Identifying Best Neighborhood in Silver Spring for opening an Alpha Gym center

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Objective

➢ To identify a neighborhood which would be better for opening a Gyms among the different Silver Spring neighborhoods.
➢ To explore the Neighborhoods of Silver Spring, Maryland

Introduction

A gymnasium is comes from the ancient Greek word *Gymnasium. It* refers to a location for gymnastic, athletics and gymnastic services. It is commonly found in athletics and fitness centers which is used for educational space in an Educational Institutions. Due to Great Britain colonization, the national interest in sport and games were extend to many other countries. In 1800s such programs were included in school and collage curriculum which emphasize health, strength and bodily measure. The Boston young men's Christian Union claims is the first Gym in United States in the mid of 1800"s [1]. Now a days, in every city there are lot of gyms are opening from time to time.

Going to a Gym fitness has several health benefits. The center for Disease Control and Prevention recommends that all adults get at least 30 minutes of moderate exercise for five days a week. Making a regular exercise has many physical and mental benefits[2].

Alpha fitness Gym is one of the privately owned center which equipped with new technology product equipments and well professional trainers. To open a new Gym center in one of the neighborhoods of Silver Spring, the Alpha Gym stake holders have to take in to account some important points. There should be an enough research on the location where the Gym is open that is about the population density, number of shopping centers found in the neighborhood and the average house rent of the neighborhood. The one which is open in a populous neighborhood and which has not that much expensive house rent is more profitable than the one which is open in a less dense residential area. It would be also more profitable if it is open nearby a shopping centers. At one walk , customer could do several things at a time; however, It is not advised to open a new Gym center nearby other Gyms since it may not be profitable in the future due to the competition that will be exist among the different Gyms.

Silver spring is a suburban city which is found in Montgomery county, Maryland. It extends from borders of Washington, DC to the South, Prince George County, Maryland to the east and Howard County, Maryland. to the North. Based on the United census bureau 2017 estimates, it has about 79,483 population living in this city. It is the most populous place in Maryland, after Baltimore, Columbia, and German town. It is the largest city in Montgomery County after German town. There are 76 neighborhoods [3].

In Silver Spring,   there are 79,483 residents living. It is colorful with diversified people along with their culture. There are 35.6% white, 25.5% Black, 8.1% Asian, 27.8% Hispanic/Latino, 0.1% native American and 0.2% others. The median age in this city is 34.1 years whereas United State median age is

37.4 years. The a average family size in silver spring is 2.5 whereas in United State is 2.6(https://www.bestplaces.net/people/city/maryland/silver_spring)

As it is a populous city, opening an additional Gym center in the city, would be a good business. The Alpha fitness Gym stakeholders decide to open an additional Gym in one of the neighborhood of silver spring after they studied the Gym market in the city. To identify the neighborhood where the new Gym would open, we will use the Foursquare API navigation method. Foursquare API is a navigation means from a Foursquare data base. It is used to explore a particular location and particular venues, to get trending venues and Foursquare users.

Understanding the problem

Now a days the demand of Gym is increasing from time to time; However, in some cities there is no enough Gym centers to serve the society especially in the populous cities such as: Baltimore, MD, Columbia, MD, Silver spring, MD and others. In this study, we are focusing on Silver Spring city of Maryland. In some Silver Spring neighborhoods, there is less or no Gym centers to serve the society to get such service, some customers have to travel or drive a long distance. Due to such case, the Alpha fitness Gym stake holders decide to add one additional branch in Silver Spring neighborhood so as to serve the society a quality service at a reasonable cost after they have studied the business in the city.

