The Battle of the Neighborhoods – Week 2 (Complete Report)

1. Introduction

1.1 Background

Californians by nature are fun loving people it does not matter what race, culture or region they belong to. They love to spend quality time with family and friends. Los Angeles (LA) is a densely populated metro city. To avoid the daily rat race, people live in the suburbs of LA and still like to be called as Angelenos. Lots of people live in the suburbs of LA and most of the suburbs in outskirt of LA fall under the vicinity of the largest valley in the world called San Fernando Valley (SFV). This is where the city of west hills is located.

1.2 Problem

A well-known Bowling chain is our audience and stakeholder. The sponsors/stakeholders are looking forward to open up a new location for their bowling alley in the SFV's West Hills city. *The problem is where should they open their Bowling Alley in the city in order to get minimum competition, maximum customer turnout in short find an optimal location?* This project specifically targets the stakeholders who are interested in opening a new location for **Bowling Alley** in the city of **West Hills of California**, USA.

This report will answer the above question and provide with possibly a best solution to the problem. We will use our data science skills to wrangle the data and analyze some of the areas of given neighborhoods, based on the above criteria. In order to support our findings, we will present the stakeholders with the best or optimal location to facilitate their decision making.

Some demographics of West Hills: The population of the city is almost around 50,000 with mean household income of $120,608, which is way higher than the national household income. 75% of the population has either Master’s or Higher degree, Bachelor’s degree or, some college degree as opposed of national percentage of 61%. Not only that 79% of the population is adult population. It is a fairly diverse city when it comes to racial diversity.

1.3 Interest

As mentioned in the above item 1.2 our client is a well-known Bowling and Venues company and this report is of great interest to them (executives of the company) as they plan on adding a new location to their chain of Bowling Alleys.

2.Data Acquisition and Cleaning

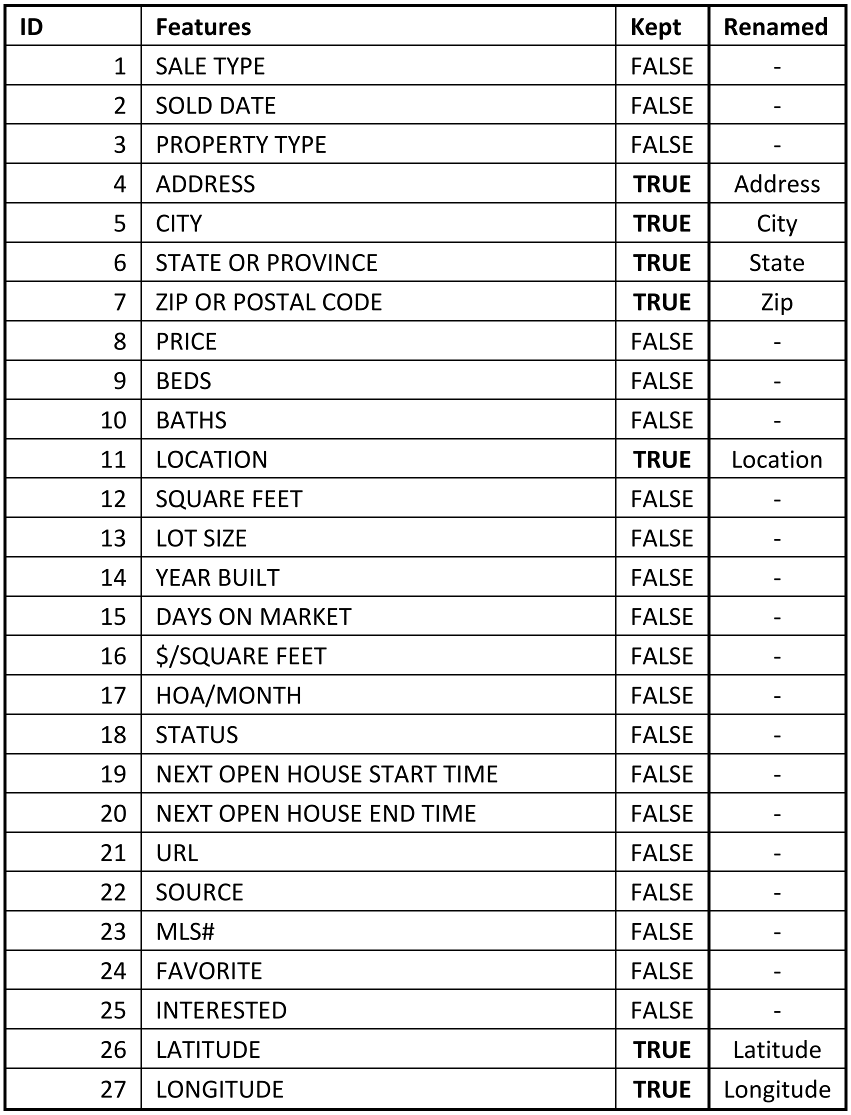
2.1 Data Sources

For resolving above problem, data for the West Hills city for the neighborhood was acquired from acquired from Redfin in the form of .CSV files. Few versions were downloaded for last 3 years data and the combined all the datasets in to one .CSV data file. Also, we acquired some demographics about the city of West Hills from Niche

Data acquired through downloading csv files or scraped data have been combined into a single dataset, as a .CSV file. There were some missing values and some parts of the data were coded wrong, so we cleaned the data to suit our purpose. Apart from above Foursquare API has also been deployed.

