

Philadelphia Housing Price Analysis

Introduction

Philadelphia is one of the most oldest cities in the United States. It locates on the east coast. However, its housing price is not as high as other major cities such as New York, Boston, and Washington DC. Also, not only is the Philadelphia real estate market affordable, but it offers advantageous entry point to the market. That's because it's one of the few most populous cities that has an affordable investment property price. Therefore, it always attracts real estate investors attention. In this project, I am trying to use venues data to analyze Philadelphia's housing market.

Data Description

The data I am using in the project are: 1. The list of neighborhood in Philadelphia from Wiki. 2. Foursquare API to get the most common venues of given Neighborhood in Philadelphia. 3. The average housing price per square foot of each neighborhood.

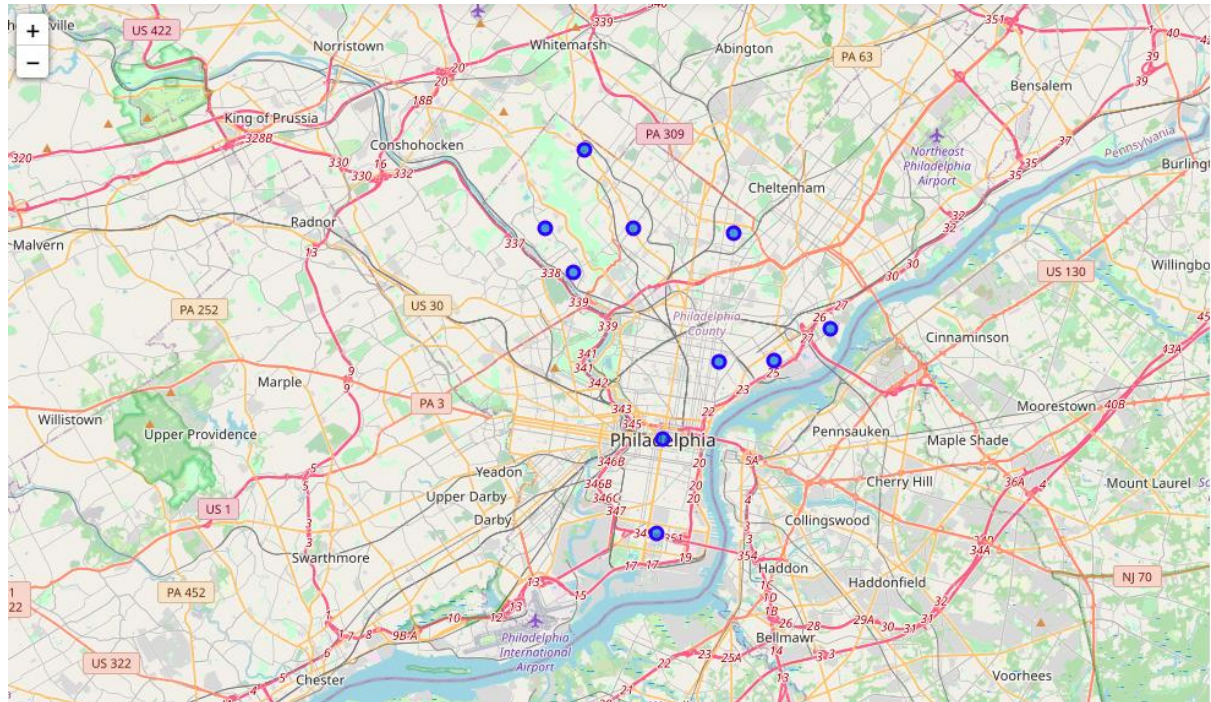
Methodology

I used GitHub repository as my database for this project. My master data include neighborhood, housing price per square foot, neighborhood's latitude, and longitude.

	Neighborhood	Price
0	Bridesburg	187
1	Center City	393
2	Chestnut Hill	210
3	Germantown	192
4	Kensington	718
5	Manayunk	194
6	Olney	219
7	Port Richmond	176
8	Roxborough	188
9	South Philadelphia	236

	City	Neighborhood	Latitude	Longitude
0	Philadelphia	Center City	39.952724	-75.163526
1	Philadelphia	South Philadelphia	39.912599	-75.166790
2	Philadelphia	Southwest Philadelphia	39.952724	-75.163526
3	Philadelphia	West Philadelphia	39.952724	-75.163526
4	Philadelphia	Bridesburg	40.000390	-75.069618
5	Philadelphia	Kensington	39.985946	-75.131843
6	Philadelphia	Port Richmond	39.986355	-75.100917
7	Philadelphia	Roxborough	40.043220	-75.229284
8	Philadelphia	Manayunk	40.024557	-75.214068
9	Philadelphia	Germantown	40.043445	-75.180177
10	Philadelphia	Chestnut Hill	40.077055	-75.207400
11	Philadelphia	Olney	40.041223	-75.123786
12	Philadelphia	Oak Lane	39.952724	-75.163526

I used folium to visualize geographic details of Philadelphia and its neighborhood, and I create a map of Philadelphia with neighborhoods superimposed on top. The map is shown as below based on longitude and latitude.



