# Choosing a Place to Have Great Burgers in Toronto Based on Users Engagement & Feedback

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## Introduction

Toronto (Ontario, Canada) is one of the most multicultural and multiracial cities in the world [1]. In July 2018, its population was estimated in 2,956,024 people, which makes Toronto the largest city in Canada [2].

On the other hand, there is New York. In 2018, it was estimated that around 8,398,748 people lived in this city, making it the biggest city in the United States [3].

Also, as the location of Foursquare's headquarters, New York has a huge amount of data on this platform. This is why I am going to use NY as the parameter for this project.

This analysis aims to solve the problem of where to have a great burger in Toronto based on the clients' engagement and evaluation. The target audience is any hunger person looking for a good place to have a great burger.

The decision will be taken by assuming that the better the burgers, the more the costumers will be engaged in that Foursquare's place and the higher will be the grades. The method to be presented will compare the top 12 boroughs in New York to the top 12 boroughs in Toronto. This allows us to analyse which places in Toronto tend to have the same engagement levels and evaluations as users in New York.

## Pre-processing and Proposed Method

The data used comes exclusively from the Foursquare's API. First, it is explored up to 300 top trending places in a radius of 10km from the center of New York and Toronto. The information that we need from each venue are: id, name, latitude and longitude.

The next step is to get the borough of each venue. To do that, geopy.geocoders is the approach used to obtain the full address and extract the borough from it.

A sample of the resulting structure is shown in Figure 1.

| | venue.id | venue.name | venue.location.lat | venue.location.lng | borough |
|---|---|---|---|---|---|
| 1 | e298b0f964a52040621fe3 | Mother's | 40.71487632562948 | -73.94445591367176 | Brooklyn |
| 2 | 3c2b49f964a52036a11fe3 | Bareburger | 40.7633166245262 | -73.92113908234228 | Astoria |
| 3 | e3889e4b01d5de4d4a81a | Blue Collar | 40.71135771797886 | -73.95771847756468 | Brooklyn |
| 4 | e74880f964a520150a1fe3 | Shake Shack | 40.74148371088094 | -73.9882180094719 | New York County |
| 5 | 9308daf964a520712b1fe3 | DuMont Burger | 40.71361910775793 | -73.96191390880838 | Brooklyn |
| 6 | ca35d4498e950b67e87df8 | Shake Shack | 40.752700113678515 | -73.97709378302513 | Midtown East |
| 7 | 0d0b440e9e9521c7d13cbd | Whitmans | 40.7279733967652 | -73.98429759357843 | Manhattan Community Board 3 |
| 8 | d66200f964a520fbe71ee3 | P.J. Clarke's | 40.75892425944354 | -73.96847418200814 | Murray Hill |
| 9 | 9c6881498eaaf3954382f3 | Superiority Burger | 40.72754947104763 | -73.9832897923765 | Manhattan Community Board 3 |
| 10 | d66200f964a52044ea1ee3 | J.G. Melon | 40.77105 | -73.95931 | Manhattan Community Board 8 |
| 11 | 48b87a1498edc77fcbf745c | Burger & Lobster | 40.74009976293929 | -73.99350464344025 | Manhattan Community Board 4 |
| 12 | 4a81ed04f964a520fff71fe3 | Jackson Hole | 40.76751719853113 | -73.8992667490776 | Queens |
| 13 | b3a100f964a5206c1e1fe3 | Burger Joint | 40.76419333666803 | -73.9786886823632 | Midtown |
| 14 | b78a37f964a52070351fe3 | Minetta Tavern | 40.73004893228044 | -74.00064667028238 | Greenwich Village |
| 15 | 79d808498eaa73550d399c | Black Tap | 40.723897 | -74.004221 | SoHo |
| 16 | 0d8c05df964a520c95d1fe3 | 5 Napkin Burger | 40.760180000000005 | -73.9910951312828 | Hell's Kitchen |
| 17 | 9f889c498e6ead0cae0d50 | Black Iron Burger | 40.75417342765138 | -73.99024800252201 | Manhattan Community Board 5 |
| 18 | 3f1a197f964a52042521fe3 | Five Leaves | 40.72361194852374 | -73.9516300884814 | Greenpoint |
| 19 | d66200f964a52096e91ee3 | Corner Bistro | 40.738022770880654 | -74.00373995304108 | Manhattan Community Board 2 |
| 20 | b05c761e7a2370039b6f1ff | Shake Shack | 40.717372574839686 | -73.96049213342168 | Brooklyn |
| 21 | 88ea117223b1f7253e2fa8 | Bill's Bar & Burger | 40.759289564255084 | -73.97753477096558 | Midtown |
| 22 | fb587bf964a5202b1d22e3 | Jackson Hole | 40.7638694 | -73.9629729 | Manhattan Community Board 8 |
| 23 | c4d6e498e77c0a2b1d85a | Mister Dips | 40.72234485175334 | -73.95729914693591 | Greenpoint |
| 24 | d2625a498e5d4ffd200303 | Bareburger | 40.74349645012385 | -73.95363438208204 | Queens |
| 25 | 9a8eccd4b1b1f7314dd135 | B&B Winepub | 40.7258 | -73.99793 | Manhattan Community Board 2 |

