

San Francisco Homeless Crisis

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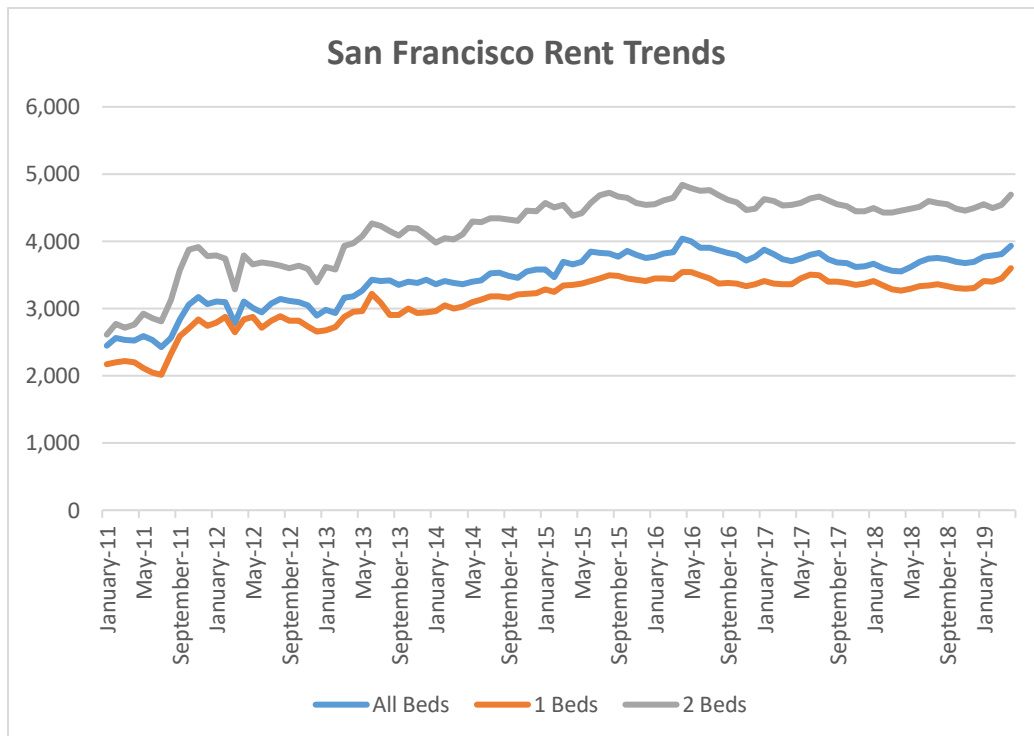


~ Introduction ~

Ever-evolving technology have continued to capture our surprise in new creative ideas and services. Software companies such as Google, Facebook, Uber, Twitter, and Instagram spurred from the San Francisco Bay Area, Silicon Valley and made its way to the world. Today these billion-dollar companies have brought a great number of people from all over the world to Northern California. Software developers and engineers have gathered to create and innovate in the Silicon Valley. On the flip side, there has been a clearly visible income gap amongst the people living in San Francisco.

