

Location Suggestion for an Ice-Cream Retail House In New York

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27 January 2020

1 Introduction

1.1 New York City

New York City is not only the most populous city of the United States of America but it also the most densely populated city in the country. It had an estimated population of 8.4 million in 2018 over an area of 784 square kilometres. The city is located at the southern tip of the state of New York. The city is often referred to as the cultural, financial, and media capital of the world, and commands a very high impact upon commerce, entertainment, research, technology, education, politics, tourism, art, fashion, and sports.

New York is situated on one of the world's largest natural harbours. New York City consists of five boroughs, each of which is a separate county of the State of New York.

The five boroughs –

- i. Brooklyn,
- ii. Queens,
- iii. Manhattan,
- iv. The Bronx, and
- v. Staten Island

Tourism is a vital industry for New York City, which has witnessed a growing combined volume of international and domestic tourists.

1.2 Brooklyn Borough

Brooklyn (Kings County) is situated on the western tip of Long Island. It is New York's most populous borough.

Brooklyn is known for its cultural, social, and ethnic diversity, an independent art scene, distinct neighbourhoods, and a distinctive architectural heritage. Downtown Brooklyn is the

largest central core neighbourhood in the outer boroughs. The borough has a long beachfront shoreline including Coney Island.

1.3 Brooklyn Ice-Creams

A small ice-cream parlour was opened in 2012 by a local resident Mr. Ridley Johnson in the Bay Ridge area of Brooklyn. Bay Ridge is a residential neighbourhood in the southwest corner of the New York City borough of Brooklyn. Being nearer to the coast, the area received high number of footfalls during the day which further increased during the night. Key attractors were the fruit flavoured ice creams which were loved by kids, adults and older people. Soon the business flourished and Mr. Johnson moved to a bigger parlour in the town centre in 2015 and named it 'Brooklyn Ice-Creams'. Since then the business has increased and daily footfall is 500 which includes not only people from the neighbourhood but lovers of the ice-cream from other parts of Brooklyn and Manhattan.

1.4 The Business Problem

Ever since, Mr Jonson moved to bigger place, the response to the parlour had increased. The unique flavours of the ice-crèmes with local recipe appealed to all. However, Mr. Johnson had been thinking of opening an extension in Brooklyn area down south.

He has engaged Mr. Natham Wright who is a renowned commercial property dealer in Brooklyn and is personally know to Mr. Johnson. He had explored some places near the cost side and found that economical shops would be available in the following six areas

1. Sea Gate
2. Coney Island
3. Brighton Beach
4. Manhattan Beach
5. Sheepshed Bay
6. Gerritsen

Moving to the new area shall attract tourists also. Based upon the experience, Mr. Johnson feels that the following two factors shall be considered while selecting a neighbourhood:

1. Neighbourhood should be similar to the Bay Ridge area as people with similar lining and neighbourhood locations shall increase the chance of success
2. The neighbourhood should not have ice-creame as among the most common venues

Mr. Ridley Johnson the owner of Brooklyn Ice-Creams wants the help of data in finding the next best locality for his shop.

1.5 The Target Audience

The target audience is clearly Mr. Ridley Johnson who is looking to find a new and an appropriate place for opening up of his ice-cream parlour. The information also concerns Mr. Natham Wright who has been engaged by Mr. Johnson to find a suitable place to expand the venture.