Figure 1. Sample of the venues obtained from Foursquare's API with their respective boroughs.

Some boroughs have only 1 or 2 trending venues in it. Because of these inexpressive counts, only the top 12 boroughs were picked, i.e., the 12 boroughs with the highest counts of venues were picked from each city. The rest was discarded.

The places gathered from New York are shown in Figure 2.
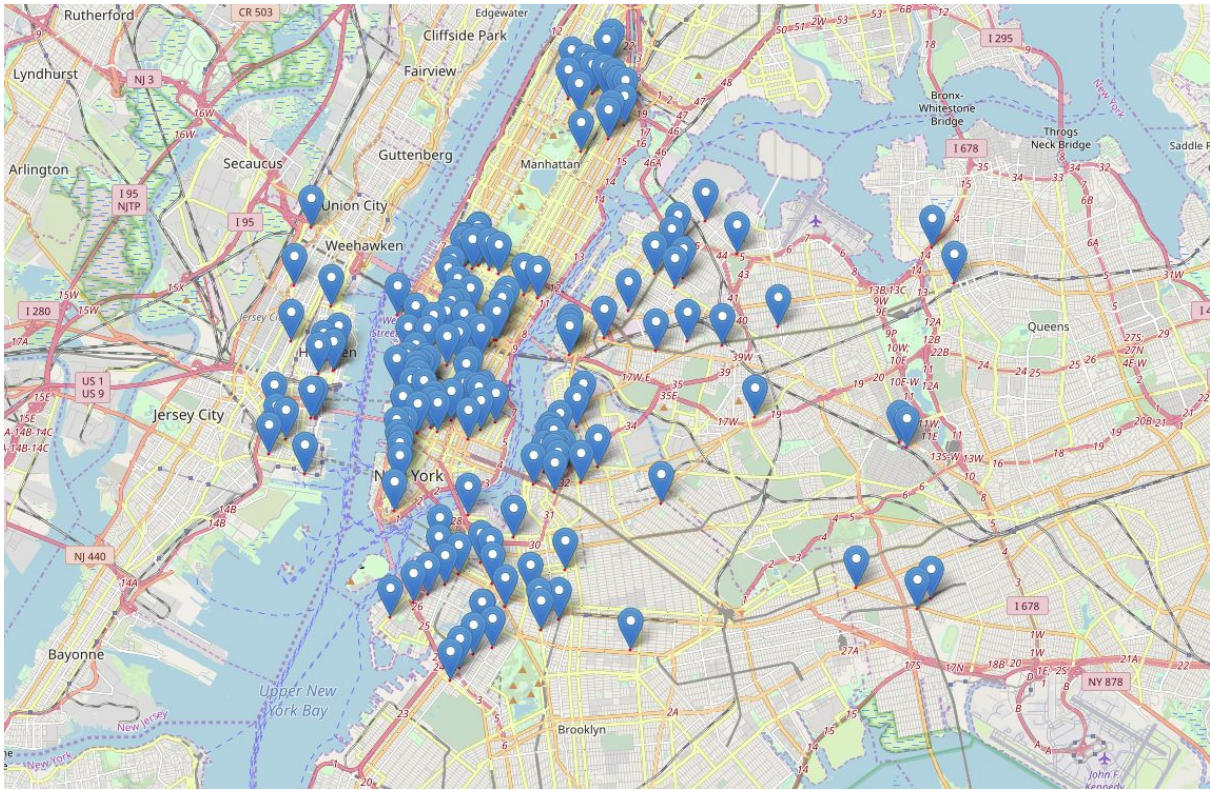
Figure 2. Venues in New York used in the analysis.