Data section

In this study we have been used the Silver Spring geographic location data to explore the Silver spring neighborhoods and to identify the best candidate neighborhood site for opening the alpha fitness Gym center. In this study, 76 neighborhoods are included namely: Arcola, Blair Portal, Brookside Forest, Burnt Mills Hills, Burnt Mills Knolls, Burnt Mills Manor, Burnt Mills Village, Chestnut Hills, Chestnut Ridge, Clifton Park Village, Connecticut Avenue Park, Cresthaven, Deer Park, Downtown Silver Spring, Downtown Wheaton, East Springbrook, Fairland Heights, Forest Glen, Forest Glen Park, Four Corners, Foxhall, Franklin Knolls, Georgian Forest, Glemont Forest, Glen Haven, Glenallen, Glenmont, Glenmont Hills, Glenmont Village, Glenview, Goodacre Knolls, Green Wood Knolls, Highland View, Hillandale Forest, Hillandale Heights, Holiday Park, Homestead Estates, Indian Spring Terrace, Indian Spring Village, Kemp MIll Estates, Kemp Mill, Layhill South, Linden, Lute, Montgomery Hills, Montgomery Knolls, New Hampshire Estates, North Hills Sligo Park, Northwest Park, Northwood Forest, Northwood Park, Oakview, Pine Hill, Players Mill Estates, Quaint Acres, Rock Creek Gardens, Rolling Acres, Rosemary Hills, Seven Oaks, Silver Spring Park, Sligo Park Hills, South Woodside Park, Springbrook, Springbrook Forest, Springbrook Manor, Stephen Knolls, Stoney Brook Estates, Sunset Terrace, Viers Mill Village, Wheaton, Wheaton Crest, Wheaton Forest, Wheaton Hills, Woodside, Woodside Forest, WoodsidePark[4]. This data set contains Neighborhood, zip-code, city, county, population(size), median house hold income and population density variables and the derived latitude and longitude variable from the address.

Methodology

To explore the Silver Spring neighborhoods, we have been used a data visualization techniques such as: bar chart and Boxplot. We have been used also the scatter plot to see the relationship nature of population size with median house income of each neighborhood. To address the statement of the problem, we have been used a foursquare API techniques so as to identify the best site for the opening alpha GYM center.

Results

As shown in the Table1.0, 76 neighborhoods are included in the study. The average and standard deviation of median household income and Population density of the neighborhoods are $ 94320.882, and $18123.699 and 7259.553 and 4126.759 people per square mile respectively. From the standard deviations we can infer that as there is a great variability among household income and Population density of the different neighborhood residents. 25% of the neighborhoods have a house hold income and population density below $82554.00 and 4417.750 people per square mile respectively. The median household income and population density are $90649.500 and 6863.500 people per square mile respectively. 25% of the neighborhood has above $107601.25 and 9207.250 people per square mile. The minimum and maximum median house hold income and population density are $60821.000, and 1426.000 and $138995.000 and 28244.00 respectively

Table 1.0: Median house hold income and population density summarization of the Neighborhoods

	N	Mean	std	Min	25%	50%	75%	Max
Median HHs_Income	76.0	94320.882	18123.699	60821.0	82554.00	90649.5	107601.25	138995.0
Population_Density	76.0	7259.553	4126.759	1426.0	4417.75	6863.5	9207.25	28244.0

As it is shown in the Figure 1.0 boxplot below there is a great variiablity in the population size of the neighborhoods. Glenmont and Wheaton neighborhoods looks an outlier neighborhoods. They have much higher population size as compare other neighborhoods.
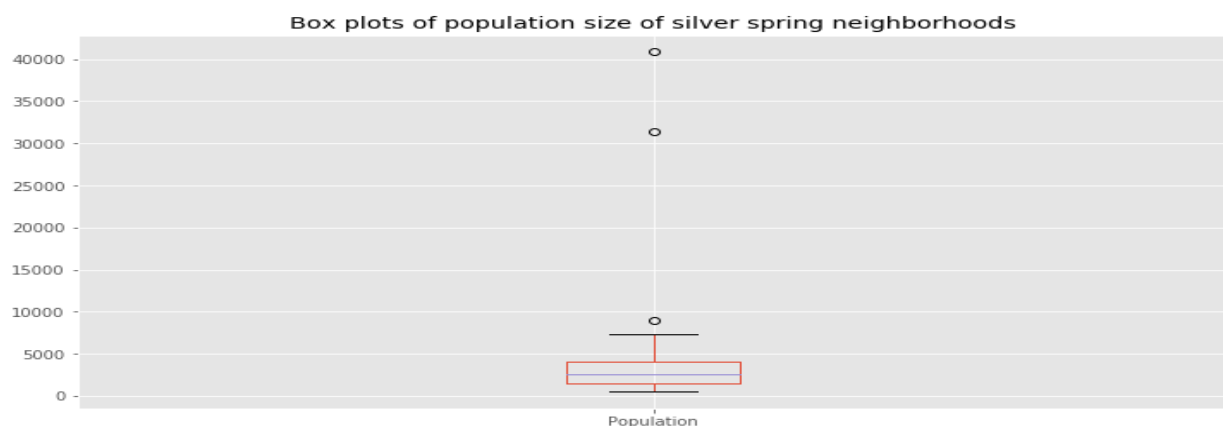

