Optimal Choice Analysis of Buying House in Nashua, NH

By – Parul Agarwal
(April 18ᵗʰ 2019)

1. Introduction

The study of optimal choice analysis of buying house in Nashua, NH is inspired by my friend 'Emma' who works with 'Oracle Corporation' in Seattle, WA; and is planning to move to 'Oracle' office in Nashua, NH. Emma has a daughter who is 5 years old, and when buying a house; proximity of house from office and school with good rating near the house would play a very important role in her decision.

Nashua 'The Gate City' was twice named the 'Best Place to Live in America' in 1987 and again in 1998, and again in year 2017, this city was ranked in top 50 U.S. cities to live. With great neighborhood, extremely low crime rate, excellent schooling, very low-income taxes and being very close to Boston makes Nashua a great city to raise kids, buy properties and even retire.

When I talked to Emma, she was excited to move to Nashua, leaving the busy city life and coming to Nashua, and as I have been living in Nashua for last decade; has asked me if I can narrow down the choices and provide her with list of houses that she might be interested in.

2. A description of the data and how it will be used to solve the problem

2.1 Description of Data and Data Source

To appropriately address Emma's requests, I approached them as follows:

- Collected data from ColdwellBankerHomes.com, from which I collected details of houses such as Price, number of bedrooms, location (Latitude, Longitude), Area (Sq. Ft.), zip code and more

- Carefully inspecting HTML data from the website for search requests, I scraped data using Python and cleaned before storing in appropriate format for further use.

- This rich data was overwhelming and Emma is looking for houses with at least 3 bedrooms and price, not more than $400,000. Therefore, I filtered that data to match the needs.

- With help of geospatial data (Latitude and Longitude), I plotted the data on the map for better visualization.

- This marker for house on sales are added with hover tooltip, to see more details

- From Nashua School District website: www.nashua.edu, I collected the information about street name and which school they belong to.

- Combining the data from www.nashua.edu with house listing data fetched from ColdwellBankerHomes.com gave more information about school zone for each house in the market

- Now it should be easy to filter houses in certain school group which would match Emma's needs

- Using FourSquare.com, I collected venue information relative to geolocation of houses listed and ranked them.

- Finally, once all of the above data is cleaned and prepared, with the help of Clustering the data, the map would show the clusters of houses which fall in certain school range, and the visualization would be very helpful for Emma to view selective houses of her interest.

2.2 Data Detail

- House data frame from www.coldwellbankerhomes.com for Nashua, NH

	Unnamed: 0	Borough	Address	ZipCode	BedRooms	\
0	0	Nashua	37 Majestic Ave	03063	3	
1	1	Nashua	7 Syracuse Rd	03064	4	
2	2	Nashua	42 Norma Dr	03062	3	
3	3	Nashua	14 Artillery Ln	03064	3	
4	4	Nashua	15 Cannongate III Rd	03063	2	
5	5	Nashua	107 Tolles N Of Lock St St	03064	3	
6	6	Nashua	90 Chandler St	03064	3	
7	7	Nashua	5 Autumn Leaf Dr	03060	2	
8	8	Nashua	82 Cherrywood Dr	03062	3	
9	9	Nashua	23 Amble Rd	03062	3	
10	10	Nashua	109 Bowers St	03060	0	
11	11	Nashua	12 Curtis Dr	03062	3	
12	12	Nashua	23 Caron Ave	03064	3	
13	13	Nashua	7 Duckford Cir	03063	3	
14	14	Nashua	18 Harbor Ave	03060	2	
15	15	Nashua	50 Raymond St	03064	5	
16	16	Nashua	8 Huntingdon Ln	03062	4	
17	17	Nashua	36 Dublin Ave	03063	3	
10	10	N--h--	14 C----- C+	02062	2	

```
listNashua.shape
```
```
(480, 10)
```