The places gathered from Toronto are shown in Figure 3.



Figure 3. Venues in Toronto used in the analysis.

Then, also using the Foursquare's API, more details from each venue were gathered. To be more specific, the details used are:

- rating: the place's average rating, from 0 to 10, given by users;
- likes: the amount of users who liked the place; and
- tips count: the amount of tips of that place.

Only three features have been chosen to make it possible to show my work using 3-D plots. The resulting data looks as in Figure 4.

| | venue.id | venue.name | venue.location.lat | venue.location.lng | borough | rating | likes | tips_count |
|---|---|---|---|---|---|---|---|---|
| 1 | 49e298b0f964a52040621fe3 | Mother's | 40.71487632562948 | -73.94445591367176 | Brooklyn | 8.0 | 222 | 98 |
| 2 | 4ffe3889e4b01d5de4d4a81a | Blue Collar | 40.71135771797886 | -73.95771847756468 | Brooklyn | 8.3 | 264 | 106 |
| 3 | 439308daf964a520712b1fe3 | DuMont Burger | 40.71361910775793 | -73.96191390880838 | Brooklyn | 8.1 | 429 | 229 |
| 4 | 4c0d0b440e9e9521c7d13cbd | Whitmans | 40.7279733967652 | -73.98429759357843 | Manhattan Community Board 3 | 8.5 | 492 | 234 |
| 5 | 549c6881498eaaf3954382f3 | Superiority Burger | 40.72754947104763 | -73.9832897923765 | Manhattan Community Board 3 | 8.6 | 489 | 150 |
| 6 | 548b87a1498edc77fcbf745c | Burger & Lobster | 40.74009976293929 | -73.99350464344025 | Manhattan Community Board 4 | 8.7 | 1182 | 271 |
| 7 | 4a81ed04f964a520fff71fe3 | Jackson Hole | 40.76751719853113 | -73.8992667490776 | Queens | 8.6 | 224 | 86 |
| 8 | 539f889c498e6ead0cae0d50 | Black Iron Burger | 40.75417342765138 | -73.99024800252201 | Manhattan Community Board 5 | 8.3 | 249 | 78 |
| 9 | 3fd66200f964a52096e91ee3 | Corner Bistro | 40.738022770880654 | -74.00373995304108 | Manhattan Community Board 2 | 8.3 | 1060 | 391 |
| 10 | 5b05c761e7a2370039b6f1ff | Shake Shack | 40.717372574839686 | -73.96049213342168 | Brooklyn | 8.8 | 35 | 2 |
| 11 | 54d2625a498e5d4ffd200303 | Bareburger | 40.74349645012385 | -73.95363438208204 | Queens | 8.2 | 134 | 25 |
| 12 | 4c9a8eccd4b1b1f7314dd135 | B&B Winepub | 40.7258 | -73.99793 | Manhattan Community Board 2 | 8.0 | 556 | 298 |