Figure 1.0: Box plot of the population size of Silver Spring neighborhoods

As shown in Figure 2.0 bar chart below, Glenmont and Wheaton neighborhoods residents are much higher than other neighborhoods. This supports for the information obtained in Figure 1.0 above.
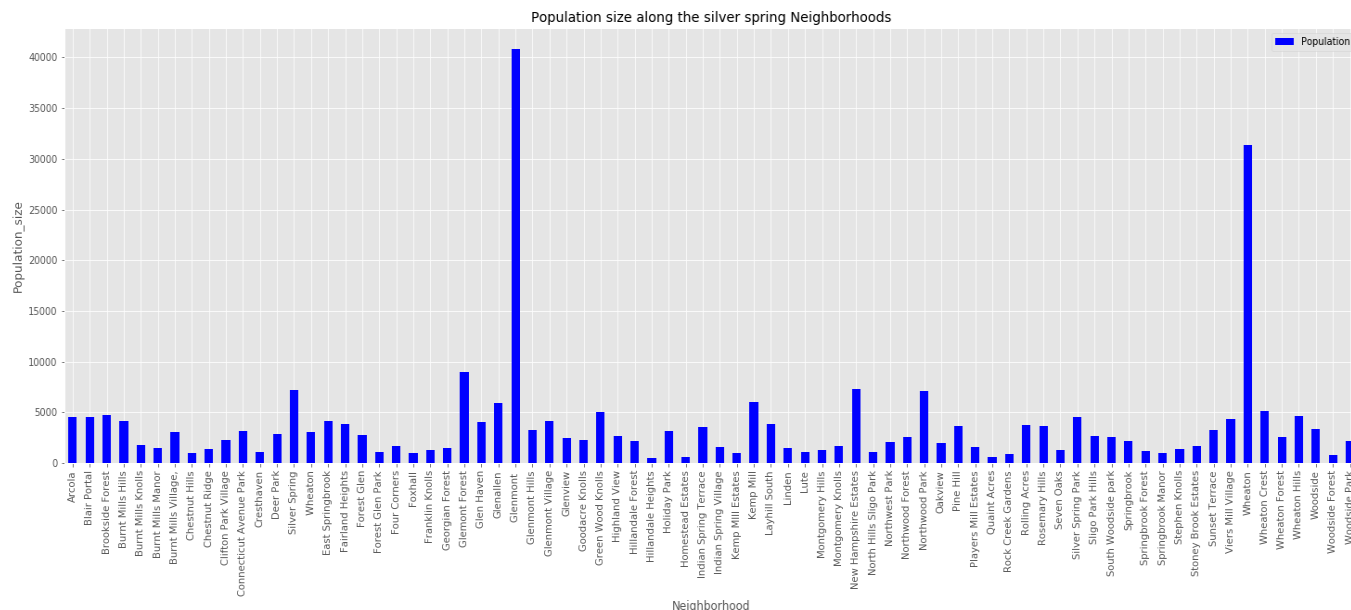