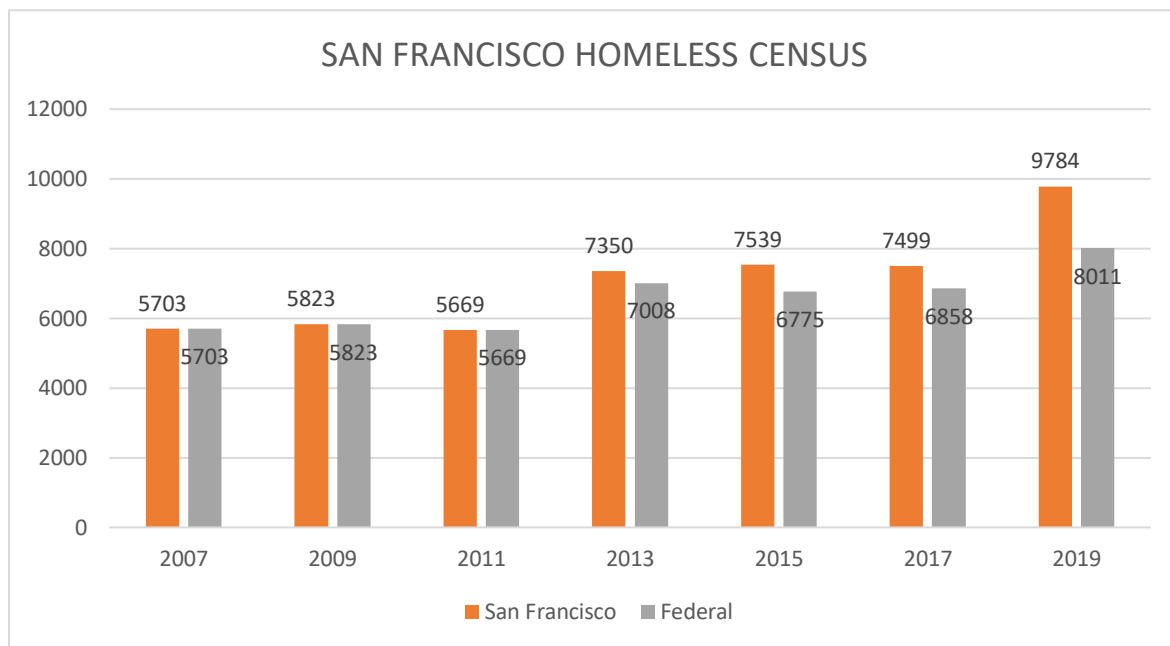
The income gap that has been flooded throughout the San Francisco Bay Area has created a ripple amongst families and individual that led some to move out of the city and some to live on the street. The housing price has inflated more than the average individual can afford.

“The average apartment rent over the prior 6 months in San Francisco has increased by \$256 (7%) One bedroom units have increased by \$306 (9.3%) and two-bedroom apartments have increased by \$230 (5.2%).” (Jungle) People have begun being kicked out of their homes and without any warning, rents have skyrocketed. The housing has increased however many average workers in San Francisco’s income has not been raised.



The situation for housing has become worse by the City of San Francisco taking actions that accentuate the rise in housing price in various situation. The city of San Francisco has continued to put a restriction on building permits on affordable housings, emphasizing environmental issue and minor issues such as “casting of the shadow on private property.” Many of the building in San Francisco needs to be remodeled since it’s more than a century old however many owners cannot get a permit. The number of homeless has exploded in the past several years.

Due to poor living condition and lack of housing in San Francisco, a large number of families and individuals were led to live on the street. With very less oversight on the homeless from the City of San Francisco, homeless that has been living on the street has continued to persist. "In 2019, San Francisco reported 8,011 homeless people met the federal definition of homeless, an increase of 17 percent from 2017. When looking at San Francisco's expanded definition, the city's 2019 total homeless population is 9,784, the highest in the Bay Area." (Eby)



Just the Federal count in homeless has doubled from ten years ago. There are almost ten thousand homeless people on the street in San Francisco, which has a surface area of only 46.87 mi².

Methodology

From the numbers, we can expect the homeless to continue to grow. In order to help homeless' to get back on their feet, we would first consider helping generate a stable income. Income majorly comes from occupancy and the high minimum wage in the city already serves the perfect condition. Although in order to even start occupancy, homeless' need proper housing.

Homeless carry their whole belongings around and cannot properly treat their hygiene without a form of housing. Homeless shelters are often overcrowded and weekly street cleaning forces them to continuously move one place to the other. It is certain that housing is the most critical problem that homeless' have today.

There are several limitations that we would need to consider in order to solve the homelessness in San Francisco.

1. High housing cost to house the homeless individual and families.
2. Restriction on building new affordable housing in San Francisco
3. Difficulties renovating the current building for housing
4. Overcrowded homeless shelters

Considering the restraints above the only solution to homelessness is to rely on current infrastructure in order to provide housing to homeless'. Although current public infrastructure in San Francisco does not offer a great solution to house homeless' on the street. It is not a large city and because of the building restriction, it is not made to house a large number of people at the same time. We would need to rely on private properties that are vacant most of the time, especially at night.

In essence, the private property that is vacant at night and located all around the city are the 160 churches in San Francisco. If every church housed 20 homeless', in just one day, half of all homeless in San Francisco will be cut in half. The effect would not only eliminate the homeless crisis but would open up homeless shelters for people in need. People would then find occupancy and the increasing homelessness would decrease in time. Churches would be rewarded through additional tax exemption and would be able to bring more people to their service. It would be a win-win deal for all people in San Francisco.