| 13 | 3fd66200f964a52021ea1ee3 | Walker's | 40.71980919292731 | -74.00685377052856 | Manhattan Community Board 1 | 8.0 | 272 | 107 |
| 14 | 5460fb3b498e94400cc7fd29 | Shake Shack | 40.74966574698551 | -73.97571869830242 | Manhattan Community Board 6 | 8.9 | 627 | 93 |
| 15 | 4db8989a8154ce84dc168e1c | two8two Bar & Burger | 40.688513 | -73.989743 | Brooklyn | 8.0 | 335 | 167 |
| 16 | 4c4dff7f67929c74f368699b | The Burger Garage | 40.746847 | -73.942472 | Queens | 7.9 | 150 | 62 |
| 17 | 4c0c5587340720a166978993 | Westville Chelsea | 40.74196304002314 | -74.0000471919283 | Manhattan Community Board 4 | 9.1 | 1096 | 279 |
| 18 | 3fd66200f964a5207feb1ee3 | Diner | 40.710620909854164 | -73.96558474265818 | Brooklyn | 8.9 | 888 | 284 |
| 19 | 4b9aedf3f964a52019e435e3 | The Brindle Room | 40.72815413633835 | -73.98284148552706 | Manhattan Community Board 3 | 8.1 | 425 | 191 |
| 20 | 3fd66200f964a520e6e51ee3 | Mercer Kitchen | 40.72468796609349 | -73.99867503501252 | Manhattan Community Board 2 | 8.7 | 1419 | 399 |
| 21 | 3fd66200f964a520bde71ee3 | Island Burgers and Shakes | 40.764275337374954 | -73.98835137964558 | Manhattan Community Board 4 | 7.7 | 190 | 120 |
| 22 | 588cf4548b0ebb5d015a5964 | Juanchi's Burger | 40.71294743722325 | -73.95890770379296 | Brooklyn | 8.1 | 49 | 19 |
| 23 | 4a6bdf50f964a52024d01fe3 | Korzo | 40.662049077056736 | -73.99250281208833 | Brooklyn | 8.7 | 225 | 104 |
| 24 | 45096dd1f964a5203c391fe3 | Cronin & Phelan's | 40.75910160466315 | -73.91930628879398 | Queens | 8.7 | 66 | 46 |
| 25 | 52c6e56211d293ba81a6ff9b | Emily | 40.683419946744586 | -73.96655063949262 | Brooklyn | 9.2 | 935 | 289 |

Figure 4. Sample of the venues obtained from Foursquare's API with their respective details.

At this point, we have all the information we need from each venue. But the purpose of this analysis is to analyse boroughs, so the mean of each of these features was calculated individually and these three means are the features of each borough.

However, the ranges for each of the features are very different. In order to make them equal, they were normalized using the min-max method, so they will all vary from 0 to 1.

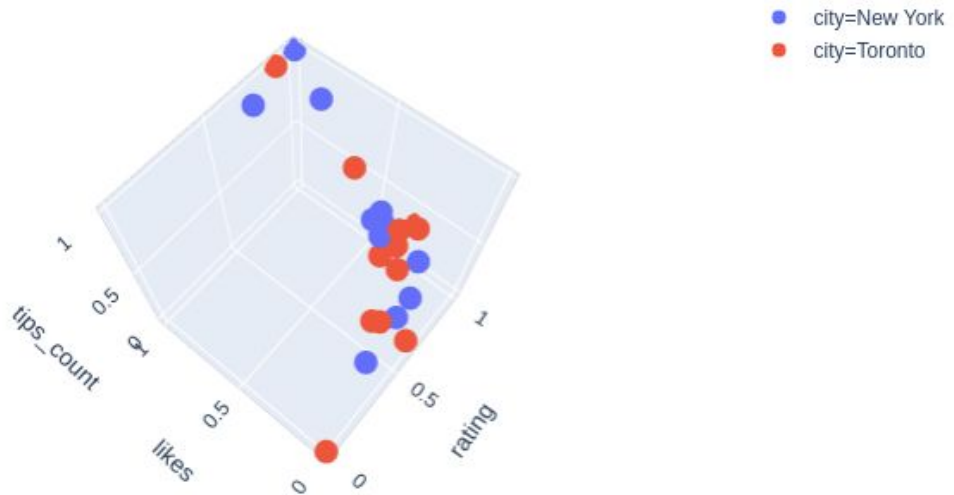The plot for each borough is shown in Figure 5.