Figure 2.0: Population size of each neighborhood

Figure 3.0 below shows the population density of each neighborhood. Blair portal neighborhood is the most dense neighborhood. highest people is living per square mile. Springbrook Forest neighborhood has the least people dwelling per square mile
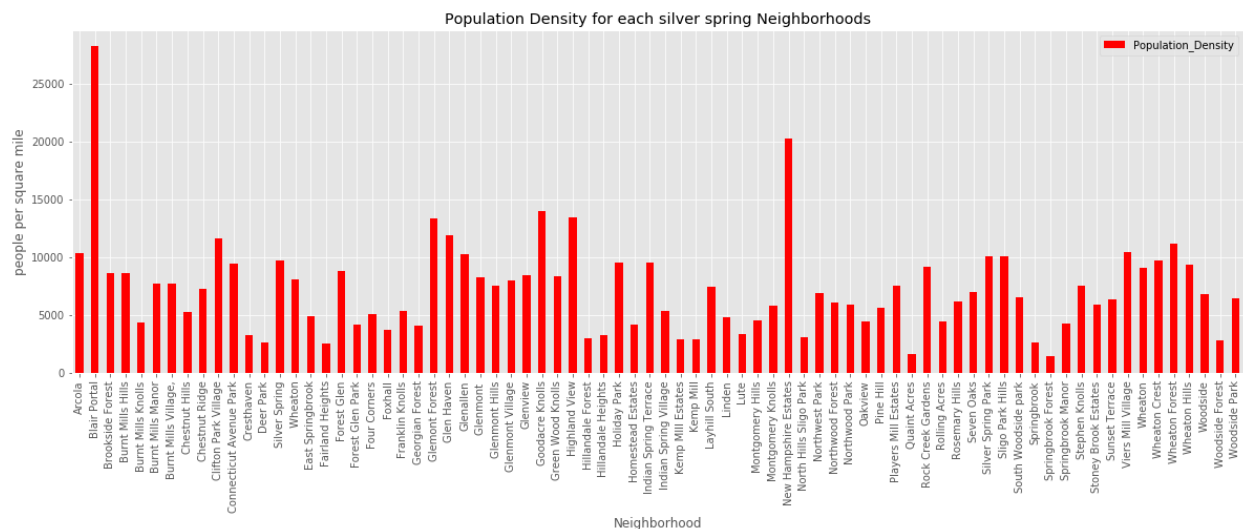

Figure 3.0: The Population density of each neighborhood (people per square mile)

Figure 4.0 below shows the distribution of median house hold income along the silver spring neighborhoods. As it shown, Woodside Forest and Northwood Forest residents have a highest and lowest median house hold income respectively.
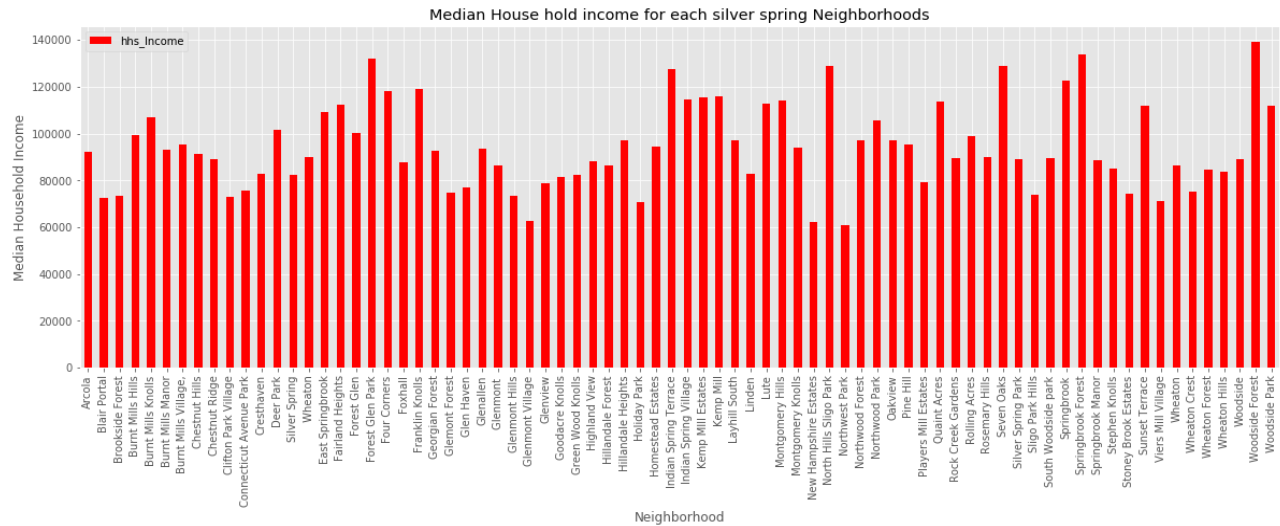
Figure 4.0: Median household income for each neighborhoods