2.2 Data Cleaning

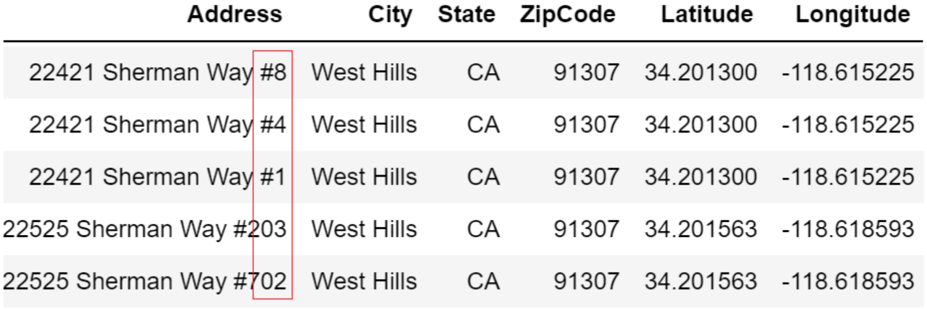
We dropped some features from the data and kept some as they were more relevant for our solution. The combined data file has below features, out of which only the few were kept in the data and rest were dropped. We also renamed the columns



ID	Features	Kept	Renamed
1	SALE TYPE	FALSE	-
2	SOLD DATE	FALSE	-
3	PROPERTY TYPE	FALSE	-
4	ADDRESS	**TRUE**	Address
5	CITY	**TRUE**	City
6	STATE OR PROVINCE	**TRUE**	State
7	ZIP OR POSTAL CODE	**TRUE**	Zip
8	PRICE	FALSE	-
9	BEDS	FALSE	-
10	BATHS	FALSE	-
11	LOCATION	**TRUE**	Location
12	SQUARE FEET	FALSE	-
13	LOT SIZE	FALSE	-
14	YEAR BUILT	FALSE	-
15	DAYS ON MARKET	FALSE	-
16	$/SQUARE FEET	FALSE	-
17	HOA/MONTH	FALSE	-
18	STATUS	FALSE	-
19	NEXT OPEN HOUSE START TIME	FALSE	-
20	NEXT OPEN HOUSE END TIME	FALSE	-
21	URL	FALSE	-
22	SOURCE	FALSE	-
23	MLS#	FALSE	-
24	FAVORITE	FALSE	-
25	INTERESTED	FALSE	-
26	LATITUDE	**TRUE**	Latitude
27	LONGITUDE	**TRUE**	Longitude

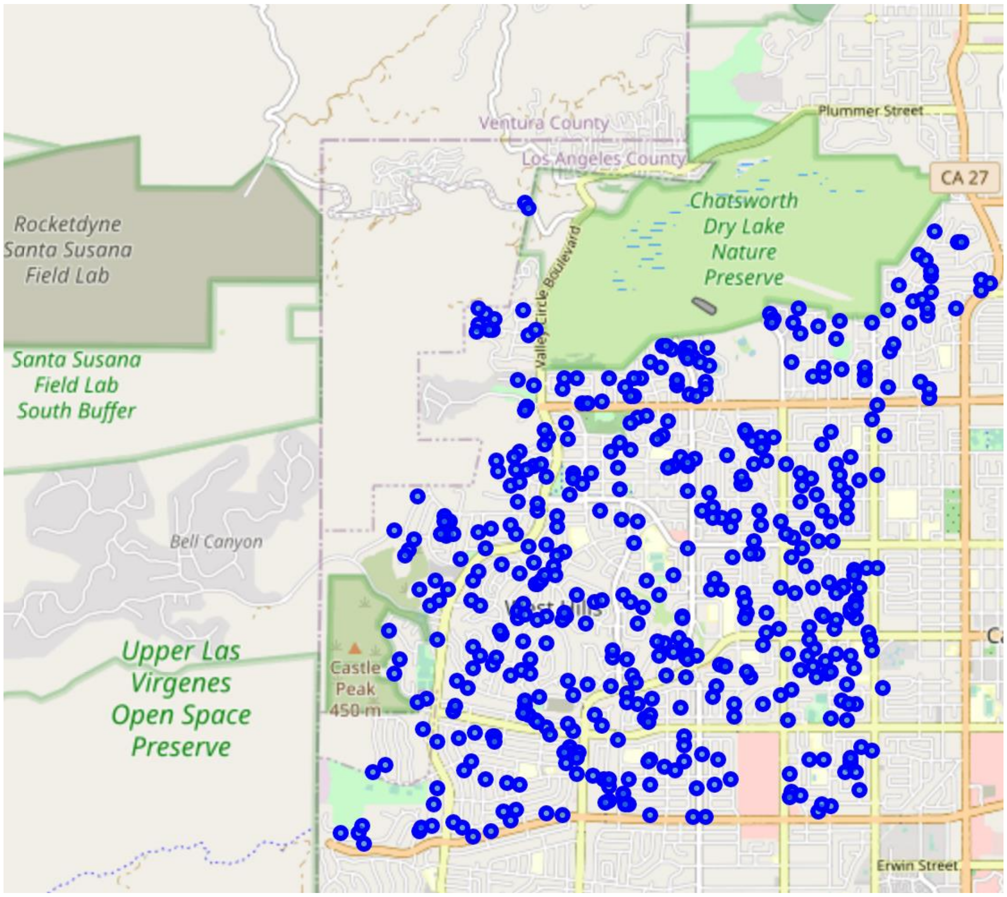
Later the column state and location were dropped as information was redundant and we already had the data in City feature. Some rows were dropped as well since they were wrongly zip coded.

We also combined similar addresses with different unit number into one by ignoring the #unit number, like in the example below. Later we removed the duplicate records.



Address	City	State	ZipCode	Latitude	Longitude
22421 Sherman Way #8	West Hills	CA	91307	34.201300	-118.615225
22421 Sherman Way #4	West Hills	CA	91307	34.201300	-118.615225
22421 Sherman Way #1	West Hills	CA	91307	34.201300	-118.615225
22525 Sherman Way #203	West Hills	CA	91307	34.201563	-118.618593
22525 Sherman Way #702	West Hills	CA	91307	34.201563	-118.618593