Analysis

In order to bring upon such mandate, there would be a need for a plan and a proof of concept to show that the proposition is valid and effective. In order to maximize the efficiency of housing, we cannot just allocate a static number of people in every church, however, there is no data set for the specific number each church can hold. So we would need to maximize the efficiency in housing homelessness in terms of proximity of each church. The closer the churches would be able to expand the housing cap, so if there is occupancy in another church nearby we would quickly be able to allocate people between each church.

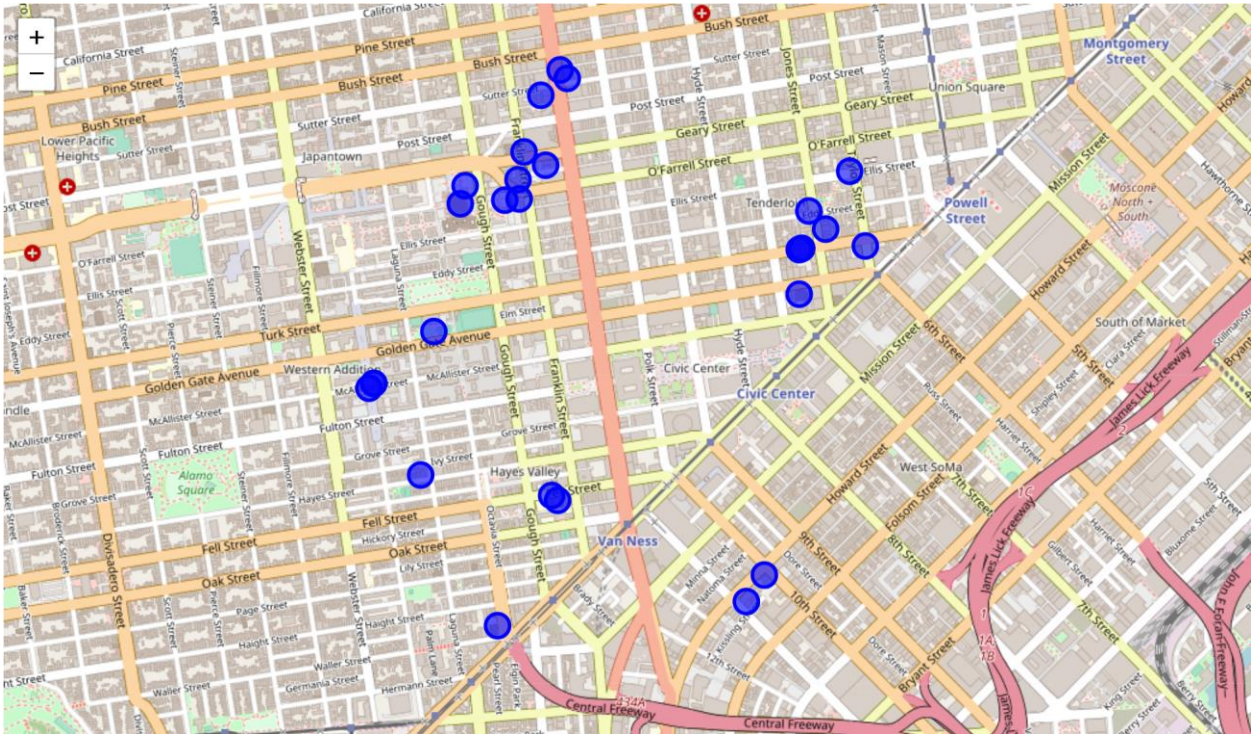
Data

The proof of concept that would be proposed would first target the churches that are 800m within a radius of City Hall. Through the FourSquare database, we would be filtering the churches around City Hall that are 800m in radius and measuring the proximity of each church to each other. We will then rank and group in terms of distance of proximity. Then we would be able to accurately measure how effective this proposition can be, with just an 800m radius.