Figure 5.0 below shows as there is a negative relation ship between population size and median house hold income of the neighborhoods. As the population size increase the median house hold income decrease and vice versa.
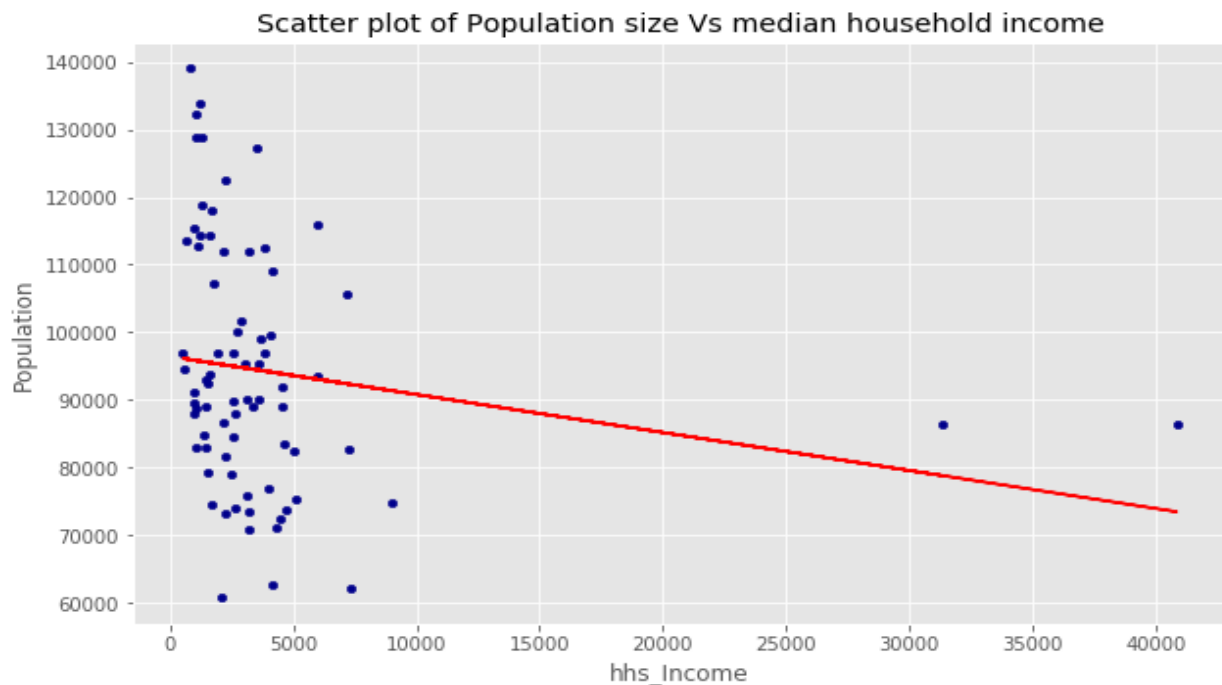
Figure 5.0: Scatter plot of Population Size Vs median house hold income of each neighborhood

Table 2.0 summarizes the number of Gyms found in each neighborhoods. As it shows there are few number of neighborhoods which has a Gym center. Most of the other neighborhoods do not have a Gym at all. Downtown Silver Spring has a large number of Gyms among the Silver Spring neighborhoods.

Table 2.0: The distribution of Gyms in the different neighborhood of Silver Spring, Md