-   Elementary school data frame from www.nashua.edu for Nashua, NH

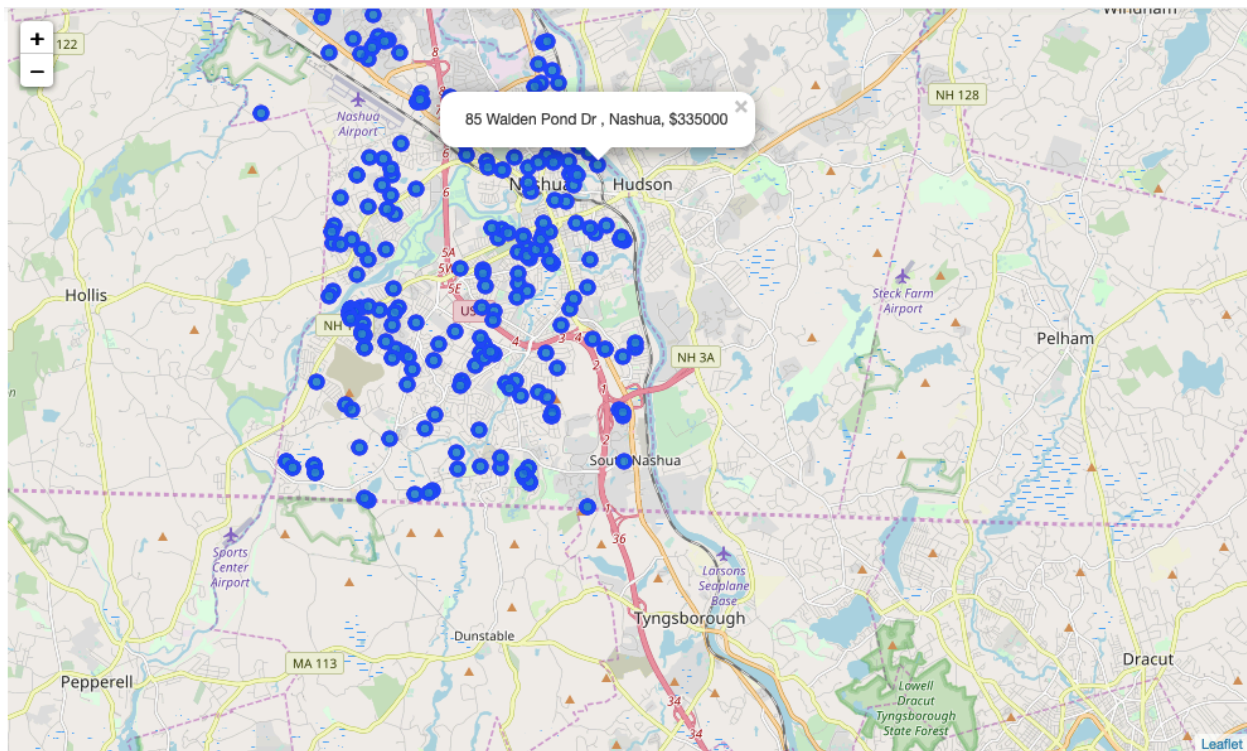|	Street Name	Elementary School	School Rating	lat	long
0	Abbe Ln	Birch Hill	4	42.748814	-71.527122
1	Abbott St	Mt. Pleasant	2	42.769575	-71.469794
2	Aberdeen Ln	Main Dunstable	6	42.719241	-71.495093
3	Acacia St	Main Dunstable	6	42.729208	-71.504340
4	Academy Dr	Charlotte Ave	5	42.787055	-71.465856

```
# Save data on desktop file name NH_school1
school.to_csv(r'/Users/parul/Desktop/NH_school1.csv',index=False)
```
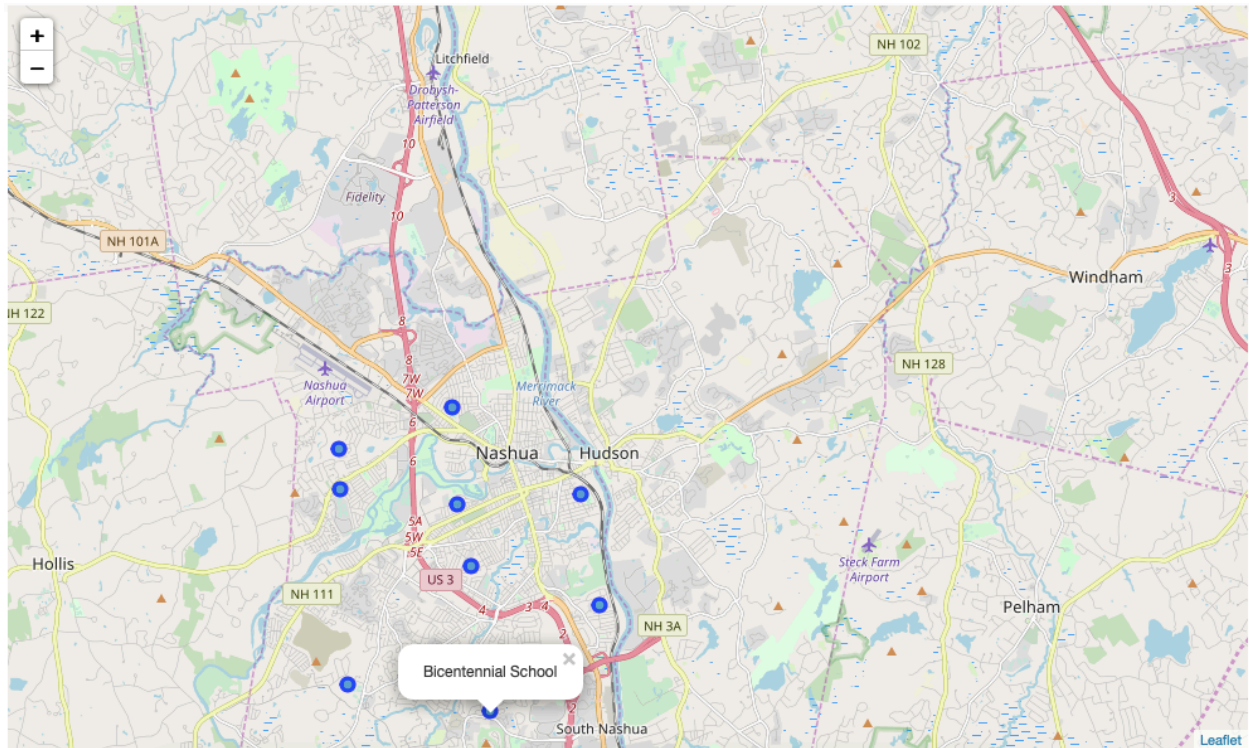
```
school.tail()
school.shape
```

```
(1528, 5)
```