Results and Discussion

	id	name	categories	referralid	hasPerk	location.address	location.crossStreet	
1	1324a0f964a520ab9423e3e	Advent of Christ the King fix: ' .png', 'primary': True]]		v-1564542051	False	261 Fell St	Franklin/Gough	37.7758
2	25a3eae4b0c41c53d97e0f	The Nativity Of Our Lord fix: ' .png', 'primary': True]]		v-1564542051	False	240 Fell St	Franklin	37.7760
3	346b4f81543d71da452b08	Bethel A.M.E. Church fix: ' .png', 'primary': True]]		v-1564542051	False	916 Laguna St	415-921-4935	37.78060
4	4d9d33d2e6f0f47b0270c08e	Roman Catholic Church fix: ' .png', 'primary': True]]		v-1564542051	False	133 Golden Gate Ave	Jones St	37.7816
5	51e79e0cb6442b2ed407db	's Roman Catholic Church fix: ' .png', 'primary': True]]		v-1564542051	False	1401 Howard St		
6	61618d43d47912d4bcbe52e	Hillsong SF fix: ' .png', 'primary': True]]		v-1564542051	False	1300 Van Ness Ave	Post and Geary	37.7877
7	763a775e4cdf1e2bf908494	ton Square Baptist Church fix: ' .png', 'primary': True]]		v-1564542051	False			37.7856
8	81ab16ce4b059425ae6c621	SF City Impact fix: ' .png', 'primary': True]]		v-1564542051	False	230 Jones St	Turk	37.7834
9	94f25b3abe4b0b2f990bf6	ighborhood Baptist Church fix: ' .png', 'primary': True]]		v-1564542051	False	yes St, San Francisco, CA	Laguna	37.77657
10	10ce82c8e4b0b0b98af8f98	int Paulus Luthern Church fix: ' .png', 'primary': True]]		v-1564542051	False	950 McAllister St		37.7791
11	11e1fcb971fc7c0ef9856bdfb	Templo Calvario fix: ' .png', 'primary': True]]		v-1564542051	False	1419 Howard St	between 10th & 11th	37.77303
12	12a5901fff964a52072b81fe3	int Mary of the Assumption fix: ' .png', 'primary': True]]		v-1564542051	False	1111 Gough St	btwn Geary Blvd & Ellis St	37.7847
13	132e78121d5a59352951711	at Church of San Francisco fix: ' .png', 'primary': True]]		v-1564542051	False	22 Waller St	at Octavia St	37.7723
14	14ee3587f964a52039681fe3	itarian Universalist Church fix: ' .png', 'primary': True]]		v-1564542051	False	1187 Franklin St	Geary	37.78491
15	15c47c0646240f47af17dd4	incisco Lighthouse Church fix: ' .png', 'primary': True]]		v-1564542051	False	1337 Sutter St	Van Ness Ave	37.78727
16	16a546ef1495a891128b32ff	St Paulus Lutheran Church fix: ' .png', 'primary': True]]		v-1564542051	False	1541 Polk St	Sacramento	37.77915
17	17bec64c4fd60a59373ef3af1	City Impact Headquarters fix: ' .png', 'primary': True]]		v-1564542051	False	136 Taylor St	Turk St	
18	18b83d7c832bc9285f9eb3a8	Journey SF fix: ' .png', 'primary': True]]		v-1564542051	False	1290 Sutter St		37.7879
19	19edc92b498e75cde831fe24	f The Assumption Of Mary fix: ' .png', 'primary': True]]		v-1564542051	False	Gough St. @ Geary Blvd.		
20	2010a0aac65b4a49f305bbac	nter Corps Sunday School fix: ' .png', 'primary': True]]		v-1564542051	False			
21	21e2baf15ae745b1fac6c57	x Sunday Worship Service fix: ' .png', 'primary': True]]		v-1564542051	False	240 Turk St	Jones	
22	221541f9816af04d0f5042c2	int Paul's Lutheran Church fix: ' .png', 'primary': True]]		v-1564542051	False	950 McAllister St		
23	23b7443b5e5c38d515050d8f	SFGMC Rehearsal/FUUC fix: ' .png', 'primary': True]]		v-1564542051	False			37.78525
24	24e01fea0e1e7dd0d1fa4c0	Center Corps Youth Night fix: ' .png', 'primary': True]]		v-1564542051	False			
25	254cec4674e81b8deaa9fa06	Christ Evangelical Church fix: ' .png', 'primary': True]]		v-1564542051	False	1031 Franklin St	at O'Farrell St	
26	2618a85af76e1236a4c8f1c43	Francisco Worship Center fix: ' .png', 'primary': True]]		v-1564542051	False	230 Jones St		3
27	27ae74b5f964a520266220e3	St Mark's Lutheran Church fix: ' .png', 'primary': True]]		v-1564542051	False	1111 Ofarrell St	btw Franklin & Gough	37.784304
28	2882c7f1f964a520330520e3	Glide Memorial Church fix: ' .png', 'primary': True]]		v-1564542051	False	330 Ellis St	Ofarrell	37.78514