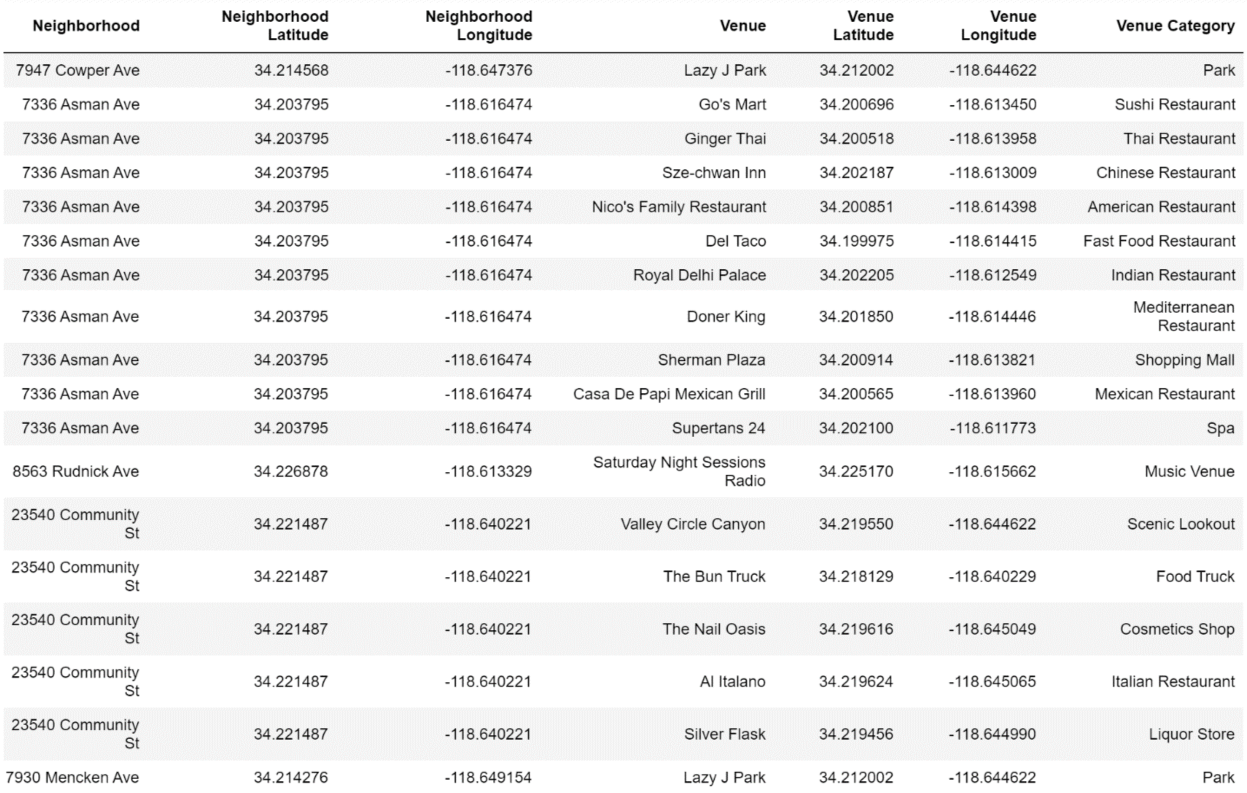
We found the geographical co-ordinates of the West Hills and used Folium to create the map of the neighborhood with the latitude and longitude that we found. Below is a screen shot of the same which plots areas in West Hills.


Ventura County
Los Angeles County
Plummer Street
CA 27
Chatsworth Dry Lake Nature Preserve
Rocketdyne Santa Susana Field Lab
Valley Circle Boulevard
Santa Susana Field Lab South Buffer
Bell Canyon
West Hills
Upper Las Virgenes Open Space Preserve
Castle Peak 450 m
Erwin Street

Foursquare API

Foursquare is a city guide for local place of interests, it get you the access of global POI data along with their Venus, co-ordinate in short it provide geospatial analytical functions. We use the power of Foursquare and we implemented Foursquare API. With the help of Foursquare API we explored the venues and business types around the neighborhoods.

Venues in the neighborhood and their Categories.



Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
7947 Cowper Ave	34.214568	-118.647376	Lazy J Park	34.212002	-118.644622	Park
7336 Asman Ave	34.203795	-118.616474	Go's Mart	34.200696	-118.613450	Sushi Restaurant
7336 Asman Ave	34.203795	-118.616474	Ginger Thai	34.200518	-118.613958	Thai Restaurant
7336 Asman Ave	34.203795	-118.616474	Sze-chwan Inn	34.202187	-118.613009	Chinese Restaurant
7336 Asman Ave	34.203795	-118.616474	Nico's Family Restaurant	34.200851	-118.614398	American Restaurant
7336 Asman Ave	34.203795	-118.616474	Del Taco	34.199975	-118.614415	Fast Food Restaurant
7336 Asman Ave	34.203795	-118.616474	Royal Delhi Palace	34.202205	-118.612549	Indian Restaurant
7336 Asman Ave	34.203795	-118.616474	Doner King	34.201850	-118.614446	Mediterranean Restaurant
7336 Asman Ave	34.203795	-118.616474	Sherman Plaza	34.200914	-118.613821	Shopping Mall
7336 Asman Ave	34.203795	-118.616474	Casa De Papi Mexican Grill	34.200565	-118.613960	Mexican Restaurant
7336 Asman Ave	34.203795	-118.616474	Supertans 24	34.202100	-118.611773	Spa
8563 Rudnick Ave	34.226878	-118.613329	Saturday Night Sessions Radio	34.225170	-118.615662	Music Venue
23540 Community St	34.221487	-118.640221	Valley Circle Canyon	34.219550	-118.644622	Scenic Lookout
23540 Community St	34.221487	-118.640221	The Bun Truck	34.218129	-118.640229	Food Truck
23540 Community St	34.221487	-118.640221	The Nail Oasis	34.219616	-118.645049	Cosmetics Shop
23540 Community St	34.221487	-118.640221	Al Italano	34.219624	-118.645065	Italian Restaurant
23540 Community St	34.221487	-118.640221	Silver Flask	34.219456	-118.644990	Liquor Store
7930 Mencken Ave	34.214276	-118.649154	Lazy J Park	34.212002	-118.644622	Park

Later we used Foursquare to explore our venues and categories furthermore, also determined the top 5 common venues in every neighborhood and

In this project we used the following libraries and packages.

- Pandas – For data analysis
- NumPy - For working with arrays/vector data
- BeautifulSoup – For Scraping (if any)
- Requests – For handling requests
- Geopy – For geocoding data
- Folium – For map plotting and markers.
- Sklearn – For kMeans clustering
- Foursquare API – For venues and getting place of interest.
- Matplolib and Seaborn – For plotting charts.

