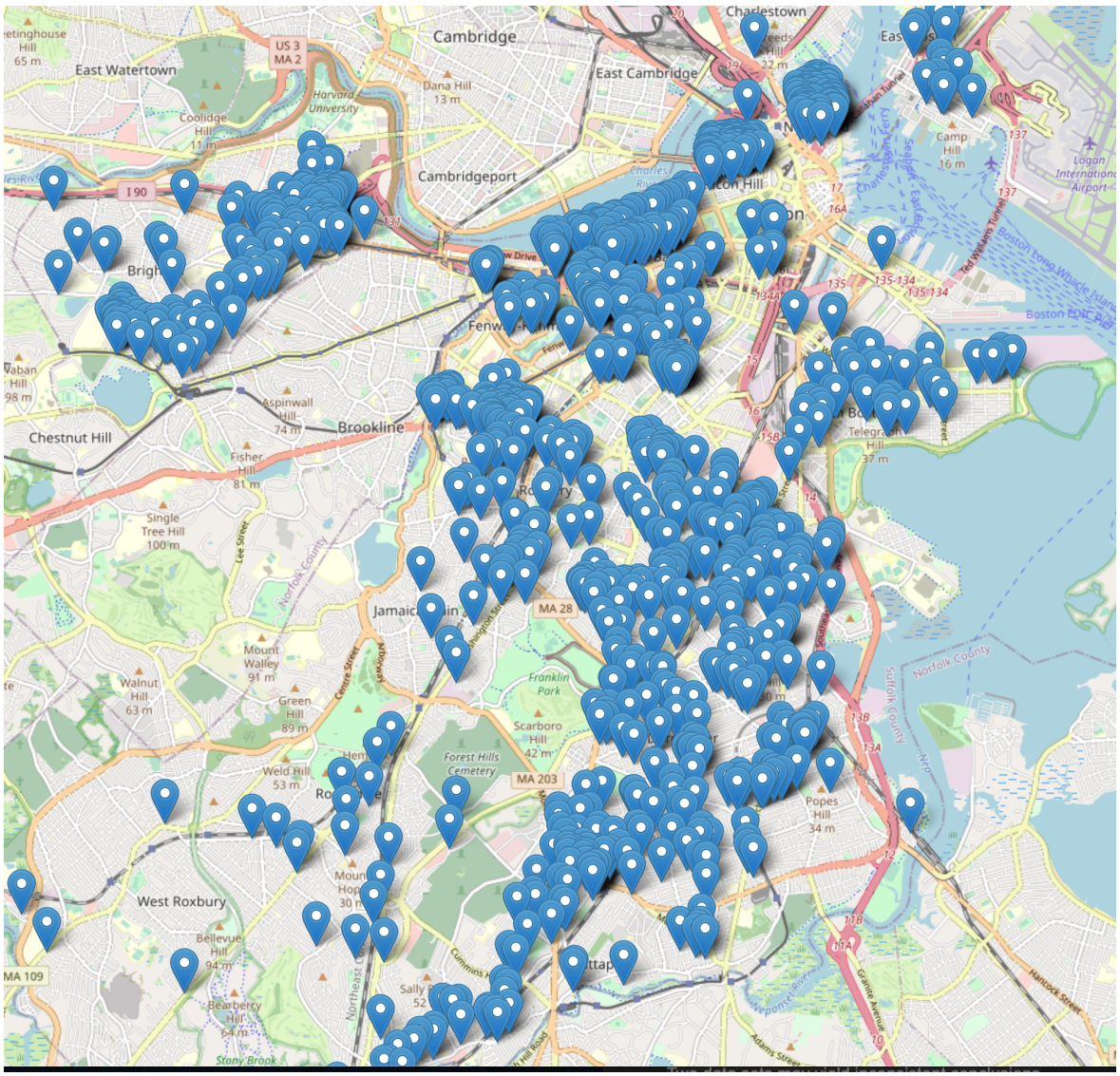
distribution of non-affordable housing heatmap

The above two heat maps show the distribution of affordable and non-affordable housing in the Boston area.