As a first step, access to Foursquare API to retrieve the information for churches around the San Francisco City Hall is initiated. The address for the San Francisco City Hall would be 1 Dr. Carlton B Goodlett Pl, San Francisco, CA 94102. The query would retrieve the 800m radius of this address and would transform the JSON into pandas data frame as above. The visualization of the churches that are 800m of the City Hall is listed below.



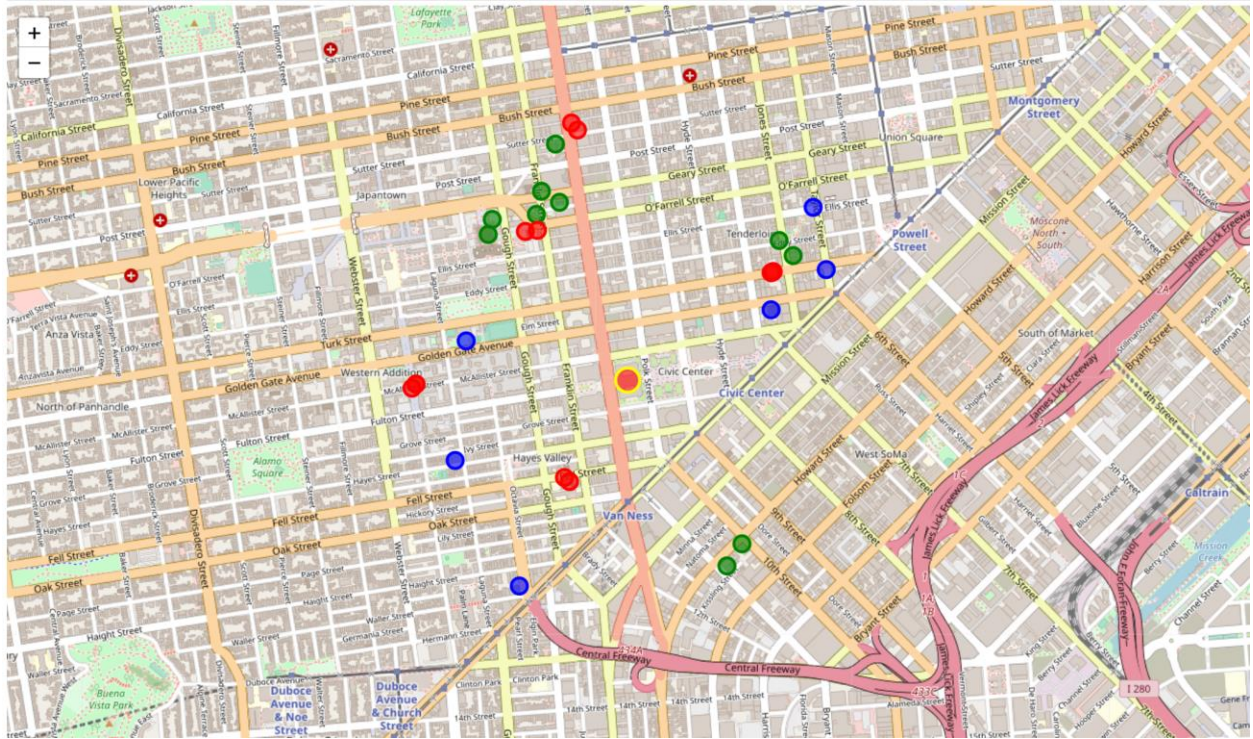
The next step would be to calculate the proximity between every church of 800m of the City Hall. We would be creating a new data frame to store proximity data to list the distance between two churches.