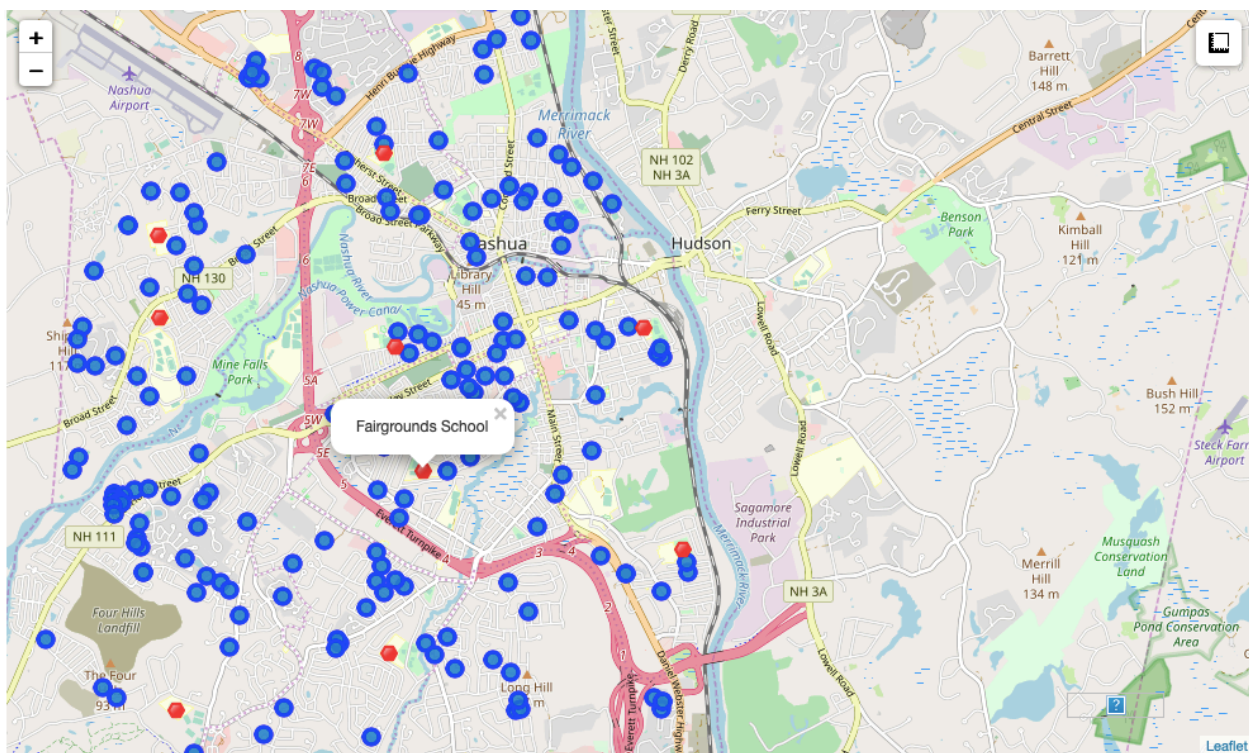## 3. METHODOLOY EXECUTION - Mapping Data