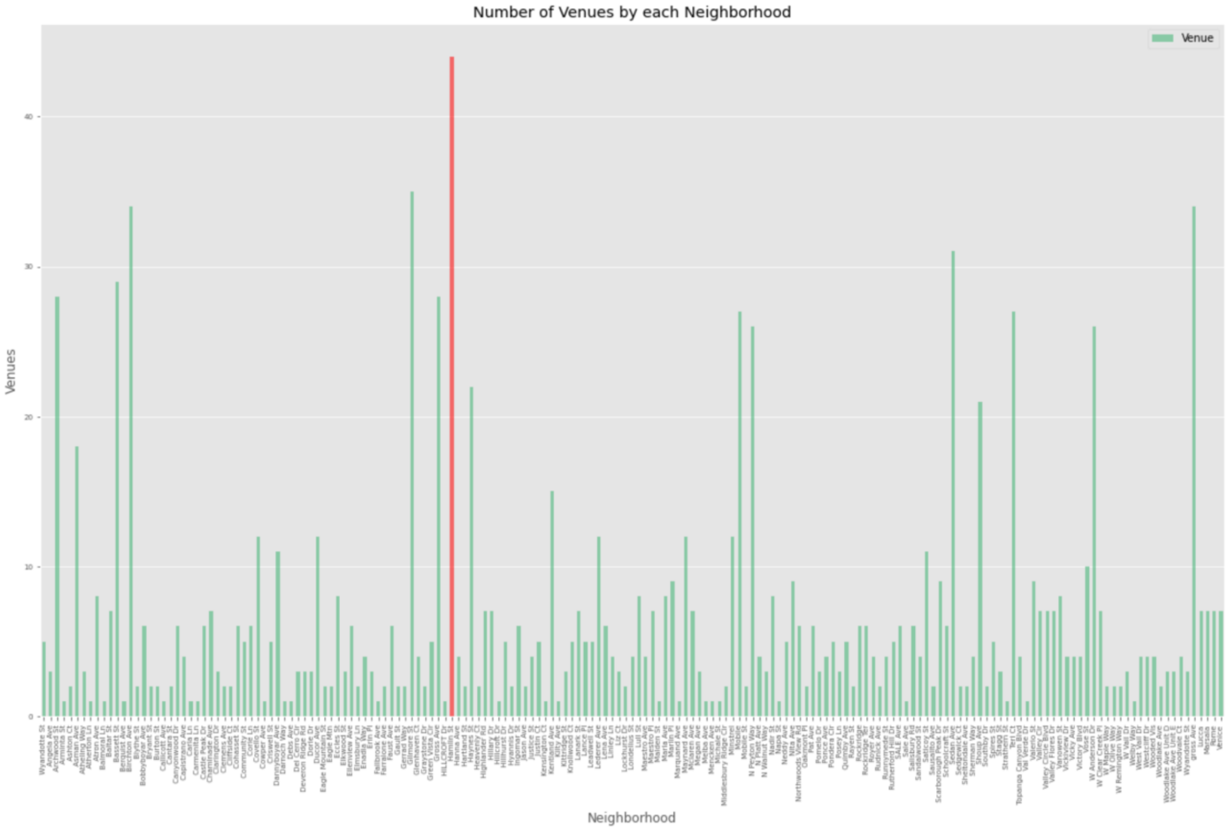
3.Methodology

After the obtention of datasets from different sources, our goal was to preprocess the data which we completed in the previous steps. Now, to get the results we need to analyze our data in exploratory analysis and come up with our hypothesis as we could be having a limited dataset. We did some exploratory analysis and discovered some more information about the venues.

Remember our final goal is to suggest an optimal location for the bowling business. For that we used K-Means Clustering Algorithm, since we were going to look for the similarities between the business (or venues as in Foursquare API) and cluster them into similar segments, depending on the category of the venues, geo location of the venue and so on.

3.1 Exploratory Data Analysis

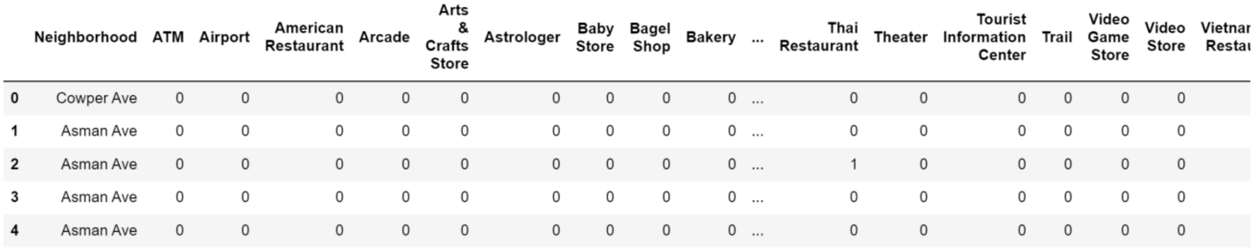
While working with the Foursquare and extracting data for the venues, we found that from the neighborhoods Hamlin St. had most number of the Venues and Fallbrook Ave. had the least number of venues. That could not be totally true as it depends on the cross streets as well. Possibility is that Fallbrook could have the most number of venues and Hamlin could have the least. This could be a topic for future suggestion as more data would be needed for higher accuracy of the results. Further, we explored data for top 5 most common venues in each neighborhood.



We also explored the venue density, in our case more like similar business as Bowling Alley, across different locations in the city of West Hills. For that we used K-mean to identify a few promising areas close to center of the city.