	name1	name2	lat1	lng1	lat2	lng2	distance
15	TSA - Kroc Center Sunday Worship Service	TSA - Kroc Center Corps Youth Night	37.782969	-122.413078	37.782953	-122.413077	1.778061
11	TSA - Kroc Center Corps Youth Night	TSA - Kroc Center Sunday Worship Service	37.782953	-122.413077	37.782969	-122.413078	1.778061
3	St Paulus Lutheran Church	Saint Paulus Luthern Church	37.779151	-122.428357	37.779159	-122.428324	3.069786
5	Saint Paulus Luthern Church	St Paulus Lutheran Church	37.779159	-122.428324	37.779151	-122.428357	3.069786
14	TSA - Kroc Center Corps Sunday School	TSA - Kroc Center Corps Youth Night	37.782927	-122.413165	37.782953	-122.413077	8.271704

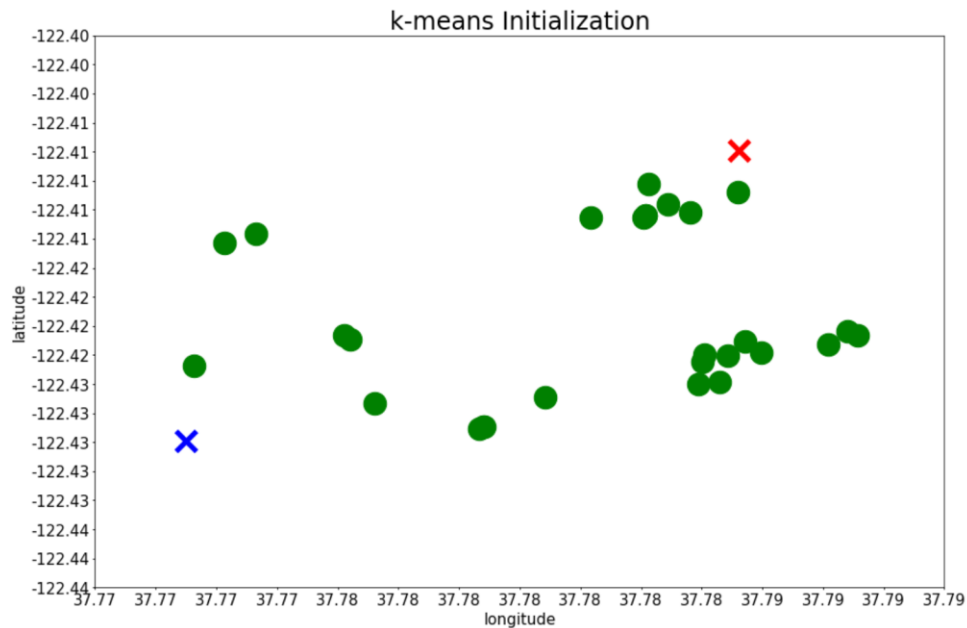
Then we would use the proximity data to create a data frame including the name of the church, location data, and the expected occupancy of each church.

	name	lat	lng	occupancy
0	Church of the Advent of Christ the King	37.775867	-122.421762	30
1	Church Of The Nativity Of Our Lord	37.776017	-122.421992	30
2	Bethel A.M.E. Church	37.780607	-122.426202	20
3	St Boniface Roman Catholic Church	37.781685	-122.413158	20
4	St. Joseph's Roman Catholic Church	37.773783	-122.414402	25
5	Hillsong SF	37.787731	-122.421429	30
6	Hamilton Square Baptist Church	37.785688	-122.422971	25
7	SF City Impact	37.783495	-122.412220	25
8	Neighborhood Baptist Church	37.776578	-122.426658	20
9	Saint Paulus Luthern Church	37.779159	-122.428324	30
10	Templo Calvario	37.773038	-122.415032	25
11	Cathedral of Saint Mary of the Assumption	37.784720	-122.425089	25
12	First Baptist Church of San Francisco	37.772342	-122.423934	20
13	Unitarian Universalist Church	37.784910	-122.423201	25
14	San Francisco Lighthouse Church	37.787270	-122.422374	25
15	St Paulus Lutheran Church	37.779151	-122.428357	30
16	San Francisco City Impact Headquarters	37.783026	-122.410774	20
17	Journey SF	37.787965	-122.421702	30
18	Church Of The Assumption Of Mary	37.784218	-122.425251	25
19	TSA - Kroc Center Corps Sunday School	37.782927	-122.413165	30
20	TSA - Kroc Center Sunday Worship Service	37.782969	-122.413078	30
21	Saint Paul's Lutheran Church	37.779040	-122.428512	30
22	SFGMC Rehearsal/FUUC	37.785300	-122.422202	25
23	TSA - Kroc Center Corps Youth Night	37.782953	-122.413077	30
24	Freedom in Christ Evangelical Church	37.784343	-122.423143	30
25	San Francisco Worship Center	37.784025	-122.412804	25
26	St Mark's Lutheran Church	37.784304	-122.423652	30
27	Glide Memorial Church	37.785143	-122.411332	20