Map showing houses available for sale in Nashua.

Map showing all elementary schools in Nashua.

Map showing houses available for sale with their elementary school zone in Nashua.

Explore and cluster the neighborhoods in Nashua

- Data frame showing top 10 venues of each neighborhood

	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
0	Abbott St , Aetna Ct , Atherton Ave , Atwood ...	Sporting Goods Shop	Skating Rink	Trail	Gas Station	Baseball Field	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping	Convenience Store
1	Aberdeen Ln , Acacia St , Alford Ln , Annabel...	Soccer Field	Trail	Pizza Place	Gas Station	Baseball Field	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping	Convenience Store
2	Academy Dr , Adams St , Adella Dr , Amherst S...	Flower Shop	Home Service	Chinese Restaurant	Pharmacy	Trail	Baseball Field	Basketball Court	Building	Construction & Landscaping	Convenience Store
3	Acton St , Alan St , Alder Dr , Almont St , A...	Baseball Field	Restaurant	Construction & Landscaping	Food	Trail	Home Service	Basketball Court	Building	Chinese Restaurant	Convenience Store
4	Addison Rd , Alex Cir , Amble Rd , Anthony Ci...	Playground	Trail	Home Service	Baseball Field	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping	Convenience Store	Field
5	Albury Stone Cir , Algonquin Ln , Amalia Dr ,...	Food	Track Stadium	Trail	Home Service	Baseball Field	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping	Convenience Store
6	Aldgate Dr , Barnesdale Rd , Bishop Ln , Bowm...	Home Service	Basketball Court	Trail	Baseball Field	Building	Chinese Restaurant	Construction & Landscaping	Convenience Store	Field	Flower Shop
7	Allds St , Alpine St , Alstead Ave , Amory St...	Baseball Field	Convenience Store	Pizza Place	Field	Outdoors & Recreation	Trail	Gas Station	Basketball Court	Building	Chinese Restaurant
8	Althea Ln , Arthurs Ln , Ash Ct , Ash St , As...	Lake	Gas Station	Thrift / Vintage Store	Baseball Field	Building	Park	Basketball Court	Chinese Restaurant	Construction & Landscaping	Convenience Store
9	Anders Ln , Appleside Dr , April Dr , Beausit...	Baseball Field	Playground	Convenience Store	Trail	Home Service	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping	Field