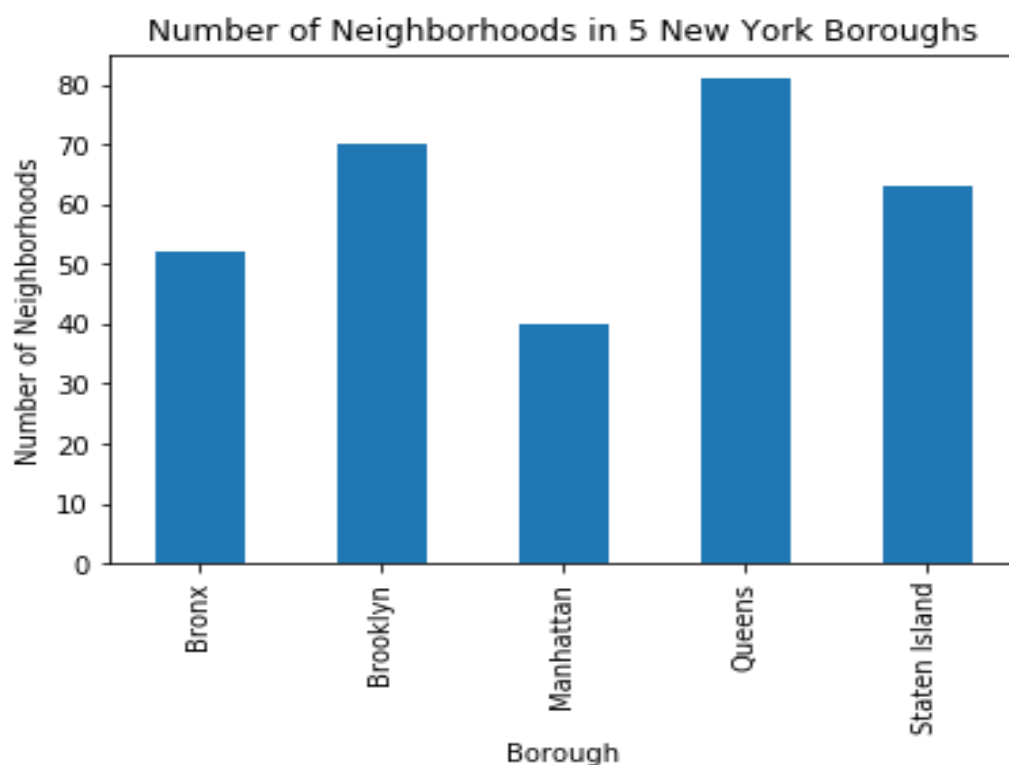
2 Data

2.1 Data Source

Twofold data is basically required for the project.

1. Brooklyn, New York neighbourhood data.
2. Nearby places data of each Brooklyn neighbourhood.

A Jason file named '*newyork_data.json*' was available to the author at the web address :- https://cocl.us/new_york_dataset. The dataset included some 306 neighbourhood of the 5 boroughs of New York City including those in the Brooklyn borough. Further data revealed that information about 70 neighbourhood in Brooklyn area was available in the dataset.



Since, it also important to study the neighbourhoods, Foursquare location data would be used to explore and cluster the neighbourhoods.

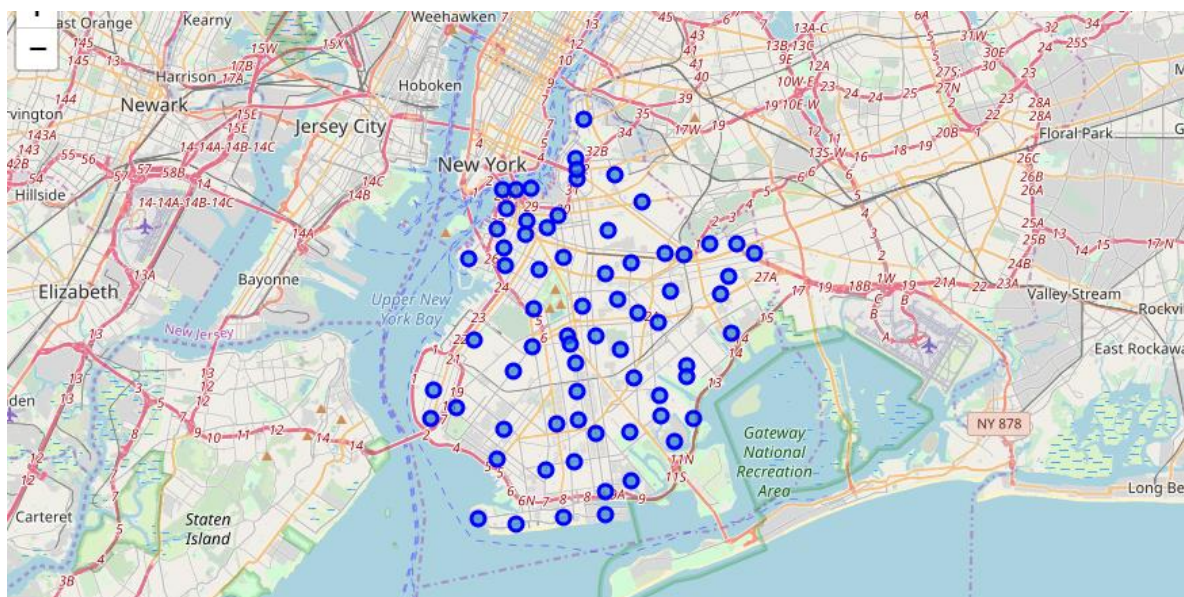
2.2 Approach to solving research problem

As highlighted in the research problem that Mr. Johnson has been looking for similar area to the Bay Ridge area but on the south side. Therefore, it was considered appropriate to undertake Cluster analysis to cluster Brooklyn's 70 neighbourhoods and especially analyse the cluster which is having the Bay Ridge neighbourhood and see if more neighbourhoods especially those in the research problem do lie in this same cluster or not. 5 clusters of the Brooklyn area were considered appropriate which is neither too small a number of clusters nor too large a number.

Thereafter, clusters were analysed and most common venues (top 5) were reviewed to take a decision on the appropriate neighbourhood. Neighbourhoods not having Ice Crème venues in top 5 most common venues were deemed to be appropriate.