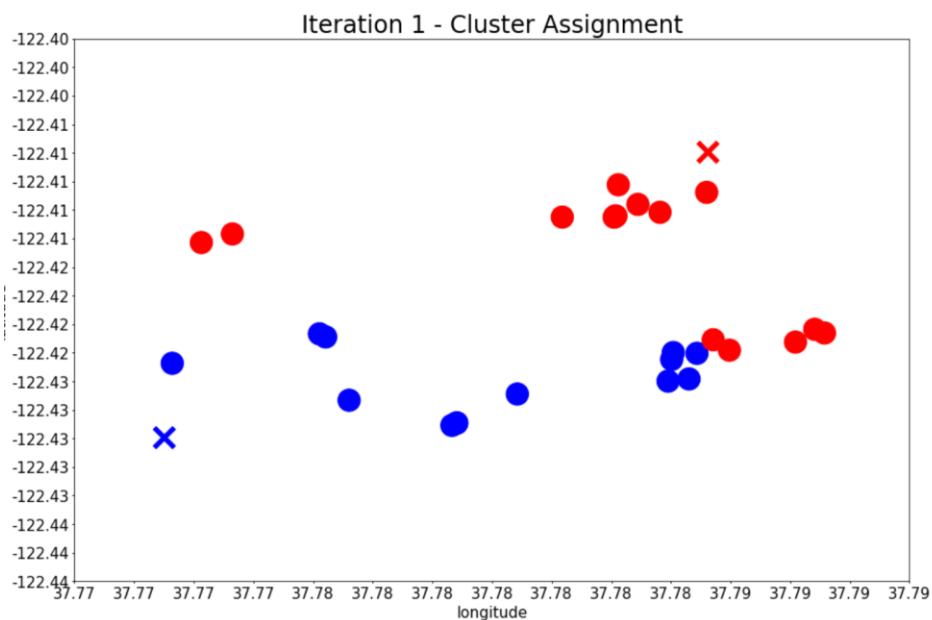
Assuming that average amount of church can occupy 20 homeless', the church that has the least amount of proximate churches would be assigned 20 occupancies, churches that have nearby churches within 100m proximity would be assigned 25, and churches that have churches in proximity within 50m would be assigned 30.