Neighborhood	N_Gyms Name	N_Gyms category	N_Latitude	N_Longitude
Arcola	0	0	0	0
Blair Portal	3	3	3	3
Brookside Forest	0	0	0	0
Burnt Mills Hills	0	0	0	0
Burnt Mills Knolls	2	2	2	2
Burnt Mills Manor	1	1	1	1
Burnt Mills Village	1	1	1	1
Chestnut Hills	0	0	0	0
Chestnut Ridge	0	0	0	0
Clifton Park Village	1	1	1	1
Connecticut Avenue Park	0	0	0	0
Crest haven	0	0	0	0
Deer Park	0	0	0	0
Downtown Silver Spring	16	16	16	16
Downtown Wheaton	2	2	2	2
East Springbrook	0	0	0	0
Fairland Heights	0	0	0	0
Forest Glen	0	0	0	0
Forest Glen Park	0	0	0	0
Four Corners	1	0	1	1
Foxhall	0	0	0	0
Franklin Knolls	0	0	0	0
Georgian Forest	0	0	0	0
Glemont Forest	0	0	0	0
Glen Haven	2	2	2	2
Glenallen	0	0	0	0
Glenmont	0	0	0	0
Glenmont Hills	0	0	0	0
Glenmont Village	0	0	0	0
Glenview	2	2	2	2
Goodacre Knolls	0	0	0	0
Green Wood Knolls	0	0	0	0
Highland View	0	0	0	0
Hillandale Forest	0	0	0	0
Hillandale Heights	0	0	0	0
Holiday Park	0	0	0	0
Homestead Estates	0	0	0	0
Indian Spring Terrace	0	0	0	0
Indian Spring Village	0	0	0	0
Kemp MIll Estates	0	0	0	0
Kemp Mill	0	0	0	0
Layhill South	0	0	0	0
Linden	0	0	0	0
Lute	0	0	0	0
Montgomery Hills	0	0	0	0
Montgomery Knolls	0	0	0	0
New Hampshire Estates	1	1	1	1
North Hills Sligo Park	0	0	0	0
Northwest Park	0	0	0	0
Northwood Forest	0	0	0	0
Northwood Park	0	0	0	0
Oakview	0	0	0	0
Pine Hill	0	0	0	0

Players Mill Estates	0	0	0	0
Quaint Acres	0	0	0	0
Rock Creek Gardens	0	0	0	0
Rolling Acres	3	3	3	3
Rosemary Hills	2	2	2	2
Seven Oaks	0	0	0	0
Silver Spring Park	1	0	1	1
Sligo Park Hills	1	1	1	1
South Woodside park	0	0	0	0
Springbrook	0	0	0	0
Springbrook Forest	0	0	0	0
Springbrook Manor	0	0	0	0
Stephen Knolls	1	1	1	1
Stoney Brook Estates	0	0	0	0
Sunset Terrace	0	0	0	0
Viers Mill Village	0	0	0	0
Wheaton	3	3	3	3
Wheaton Crest				
Wheaton Forest	5	4	5	5
Wheaton Hills	0	0	0	0
Woodside	0	0	0	0
Woodside Forest	0	0	0	0
Woodside Park	8	8	8	8

Figure 6.0 below shows the distribution of Gyms center with in 76 neighborhood of Silver spring city. As it shown, there are more number of Gyms in the downtown Silver Spring and Wheaton neighborhoods of the Silver Spring city.
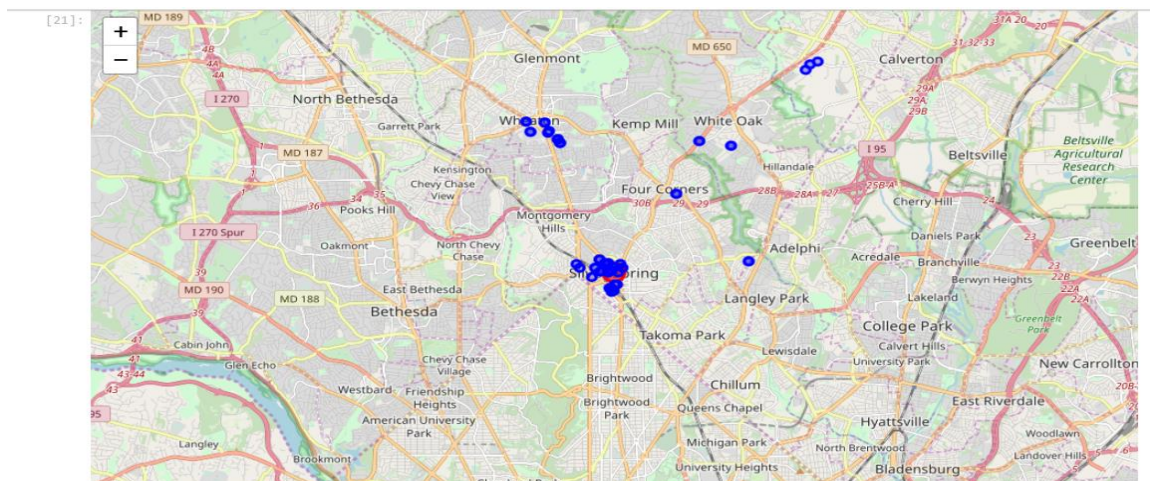