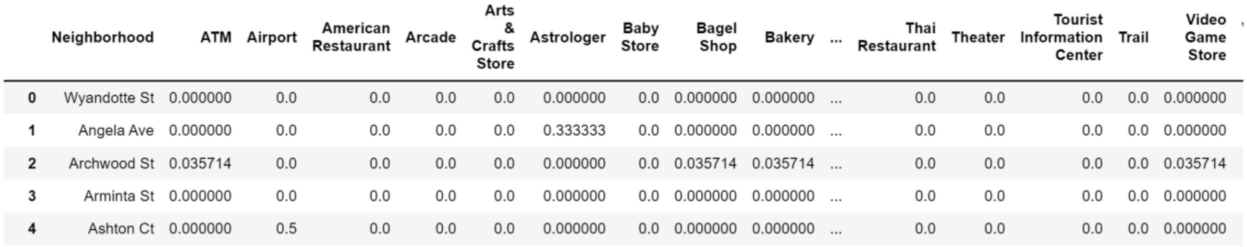
There were 117 unique categories of the venue. However, we did not find any category remotely related to an activity like Bowling Alley business.

We analyzed each neighborhood, Snapshot for which is below



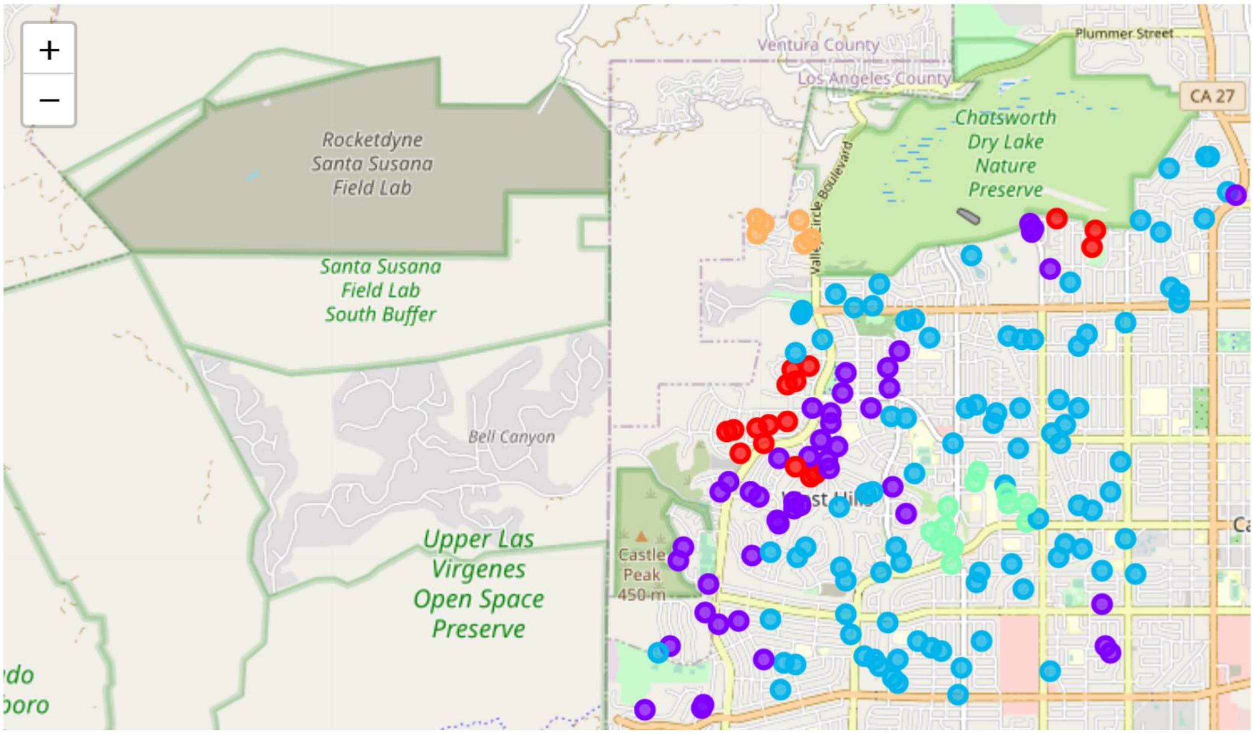
	Neighborhood	ATM	Airport	American Restaurant	Arcade	Arts & Crafts Store	Astrologer	Baby Store	Bagel Shop	Bakery	...	Thai Restaurant	Theater	Tourist Information Center	Trail	Video Game Store	Video Store	Vietnar Restau
0	Cowper Ave	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	
1	Asman Ave	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	
2	Asman Ave	0	0	0	0	0	0	0	0	0	...	1	0	0	0	0	0	
3	Asman Ave	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	
4	Asman Ave	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	

We then grouped rows by neighborhood and by taking the mean of the frequency occurrence for each category. Snapshot is pasted below.



	Neighborhood	ATM	Airport	American Restaurant	Arcade	Arts & Crafts Store	Astrologer	Baby Store	Bagel Shop	Bakery	...	Thai Restaurant	Theater	Tourist Information Center	Trail	Video Game Store
0	Wyandotte St	0.000000	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0	0.000000
1	Angela Ave	0.000000	0.0	0.0	0.0	0.0	0.333333	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0	0.000000
2	Archwood St	0.035714	0.0	0.0	0.0	0.0	0.000000	0.0	0.035714	0.035714	...	0.0	0.0	0.0	0.0	0.035714
3	Arminta St	0.000000	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0	0.000000
4	Ashton Ct	0.000000	0.5	0.0	0.0	0.0	0.000000	0.0	0.000000	0.000000	...	0.0	0.0	0.0	0.0	0.000000

While working with the Foursquare and extracting data for the venues, we found that from the neighborhoods Korean BBQ category is the most common venue for a lot of neighborhoods. As discussed earlier we use K-Means to cluster the neighborhoods in West Hills and find the best suitable location. In the event we segmented the dataset into 5 clusters of similar