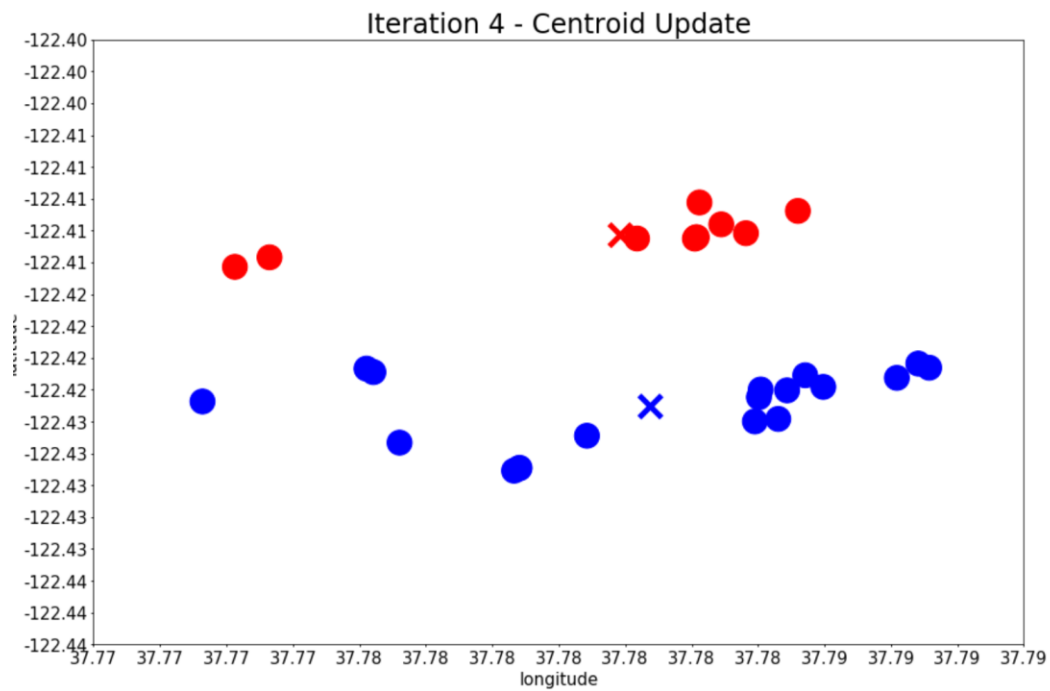


In the final step, we would be using the k-mean initialization to allocate homeless' within the region efficiently. We would be separating into 2 groups to allocate within the 800m radius using the two centroids visualized below.

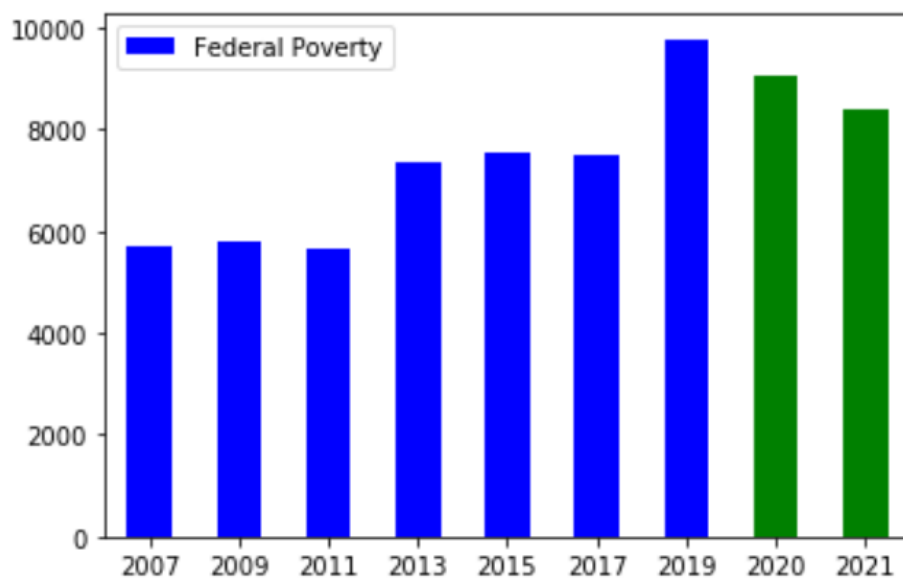


We would be running four iterations of the k-means clustering as shown below.





Conclusion



Through the smart allocation of homeless between churches, we would be able to achieve up to 23% efficiency in housing homeless' in an 800m radius of the San Francisco City Hall. This new plan would achieve up to 730 homeless housing in the city instead of 560 homeless' and the effects would clearly be effective in fighting homelessness in San Francisco. If we would be able to roll out this throughout the San Francisco City, we can expect a minimum of 3200 to up to 4300 homeless housing in a single day. This would allow bringing the rate of homeless' on the street to half and at a level that was ten years ago. The homeless shelter and housing would start having a vacancy and more homeless would have a chance to find a stable income. This new plan would accelerate in a decrease of homelessness in San Francisco exponentially.

Source

Jungle, R. (n.d.). FIND APARTMENTS IN YOUR AREA. Retrieved from

<https://www.rentjungle.com/average-rent-in-san-francisco-rent-trends/>

Eby, K., Kgo, & Kgo. (2019, July 23). History of how many people are homeless in the Bay Area. Retrieved from <https://abc7news.com/society/homeless-population-history-in-bay-area/5260657/>