Figure 6.0: Summarizes the number of Gym centers in Silver Spring city

Table 3.0, below shows that the distribution of shopping centers in each neighborhoods. Downtown silver spring and Wheaton have large number of shopping centers as compared others. There are some other neighborhoods which is not included in this table which have no a shopping center within the 500 meter radius based on the Fouresquare API such as: Burnt Mills Hills, Chestnut Hills, Chestnut Ridge, Clifton Park Village, Cresthaven, Deer Park, Fairland Heights, Foxhall, Franklin Knolls, Georgian Forest, Glemont Forest, Glen Haven, Glenmont Hills, Green Wood

Knolls, Hillandale Forest, Hillandale Heights, Indian Spring Village, Kemp MIll Estates, Kemp Mill,Montgomery Knolls, Northwest Park, Quaint Acres, South Woodside park, Springbrook, Springbrook Forest, Springbrook Manor, Sunset Terrace, Woodside Forest.

Table 3.0: The distribution of shopping center in each of the neighborhood

Neighborhood	name	categories	Latitude	Longitude
Arcola	6	6	6	6
Blair Portal	6	6	6	6
Brookside Forest	1	1	1	1
Burnt Mills Knolls	2	2	2	2
Burnt Mills Manor	4	4	4	4
Burnt Mills Village	3	3	3	3
Connecticut Avenue Park	1	1	1	1
Downtown Silver spring	30	28	30	30
Downtown Wheaton	16	15	16	16
East Springbrook	2	2	2	2
Forest Glen	2	2	2	2
Forest Glen Park	3	3	3	3
Four Corners	2	2	2	2
Glenallen	5	5	5	5
Glenmont	3	3	3	3
Glenmont Village	4	4	4	4
Glenview	1	1	1	1
Goodacre Knolls	1	1	1	1
Highland View	1	1	1	1
Holiday Park	3	3	3	3
Homestead Estates	2	2	2	2
Indian Spring Terrace	2	2	2	2
Layhill South	1	1	1	1
Linden	8	8	8	8
Lute	6	5	6	6
Montgomery Hills	4	4	4	4
New Hampshire Estates	8	8	8	8
Northwood Forest	4	3	4	4
Northwood Park	4	3	4	4
Oakview	1	1	1	1
Pine Hill	2	2	2	2
Players Mill Estates	4	4	4	4
Rock Creek Gardens	5	5	5	5
Rolling Acres	10	10	10	10
Rosemary Hills	4	4	4	4
Seven Oaks	1	1	1	1
Silver Spring Park	1	1	1	1
Sligo Park Hills	2	2	2	2
Stephen Knolls	2	2	2	2
Stoney Brook Estates	1	1	1	1
Viers Mill Village	1	1	1	1
Wheaton	22	21	22	22
Wheaton Crest	1	1	1	1
Wheaton Forest	10	10	10	10
Wheaton Hills	3	3	3	3
Woodside	3	3	3	3
Woodside Park	30	29	30	30

Discussion

In this analysis we have included 76 Silver Spring neighborhoods so as to find the best site for opening the Alpha Gym center by using the Foursquare API. As we can see from the exploratory data analysis Table 1.0, the average median house hold income and population density are $94320.882 and 7259.553 people per square mile respectively. The standard deviation of the median household income and Population density of the neighborhoods are 18123.699 and 4126.759 respectively. This indicate that as there is a great variability in the median house hold income and population density among the different neighborhoods of silver spring, MD. Bliar portal (28244.000 people/square mile) and Springbrook forest (1426.000 people per square mile) are the highest and lowest densed neighborhoods respectively. Woodside Forest (138995.000) and North west park (60821.000) has the highest and lowest average household income respectively.