2.3 Brooklyn Neighbourhoods

Brooklyn, New York neighbourhood data was prepared using the New York json file. It contained information on latitude and longitude of each location which was helpful later on while fetching the nearby venues using FourSquare API. The following map depicts the 70 neighbourhoods of Brooklyn area:



Data was obtained for following neighbourhoods:

- | | | | |
|-----|--------------------|-----|---------------------------|
| 1. | Bay Ridge | 36. | Dyker Heights |
| 2. | Bensonhurst | 37. | Gerritsen Beach |
| 3. | Sunset Park | 38. | Marine Park |
| 4. | Greenpoint | 39. | Clinton Hill |
| 5. | Gravesend | 40. | Sea Gate |
| 6. | Brighton Beach | 41. | Downtown |
| 7. | Sheepshead Bay | 42. | Boerum Hill |
| 8. | Manhattan Terrace | 43. | Prospect Lefferts Gardens |
| 9. | Flatbush | 44. | Ocean Hill |
| 10. | Crown Heights | 45. | City Line |
| 11. | East Flatbush | 46. | Bergen Beach |
| 12. | Kensington | 47. | Midwood |
| 13. | Windsor Terrace | 48. | Prospect Park South |
| 14. | Prospect Heights | 49. | Georgetown |
| 15. | Brownsville | 50. | East Williamsburg |
| 16. | Williamsburg | 51. | North Side |
| 17. | Bushwick | 52. | South Side |
| 18. | Bedford Stuyvesant | 53. | Ocean Parkway |
| 19. | Brooklyn Heights | 54. | Fort Hamilton |
| 20. | Cobble Hill | 55. | Ditmas Park |
| 21. | Carroll Gardens | 56. | Wingate |
| 22. | Red Hook | 57. | Rugby |
| 23. | Gowanus | 58. | Remsen Village |
| 24. | Fort Greene | 59. | New Lots |
| 25. | Park Slope | 60. | Paerdegat Basin |
| 26. | Cypress Hills | 61. | Mill Basin |
| 27. | East New York | 62. | Fulton Ferry |
| 28. | Starrett City | 63. | Vinegar Hill |
| 29. | Canarsie | 64. | Weeksville |
| 30. | Flatlands | 65. | Broadway Junction |
| 31. | Mill Island | 66. | Dumbo |
| 32. | Manhattan Beach | 67. | Homecrest |
| 33. | Coney Island | 68. | Highland Park |
| 34. | Bath Beach | 69. | Madison |
| 35. | Borough Park | 70. | Erasmu |

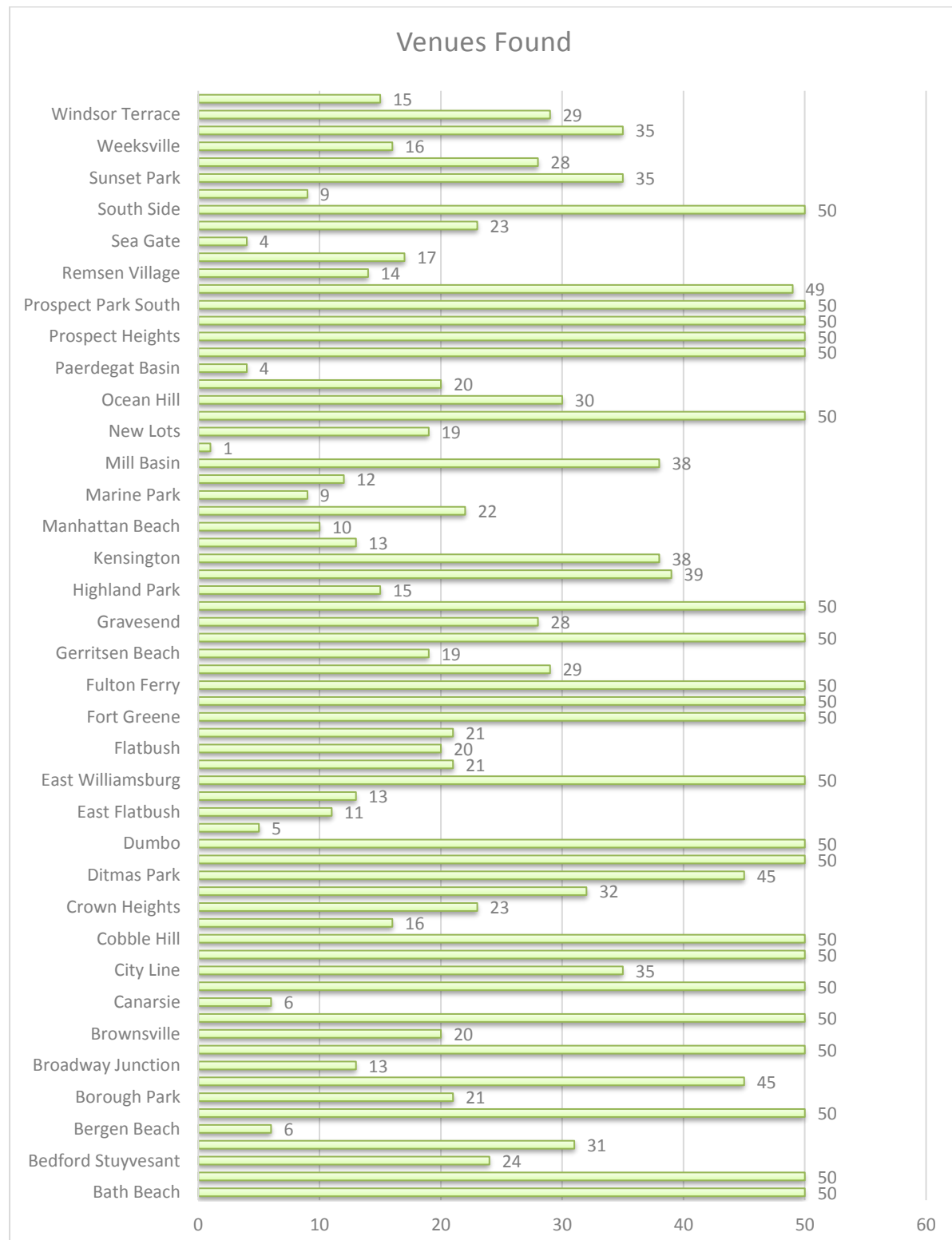
In order to explore the Brooklyn neighbourhood FourSquare API was used to fetch venues in each neighbourhood. While limit was set to 50 venues per neighbourhood within a radius of 500 m. In all 2128 venues were found.