I also utilized the Foursquare API to explore the boroughs and segment them. I designed the limits as 100 venue and the radius 500 meter for each neighborhood from their given latitude and longitude information. Below is a head of the list Venues name, category, latitude and longitude information from Foursquare API.

```
print(philly_venues.shape)
philly_venues.head()
```

(254, 7)

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Center City	39.952724	-75.163526	Dilworth Park	39.952772	-75.164723	Park
1	Center City	39.952724	-75.163526	City Hall Courtyard	39.952484	-75.163592	Plaza
2	Center City	39.952724	-75.163526	The Wanamaker Organ	39.951536	-75.162752	Concert Hall
3	Center City	39.952724	-75.163526	The Ritz-Carlton, Philadelphia	39.951446	-75.164149	Hotel
4	Center City	39.952724	-75.163526	Fogo De Chão	39.950917	-75.162971	Churrascaria

In summary, there are 254 venues in my data.

Then, in order to cluster the neighborhood, I used unsupervised learning K-means algorithm.

Result

Philadelphia's housing price will be divided into 4 groups: low price area \$187.4/sq. foot; middle low price area \$221.7/sq. foot; middle high price area: \$393/sq. foot; high price area: \$718/sq.foot

```
In [298]: cluster0_with_price.mean()
```

```
Out[298]: Price      187.4  
dtype: float64
```

```
In [299]: cluster1_with_price.mean()
```

```
Out[299]: Price      718.0  
dtype: float64
```

```
In [300]: cluster2_with_price.mean()
```

```
Out[300]: Price      393.0  
dtype: float64
```

```
In [301]: cluster3_with_price.mean()
```

```
Out[301]: Price      221.666667  
dtype: float64
```

Analysis:

1. Cluster 0 is low price area. The most common venue is Pizza Place, Bar and Coffee shop.
2. Cluster 1 is high price area which is \$718/sq. foot. The first two most common area is Vietnamese restaurant.
3. Cluster 2 is middle high price area. Hotel and Coffee shop rank the first two.
4. Cluster 3 is middle low price area. American Restaurant and Korean Restaurant are the most popular venues.

cluster0_with_price

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	Price
0	Bridesburg	Pizza Place	Café	Food & Drink Shop	Convenience Store	Speakeasy	Baseball Field	Bar	Bus Station	Gym / Fitness Center	Video Store	187
1	Port Richmond	Bar	Coffee Shop	Bakery	Pet Store	Park	Department Store	Salon / Barbershop	Music Venue	Snack Place	Pizza Place	176
2	Roxborough	Coffee Shop	Bank	Dessert Shop	Diner	Discount Store	Chinese Restaurant	Doctor's Office	Donut Shop	Mobile Phone Shop	Fast Food Restaurant	188
3	Manayunk	Pizza Place	Bar	Furniture / Home Store	Food Truck	Coffee Shop	Dessert Shop	Dive Bar	Caribbean Restaurant	Brewery	Food & Drink Shop	194
4	Germantown	Vegetarian / Vegan Restaurant	Accessories Store	BBQ Joint	Museum	Pharmacy	Photography Studio	History Museum	Bus Stop	Historic Site	Art Gallery	192

cluster2_with_price

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	Price
0	Center City	Hotel	Coffee Shop	American Restaurant	Spa	Convenience Store	Sandwich Place	New American Restaurant	Yoga Studio	Mexican Restaurant	Restaurant	393

cluster1_with_price

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	Price
0	Kensington	Vietnamese Restaurant	Chinese Restaurant	Athletics & Sports	Metro Station	Light Rail Station	Pizza Place	Other Nightlife	Train Station	Thrift / Vintage Store	Mobile Phone Shop	718

Conclusion:

Based on my analysis, Philadelphia's Housing Price is certainly decided by different category venues. However, housing price depends on different factors not only venues' category. Real estate investors could be made investment decision rely on my preliminary analysis.