- **K mean clustering**

```
# set number of clusters
from sklearn.cluster import KMeans
kclusters = 5

nashua_grouped_clustering = nashua_grouped.drop('Neighborhood', 1)

# run k-means clustering
kmeans = KMeans(n_clusters=kclusters, random_state=0).fit(nashua_grouped_clustering)

# check cluster labels generated for each row in the dataframe
kmeans.labels_[0:10]
kmeans.labels_[0:]
```
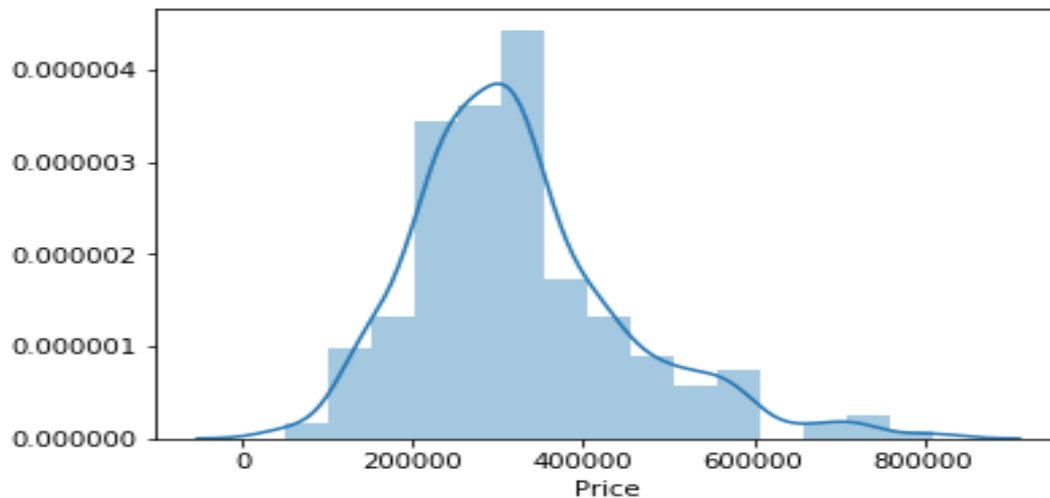
```
array([1, 2, 2, 2, 0, 4, 3, 2, 2, 0, 0], dtype=int32)
```