The FourSquare API helped in fetching the data in the below format:

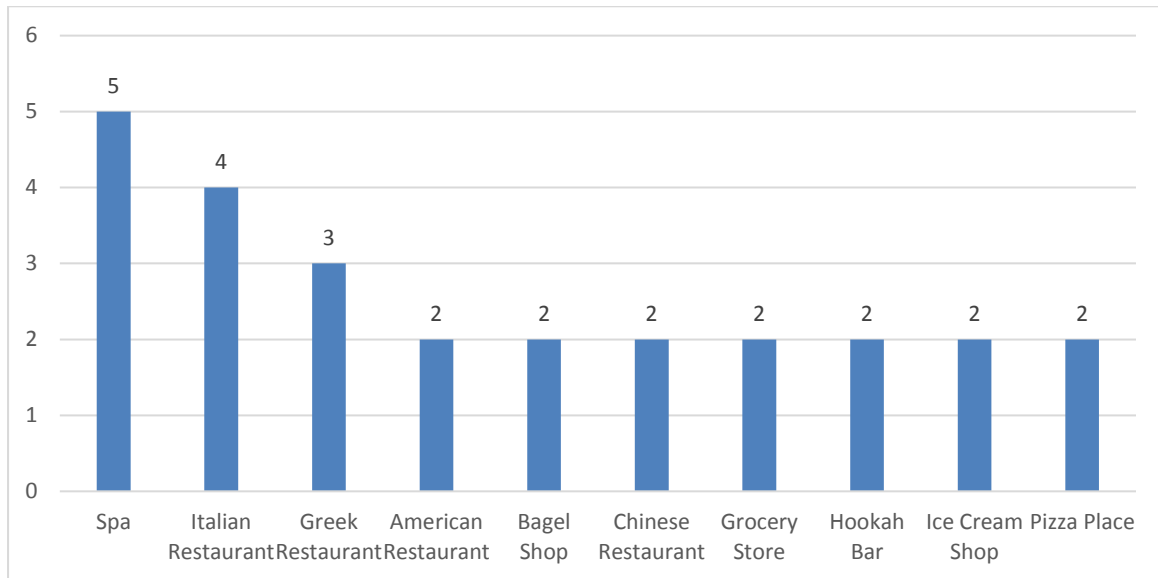
Neighbourhood	Venue	Venue Category
Bay Ridge	Pilo Arts Day Spa and Salon	Spa
Bay Ridge	Bagel Boy	Bagel Shop
Bay Ridge	Pegasus Cafe	Breakfast Spot

Bay Ridge	Cocoa Grinder	Juice Bar
Bay Ridge	Ho' Brah Taco Joint	Taco Place

Data provided was very useful as venue categories were made available for each of the 70 neighbourhoods. As shown in the figure below, venues upto 50 were found for neighbourhoods



2.4 Bay Ridge Area Top Venues



The display above shows the most common venues in the Bay Ridge area. Clustering would be used to find similar neighbourhoods in Brooklyn to meet the criteria as identified in the research problem. As can be seen Ice Cream shop does figure in the list of common venues (>1).