2. extension project:



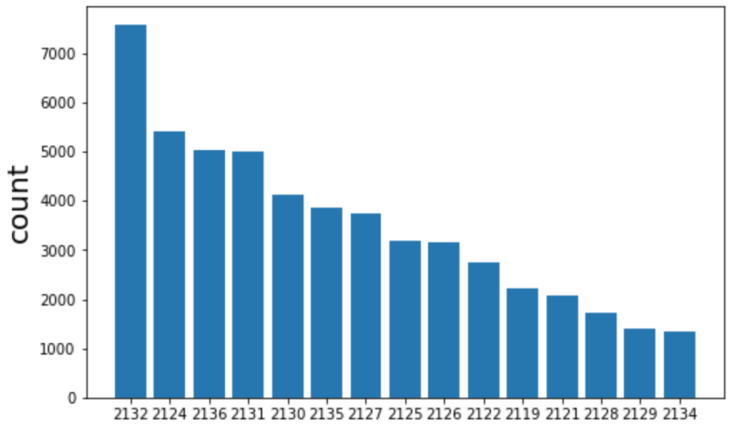
The above is the address of the complained housing. It can be seen that the housing is concentrated in the city of Boston by using Problem Properties dataset.



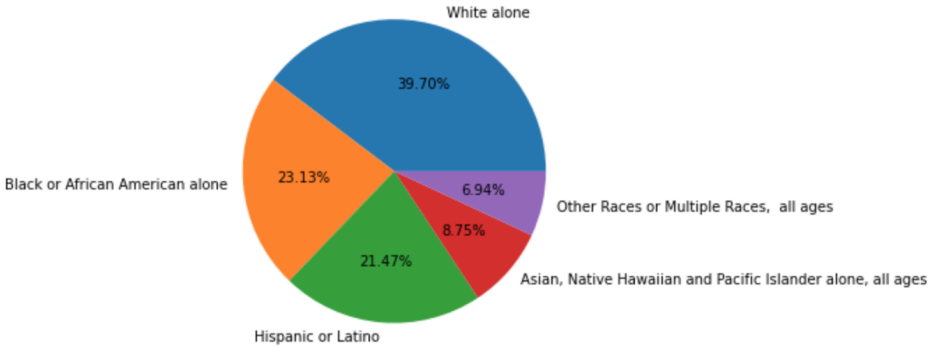
The above is the address of the complained housing using RentSmart dataset.

Results obtained / questions answered

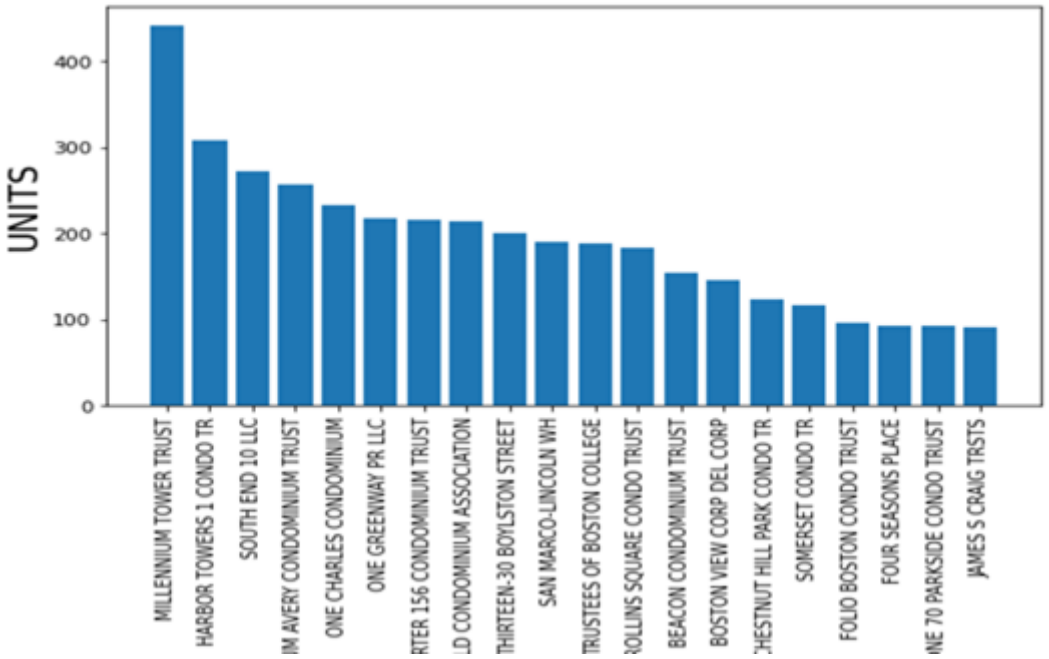
1. **base questions**
    a. What is the current distribution of landlords NOT currently enrolled in different affordable housing programs? # of units? Geographic distribution (by zip code)? Demographic profile of census block group (majority race, ethnicity, income)
        i. 19304 landlords are not currently enrolled in different affordable housing programs.
        ii. Not-enrolled-landlords distribution