- **Dataset with all available houses for sale along with their elementary school zone and nearby venues.**
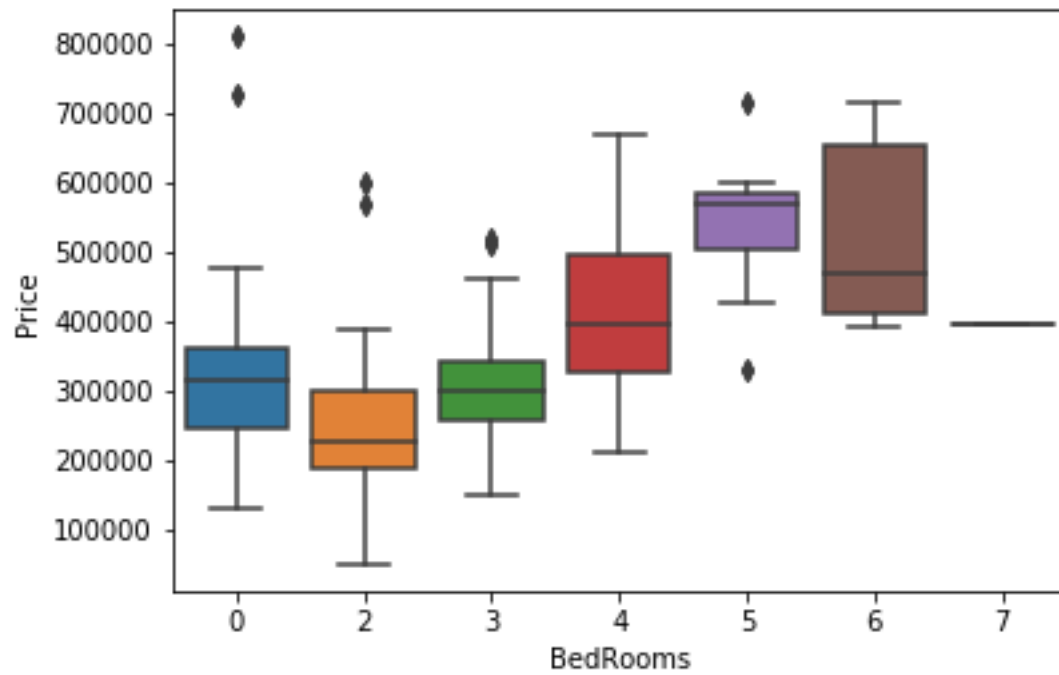
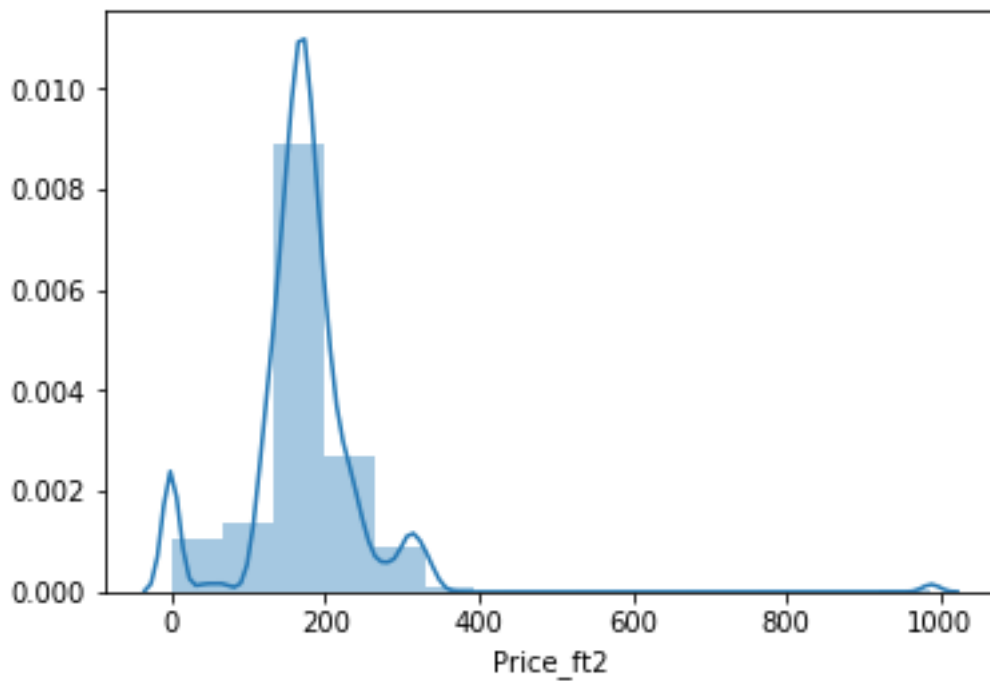|	Elementary School	Street Name	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue
0	Amherst St School	Amherst St , Amherst Ter , Artillery Ln , Aub...	42.4093	-72.4495	1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	Bicentennial School	Addison Rd , Alex Cir , Amble Rd , Anthony Ci...	42.7137	-71.4724	2	Playground	Trail	Home Service	Baseball Field	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping	Convenience Store
2	Birch Hill School	Abbe Ln, Airport Rd , Alice Dr , Amherst St , ...	42.7662	-71.5133	2	Bar	Playground	Home Service	Baseball Field	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping	Convenience Store
3	Broad Street School	Albury Stone Cir , Algonquin Ln , Amalia Dr ,...	42.7580	-71.5131	2	Food	Track Stadium	Trail	Home Service	Baseball Field	Basketball Court	Building	Chinese Restaurant	Construction & Landscaping
4	Charlotte Ave School	Academy Dr , Adams St , Adella Dr , Amherst S...	42.7744	-71.4827	0	Flower Shop	Home Service	Chinese Restaurant	Pharmacy	Trail	Baseball Field	Basketball Court	Building	Construction & Landscaping

Nashua houses for sale price statistics

- Prices of house for sale - Plot showing that most of the houses for sale in Nashua is around $350,000.