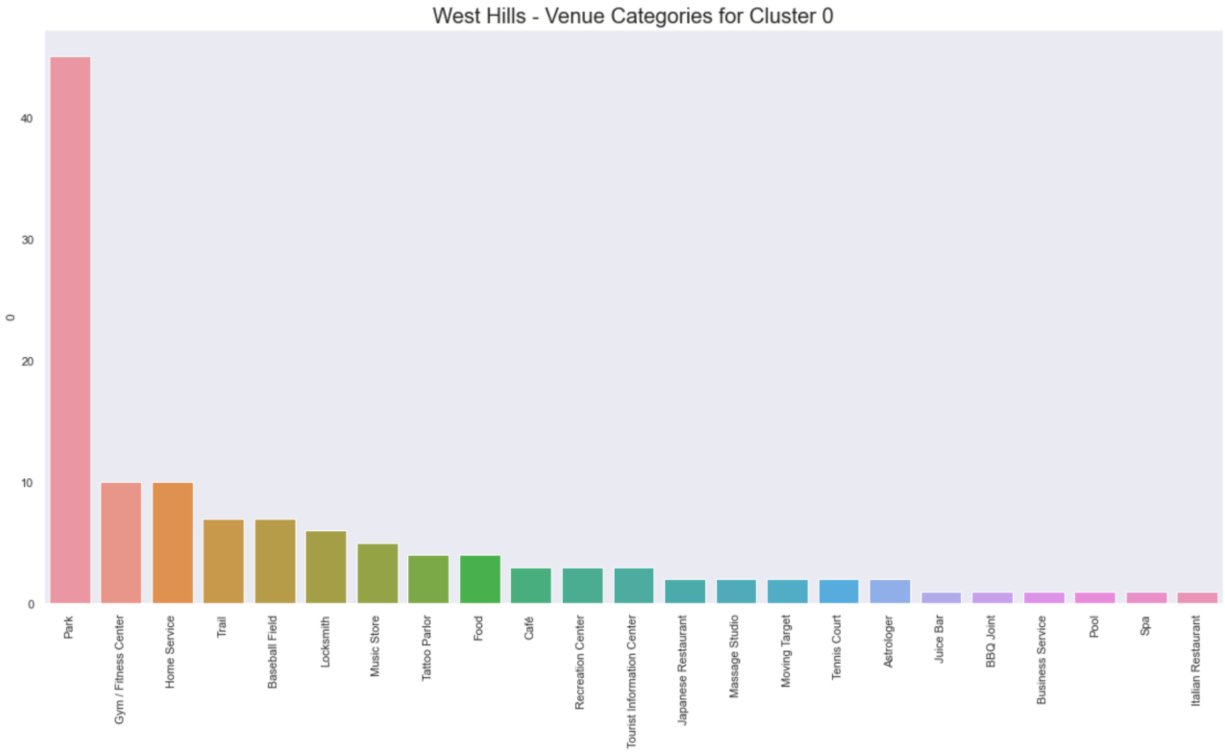

+
−
Ventura County
Los Angeles County
Plummer Street
CA 27
Chatsworth Dry Lake Nature Preserve
Rocketdyne Santa Susana Field Lab
Santa Susana Field Lab South Buffer
Valley Circle Boulevard
Bell Canyon
Upper Las Virgenes Open Space Preserve
Castle Peak 450 m
West Hills
do
boro

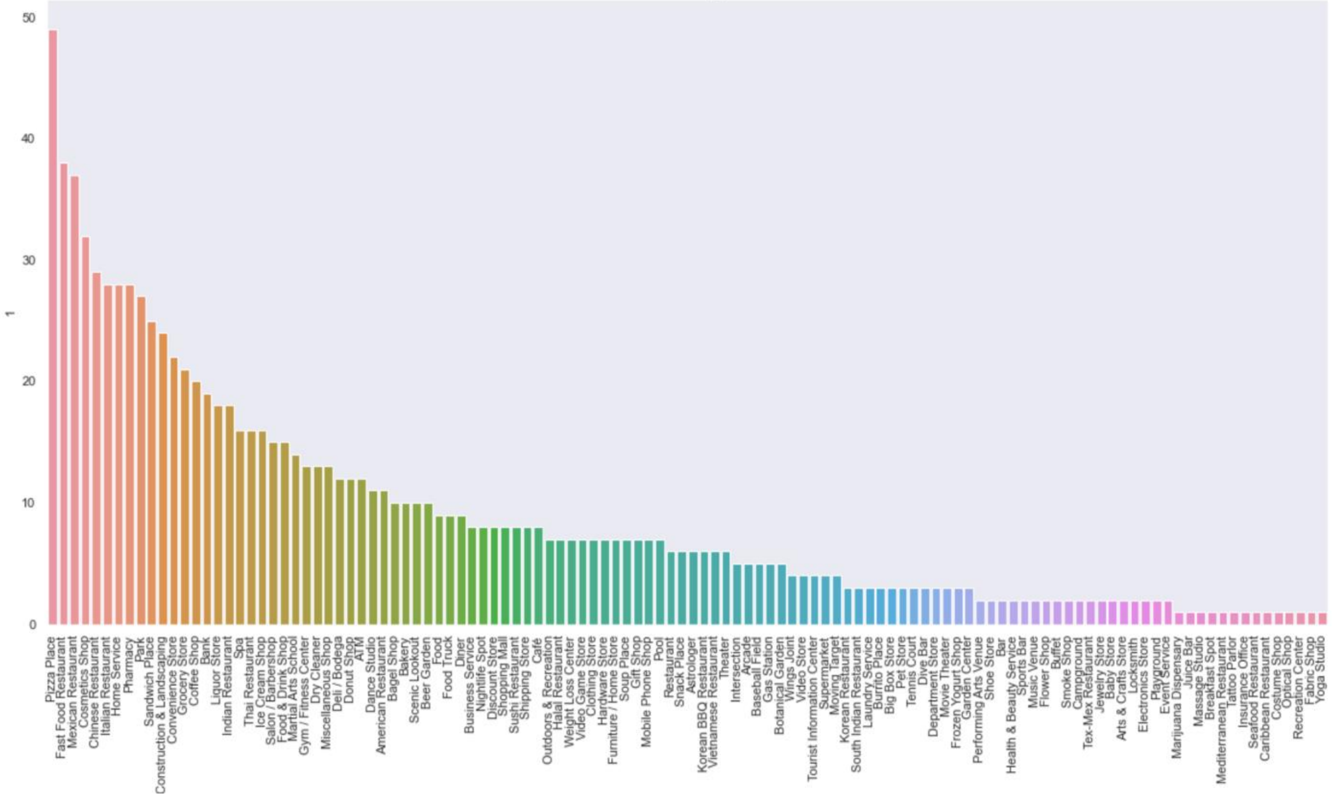
4.Results

In our quest to find out a most suitable location for the new branch of Bowling Alley in SVF's West Hills City, we found out that the city is fairly populated and has no bowling alley for the family recreation activity. However, that still doesn't answer the question what optimal location should our clients open their new Bowling Alley? We dig deeper to answer this question.