Figure 5. Plot of the features for each borough in New York and Toronto.

Finally, these three features are used to perform k-means to determine which boroughs are similar to each other.

## Results and Discussion

The burger places were clustered into three clusters, as shown in Figure 6.
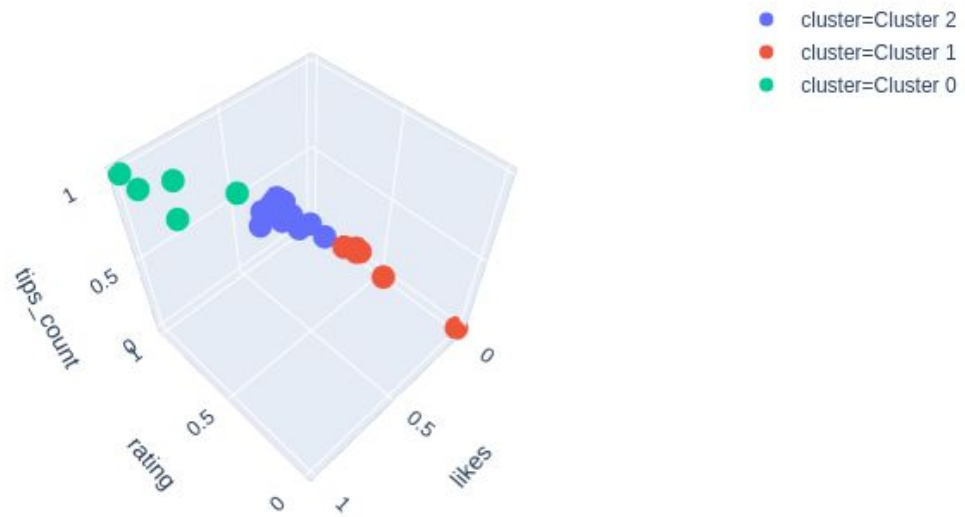
Figure 6. Plot of the 3 resulting clusters.

Namely, the clusters are formed by the following groups:

- CLUSTER 0:

  - New York: Brooklyn, Jersey City, Manhattan Community Board 1, Manhattan Community Board 5, Manhattan Community Board 6 and Queens.
  - Toronto: Davenport, Don Valley West, Downtown Yonge, Old Toronto, Toronto Centre and University—Rosedale.

- CLUSTER 1:

  - New York: Manhattan Community Board 2, Manhattan Community Board 3 and Manhattan Community Board 4.
  - Toronto: Financial District and Spadina—Fort York.

- CLUSTER 2:

  - New York: Hudson County, Manhattan Community Board 10 and Manhattan Community Board 11.
  - Toronto: Beaches—East York, East York, Toronto-Dominion Centre and Toronto—St. Pauls.

Each cluster has a specific characteristic. Cluster 0's boroughs tend to have the highest ratings, middle likes count and middle/low tips count.

Cluster 1's boroughs tend to have high ratings, the highest likes count and the highest tips count.

Cluster 2's boroughs tend to have relatively lower ratings, the lowest likes count and the lowest tips count.