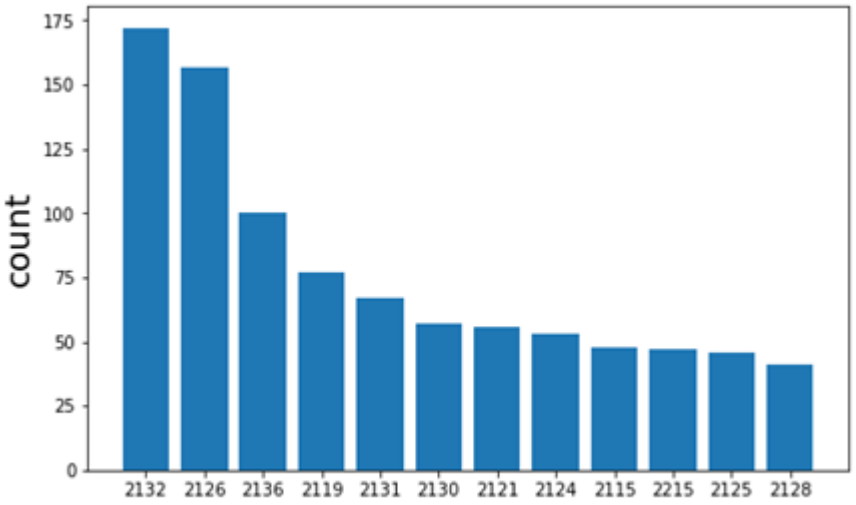
iii. Distribution of races in Boston



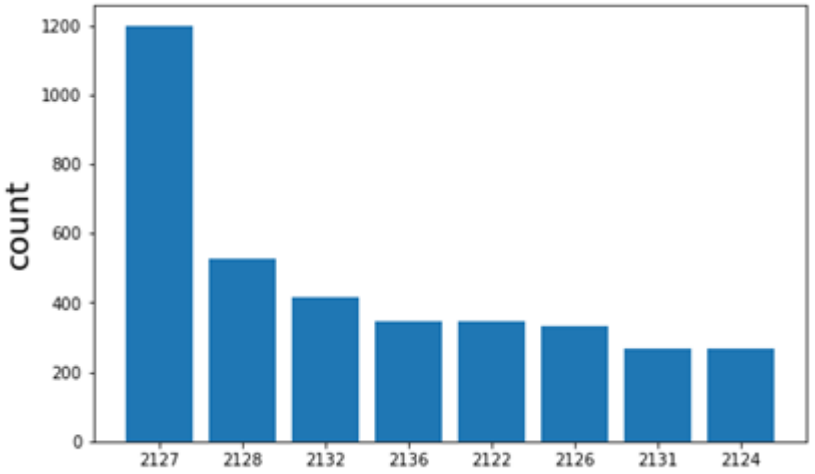
b. What is the current distribution of landlords and housing listed in current affordable housing programs?



Zip code 02132 has the most landlords.



Zip code 02127 has the most housing.



c. What is the geographic distribution of these landlords by city council district?

	CITY	count
0	dorchester	9486
1	boston	6322
2	east boston	4710
3	hyde park	3045
4	south boston	2977
5	roxbury	2585
6	jamaica plain	2187
7	roslindale	1994
8	west roxbury	1955
9	charlestown	1654
10	mattapan	1366
11	brighton	1342
12	allston	886
13	roxbury crossing	708
14	chestnut hill	22

Affordable housing distribution.

	CITY	count
0	dorchester	13310
1	west roxbury	7599
2	hyde park	5087
3	roslindale	4965
4	boston	4290
5	jamaica plain	4196
6	brighton	3876
7	south boston	3393
8	mattapan	3111
9	roxbury	2229
10	east boston	1813
11	charlestown	1416
12	allston	1330
13	roxbury crossing	654
14	chestnut hill	154
15	brookline	21
16	dedham	7
17	readville	1