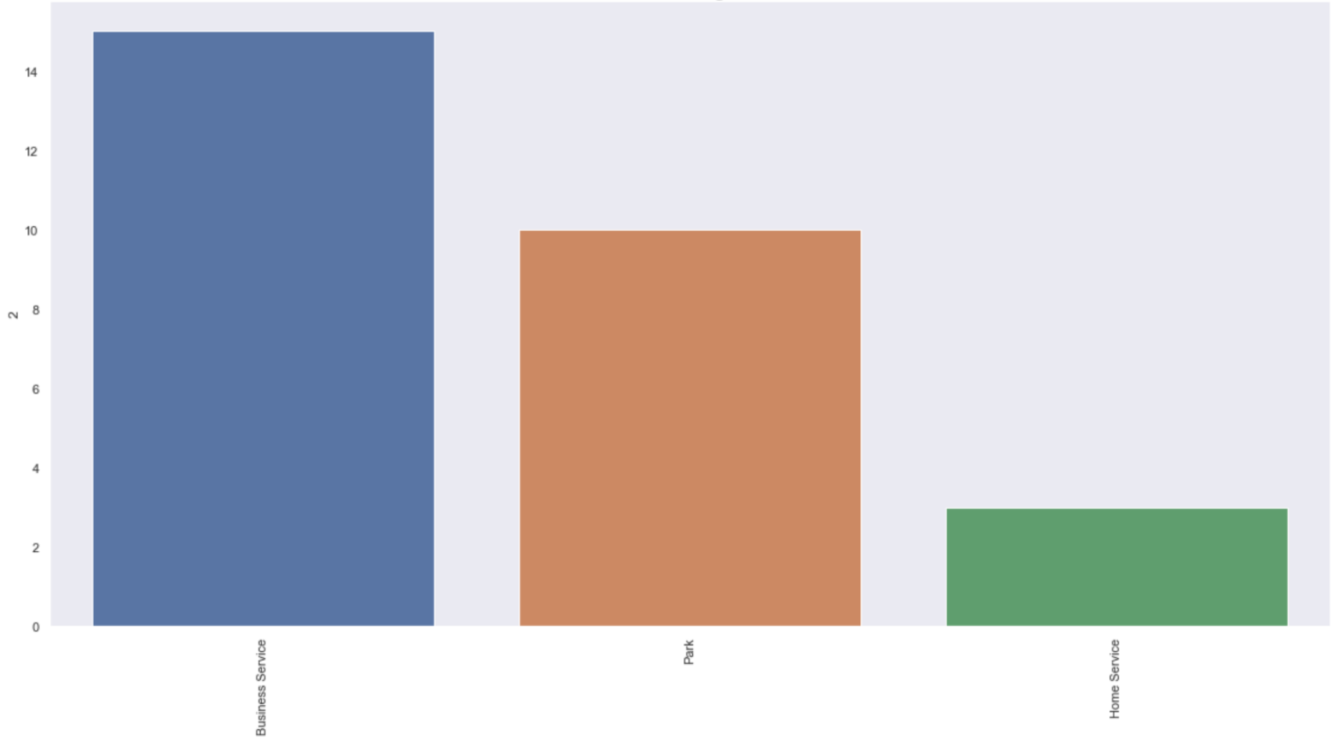
Our analysis shows that there are 122 unique venues/business, however we did not find any business which was a bowling activity for families and friends in the neighborhoods of geographical co-ordinates of 34.2032325 and -118.645476.

After clustering on venues and categories during the analysis we also discovered that a Cluster 0 and Cluster 1 have the greatest number of venues and activities. We discovered that there were many venues were common among the areas, however they all lacked the recreation activity precisely as Bowling. Please notice the clusters charts below.