From Figure 3.0 bar chart, we can summarize the population density of each neighborhood. The Blair Portal, New Hampshire estates and Goodacre knolls are the first, second and third densed neighborhoods of Sliver Spring respectively. On the other hand, Fairland, Quaint acres and Springbrook forest are the 74th,75th and 76th densed neighborhoods of the city, Silver Spring respectively.

From Figure 4.0 bar chart, we can summarize the median household income of the different neighborhood residents. Residents in Woodside Forest, Springbrook Forest and Forest Glen Park neighborhoods have the first, second and third median household income of those seventy six neighborhoods respectively. Residents in Glenmont Village, New Hampshire Estates and Northwest Park have the 74th,75th and 76th median household income out of the seventy six neighborhoods respectively.

Figure 5.0 shows as there is a negative correlation between the population size of each neighborhood with the median household income; However, it is not statistically significant at alpha 0.05 level of significance.

Table2.0 summarizes the number of Gyms in each of the neighborhood. Of these Silver Spring downtown has large number of Gyms. Most of the neighborhood have no Gym centers such as: Arcola, Brookside Forest, Burnt Mills Hills, Chestnut Hills, Chestnut Ridge, Connecticut Avenue Park, Crest haven, Deer Park, East Springbrook, Fairland Heights, Forest Glen, Forest Glen Park, Foxhall, Franklin Knolls, Georgian Forest, Glemont Forest, Glenallen, Glenmont, Glenmont Hills, Glenmont Village, Goodacre Knolls, Green Wood Knolls, Highland View, Hillandale Forest, Hillandale Heights, Holiday Park, Homestead Estates, Indian Spring Terrace, Indian Spring Village, Kemp MIll Estates, Kemp Mill, Layhill South, Linden, Lute, Montgomery Hills, Montgomery Knolls, North Hills Sligo Park, Northwest Park, Northwood Forest, Northwood Park, Oakview, Pine Hill, Players Mill Estates, Quaint Acres, Rock Creek Gardens, Seven Oaks, South Woodside park, Springbrook, Springbrook Forest, Springbrook Manor, Stoney Brook Estates, Sunset Terrace, Viers Mill Village, Wheaton Crest, Wheaton Hills, Woodside, Woodside Forest. It would be worthy if the Gym is opened in the neighborhood which has few or no Gyms area. If there are some Gyms there around in the new site, the new opening Gym may not be profitable.

From Table 3.0 we can summarize the number of shopping centers in each neighbor hood. In Silver spring down town there are high number of shopping areas, about 30 followed by Wheaton about 22. Some customers prefer to go to the Gyms which is found nearby the shopping center, at one stope they

can do several things, shopping. So that choosing the site close to the shopping center would be a advantageous.

From Table2.0 we can say that the New Hampshire Estates has only one apartment Gyms based on the result obtained by Foursquare API, but it is not a business Gyms. It gives a service only for the individuals who are living there in the apartments so that we can say that as there is no business Gym in that neighborhood. According to the 2016, US statistics bureau, the median house rent in New Hampshire Estate is $1,220 where as the median for silver spring is $1,446 that means, the house rent in this neighborhood is bellow the city median almost by $200. From Figure 3.0, we can say that New Hampshire Estates is the second populous of the Silver Spring city next to Bliar portal neighborhood. So that the Alpha Gym stake holders would be worthful if they open a new Gym in New Hampshire Estates neighborhood of the Silver Spring, MD.

Conclusion

In this study we have include 76 Silver Spring neighborhoods so as to identify the neighborhood which is best for opening an Alpha Gym center and to explore the Silver spring neighborhoods. From this we can understand that there is a great variability in population size, median household income and population density of the different neighborhoods. A foursquare was used to find the number of Gyms and shopping center in each neighborhood. New Hampshire Estates is one of the denser neighborhood in Silver Spring and it has no business Gym center. So that New Hampshire Estates would be the best site for opening the new Alpha Gym center.

Reference

[1] https://en.wikipedia.org/wiki/Gym

[2] https://www.livestrong.com/article/514902-the-advantages-of-going-to-the-gym-every-day/

[3] https://en.wikipedia.org/wiki/Silver_Spring,_Maryland

[4] http://www.city-data.com/nbmaps/neigh-Silver-Spring-Maryland.html