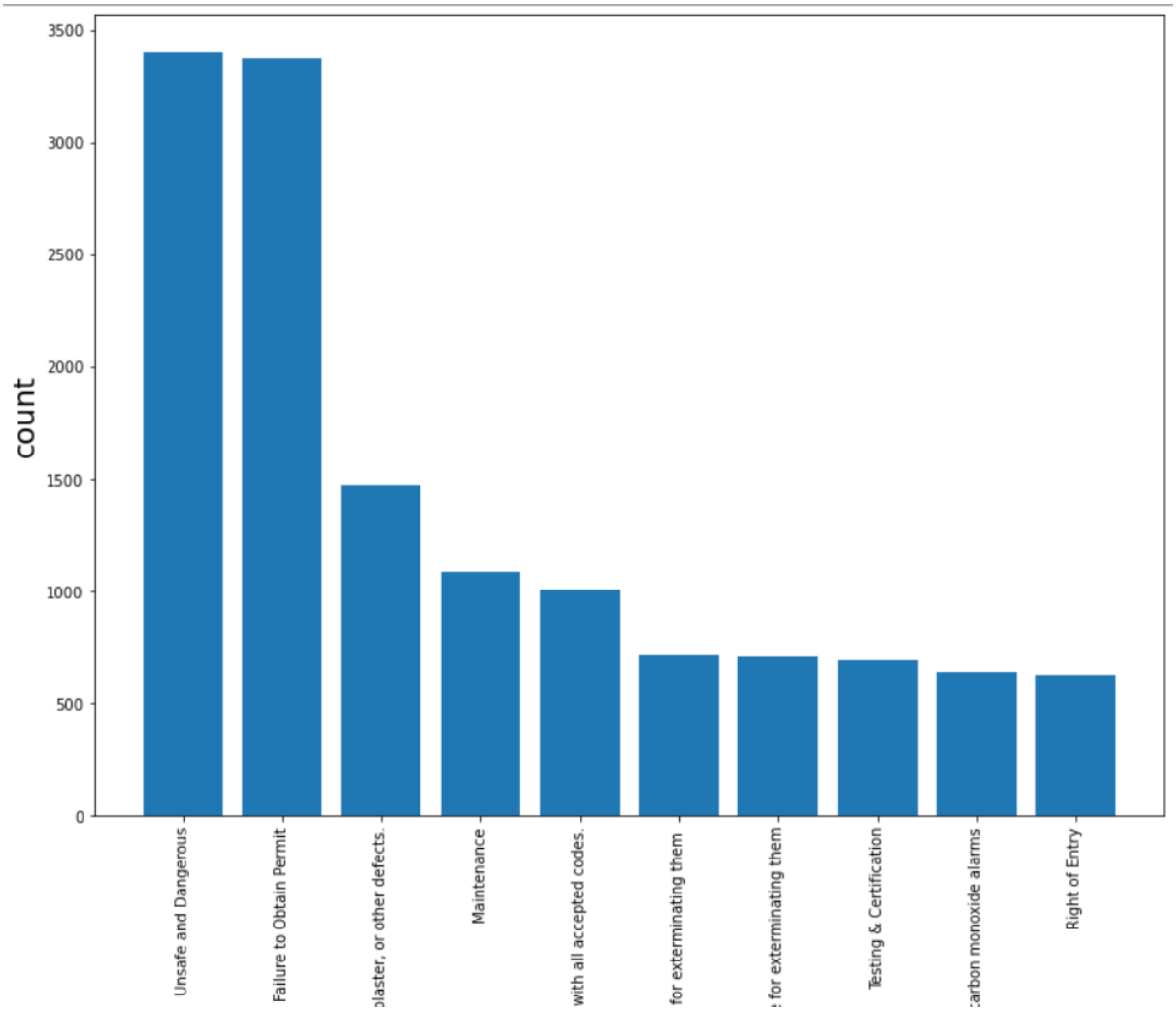
Non-affordable housing distribution

d. What percentage of housing stock is owned by owner occupied and small landlords, and at what % affordable
Owner-occupied and small landlords: **75.91%**
Affordable Owner occupied and small landlords: **36.27%**

2. extension questions

a. Which cities have the most housing complaints？

b. What problems are the most frequently complained about?
Unsafe and dangerous, and failure to obtain permits are the two problems most being complained about.



c. Where is the most complained housing？

Interpretation/limitations of results

1. We can't get a breakdown of races for each city in the Boston area, so we can't get a breakdown of the races of people who own housing in each city.
2. We suspect that the addresses we get from google API are not only located in Boston but also some other cities like NYC share the same street addresses. This may lead to a larger calculation of the number of homes owned by the landlord.
3. Some data in the combined data set is incomplete, which may affect the results of the final analysis.
4. The complainants may complain about the same problem several times at different times because the problem was not solved in time, resulting in inaccurate analysis results.

Challenges faced

1. Not familiar with the zip code and street names in the Boston area. So we don't have a very intuitive sense of the data.
2. In the process of getting a detailed address through google API, the process of splitting the address is very complicated.
3. For the two datasets in the extension project, we are unable to find a column to merge the dataset. We stacked the data according to the time of complaints. This makes our task very complicated.

Suggestions for the future of the project

1. The data obtained through the Google API will be further cleaned to reduce the bias brought by the data.
2. Obtain more data on Dorchester City to further study the distribution of housing in the city.