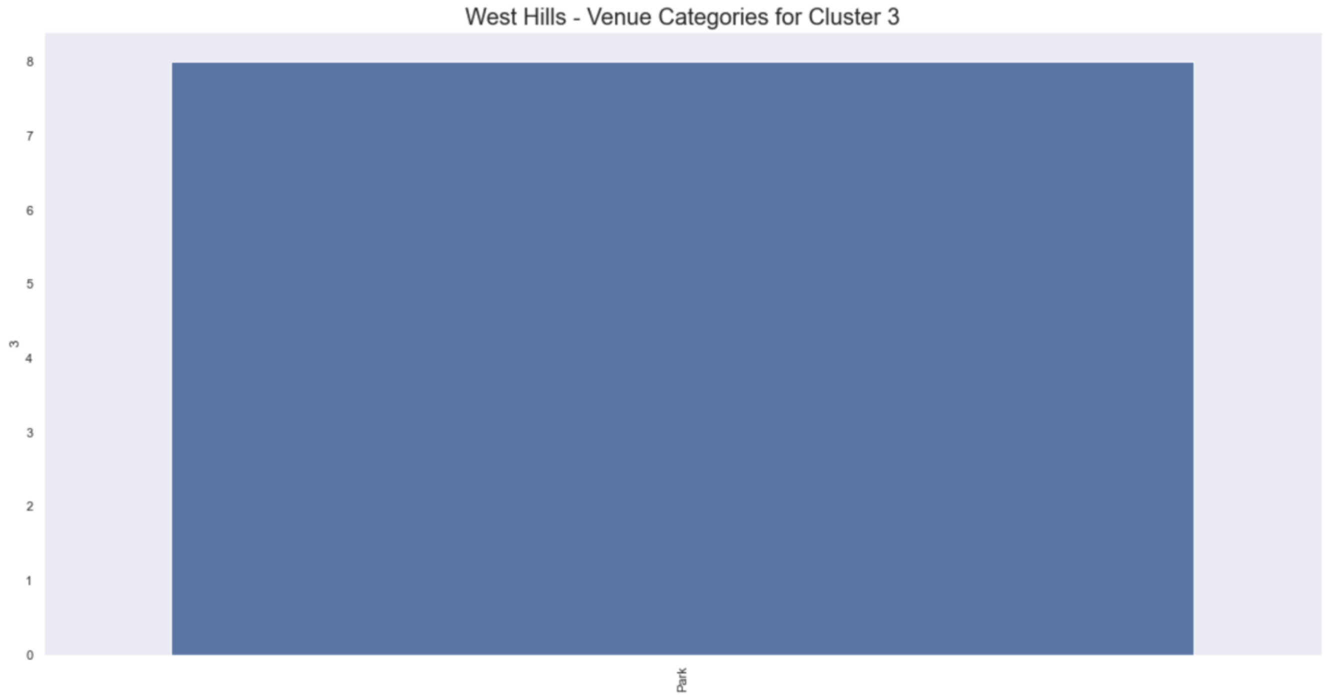


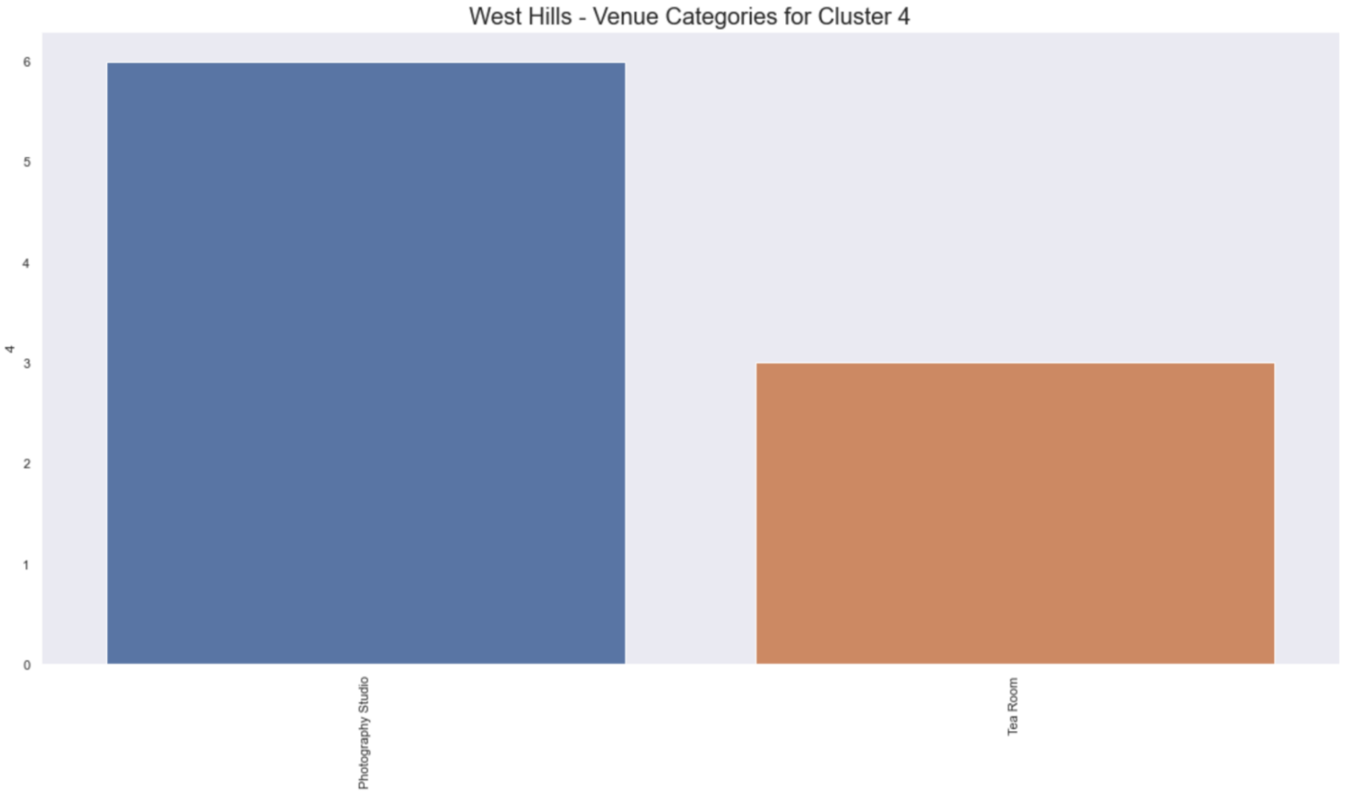


West Hills - Venue Categories for Cluster 1



West Hills - Venue Categories for Cluster 2





As our initial approach to find the most happening neighborhood and minimal competition in the bowling business, this report would be very beneficial to the client for decision making for a perfectly optimal location to open the new bowling alley. With all the given information it looks like locations in Cluster 3 would be more suitable. Lastly, there could be more considerations such as more detailed supportive data in order to come up with a more accurate finding.

5.Discussion

Our research revealed that a great number of venues/businesses are in West Hills, however it appears to have a very small number of family recreational activity in the vicinity. Specially a Bowling Alley type of activity. Most of the business are in the north-west of the city, however we found that the businesses are all over in cluster 4 as we use the K-Means clustering. Whatever the case we did not find any bowling alley in any of the neighborhoods. Practical our client (A well-known Bowling Chain) could open a new location either in the center of the city or north-west or east (which is covered in cluster 1). For future direction we could acquire more data on the city population behavior, income, age percentage area wise and so on, then we could do some more analysis and provide better accuracy.

6.Conclusion

The purpose of this research was to identify the best optimal location for opening a new branch of a Bowling Alley, with minimal competitor presence and maximum venue activity. We were successfully able to empower our client/stakeholder to make the decision on their own as we presented the statistics of the similar businesses in a neighborhood and common happening places and so on. We also with the help of our research found that there is no bowling alley in the city of West hills, which means zero or no competition in the similar type of business that our client is in.