- Number of bedrooms in the house - Plot showing that houses in range of price $350,000 have 3 to 4 bedrooms.
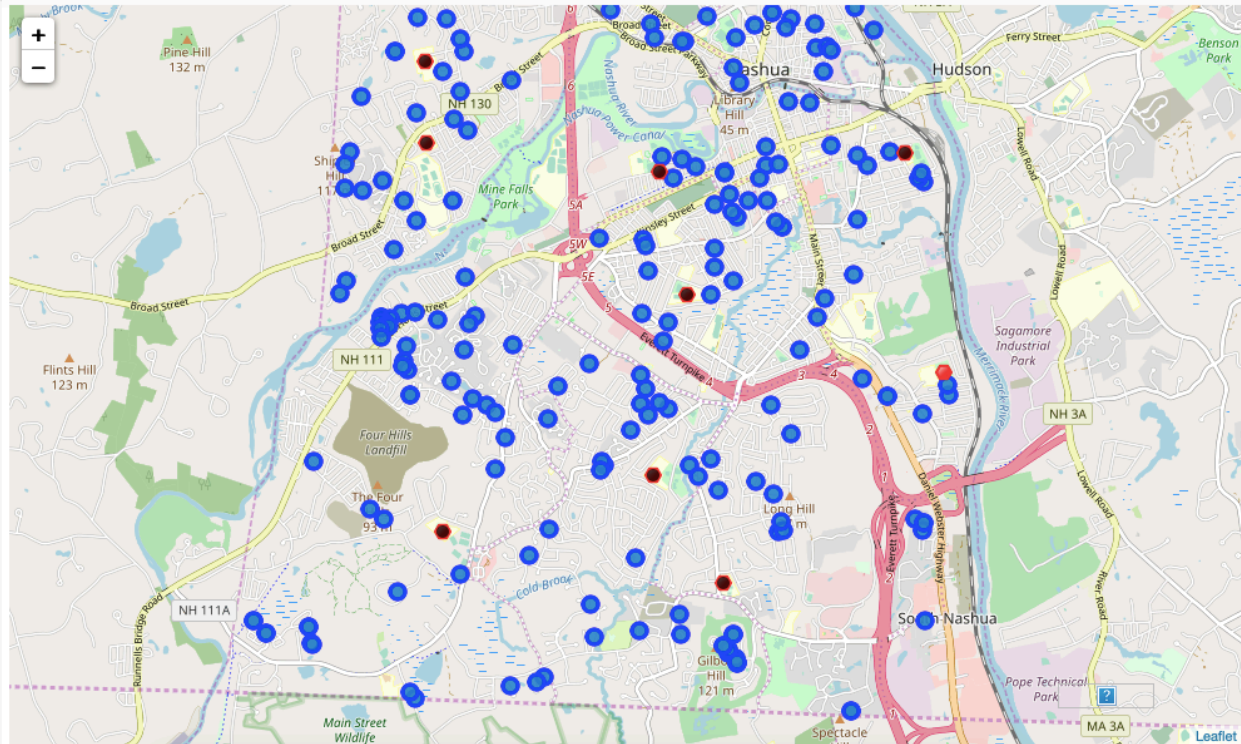

- Prices of house per sq. ft. - Plot showing that houses price is around 200 per sq. ft.

4. Result

Map showing all available houses for sale in Nashua with their elementary school zone and nearby venues.

5. Discussion

Looking at the above map, I am able to explore all possibilities since the popups provide the information needed for a good decision.

Above map concluded that best area where I could get the house in my budget of Dollar 350,000 with 3-4 bedrooms and with good rating Elementary school is area around Bicentennial School with all venues like playground, grocery, restaurants nearby.

6. Conclusion

In general, I am positively impressed with the overall organization, content and lab works presented during the Coursera IBM Certification Course. I feel rewarded with the efforts, time and money spent. I believe this course with all the topics covered is well worthy of appreciation.

The mapping with Folium is a very powerful technique to consolidate information and make the analysis and decision thoroughly with confidence. I would recommend for use in similar situations.

This Capstone project presented me a great opportunity to practice and apply the Data Science tools and methodologies learned. It helps me create, learn and show my potential in a positive way. I have acquired a good starting point to become a professional Data Scientist and I will continue exploring to creating examples of practical cases.