Numeric values for each borough are shown in Figure 7.

| borough | rating | likes | tips_count | city | cluster |
|---|---|---|---|---|---|
| Manhattan Community Board 2 | 1.000000 | 1.000000 | 1.000000 | New York | Cluster 0 |
| Manhattan Community Board 3 | 0.951049 | 0.817520 | 0.879310 | New York | Cluster 0 |
| Manhattan Community Board 4 | 0.705181 | 0.966526 | 0.951688 | New York | Cluster 0 |
| Spadina—Fort York | 0.875962 | 0.571997 | 0.695838 | Toronto | Cluster 0 |
| Financial District | 0.883333 | 1.000000 | 1.000000 | Toronto | Cluster 0 |
| Hudson County | 0.654046 | 0.113423 | 0.159574 | New York | Cluster 1 |
| Toronto-Dominion Centre | 0.000000 | 0.000000 | 0.000000 | Toronto | Cluster 1 |
| Manhattan Community Board 10 | 0.401874 | 0.096108 | 0.125480 | New York | Cluster 1 |
| Manhattan Community Board 11 | 0.000000 | 0.000000 | 0.000000 | New York | Cluster 1 |
| Toronto—St. Pauls | 0.525000 | 0.170582 | 0.272727 | Toronto | Cluster 1 |
| Beaches—East York | 0.620000 | 0.022921 | 0.076864 | Toronto | Cluster 1 |
| East York | 0.550000 | 0.142956 | 0.259009 | Toronto | Cluster 1 |
| Brooklyn | 0.834804 | 0.422748 | 0.480686 | New York | Cluster 2 |
| Toronto Centre | 0.765909 | 0.316854 | 0.365548 | Toronto | Cluster 2 |
| Old Toronto | 0.880556 | 0.304869 | 0.455704 | Toronto | Cluster 2 |
| Queens | 0.780833 | 0.123223 | 0.145344 | New York | Cluster 2 |
| Don Valley West | 0.981250 | 0.260674 | 0.381453 | Toronto | Cluster 2 |
| Davenport | 1.000000 | 0.279900 | 0.374124 | Toronto | Cluster 2 |
| Manhattan Community Board 6 | 0.929434 | 0.420229 | 0.338053 | New York | Cluster 2 |
| Manhattan Community Board 5 | 0.826644 | 0.367000 | 0.408289 | New York | Cluster 2 |
| Manhattan Community Board 1 | 0.904217 | 0.423480 | 0.456929 | New York | Cluster 2 |
| Jersey City | 0.936639 | 0.195606 | 0.199117 | New York | Cluster 2 |
| Downtown Yonge | 0.783333 | 0.225468 | 0.315488 | Toronto | Cluster 2 |
| University—Rosedale | 0.851190 | 0.286891 | 0.371210 | Toronto | Cluster 2 |

Figure 7. Numeric values of each borough for each of the 3 resulting clusters.

## Conclusion

Based on these information, a hunger person looking for a great burger in Toronto should look for a place in one of cluster 1's boroughs: Davenport, Don Valley West, Downtown Yonge, Old Toronto, Toronto Centre or University—Rosedale.

If, for some reason, it is not possible to reach one of the regions in cluster 1, it would be recommended to go for one of the places in cluster 0: Financial District or Spadina—Fort York. Although they might not be the greatest, they should still be fine burgers.

Finally, it is not recommended to go for cluster 2. According to Foursquare's database, they have the lowest ratings, likes and tips count. Since it is assumed that great burgers leads to higher grades, the recommendation is to avoid Beaches—East York, East York, Toronto-Dominion Centre and Toronto—St. Pauls when looking for a great burger.

The reader should note that this project is just a simple study for a Coursera course and does not have any kind of relation with any burger places. You should not take the conclusions herein presented for granted or as the real quality of burgers.

If you want to get in touch or know more about this study case, feel free to visit my webpage at http://mmendelson.com/ .

## References

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

[2] https://www.toronto.ca/city-government/data-research-maps/toronto-at-a-glance/

[3] https://en.wikipedia.org/wiki/New_York_City