

# Restaurants in Cape Town

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## 1 Introduction

The city of Cape Town is a popular tourist destination that offers various activities and tourist attractions. Something that would be of interest to visitors and residents is the large variety of restaurants available and their locations relative to where they stay. It would be convenient for them to know which areas of the city have their favourite type of restaurant. A visitor, for example, can decide to stay in an area where Italian restaurants are more common, or an area with many different kinds of restaurants if they prefer to have more options. In this report, we use location data to locate some suburbs<sup>1</sup> of interest and to cluster them into different groups to see how they differentiate based on the categories of restaurants they contain. This will be of interest not only to visitors and residents, but also to those interested in opening restaurants. Knowing which categories of restaurants are more common in which area will be invaluable information to help them make a decision on where to open their restaurant.

## 2 Data

Data was sourced from Google Maps and Foursquare. Google maps was used to acquire the precise coordinates of the suburbs of interest. These coordinates were used together with Foursquare to get the location data of the restaurants. We used Foursquare to search for the closest venues to a certain point (the suburb) within a specified radius. The data returned by Foursquare includes a list of venues, their coordinates and their categories. We will be focusing on the following suburbs: Cape Town City Centre, Waterfront, Gardens, De Waterkant, Tamboerskloof, Camps Bay, Sea Point and Green Point.

## 3 Methodology

Given in Figure 1 below is a map of the part of Cape Town with the locations of the eight suburbs that we will be looking at. We have selected these suburbs because of their proximity to each other and their popularity. From Foursquare we have acquired a total of 32 different restaurant categories. We made sure to also include other categories that do not contain the word “Restaurant” such as BBQ Joint, Burger Joint, Diner and Pizza Place. We used a limit of 100 venues per suburb and a radius of 750 metres. The results returned by Foursquare included a lot of duplicate entries, so we made sure to remove these duplicates and only included unique entries.

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<sup>1</sup>Note that in South Africa the term “suburb” refers to a neighbourhood within a city.

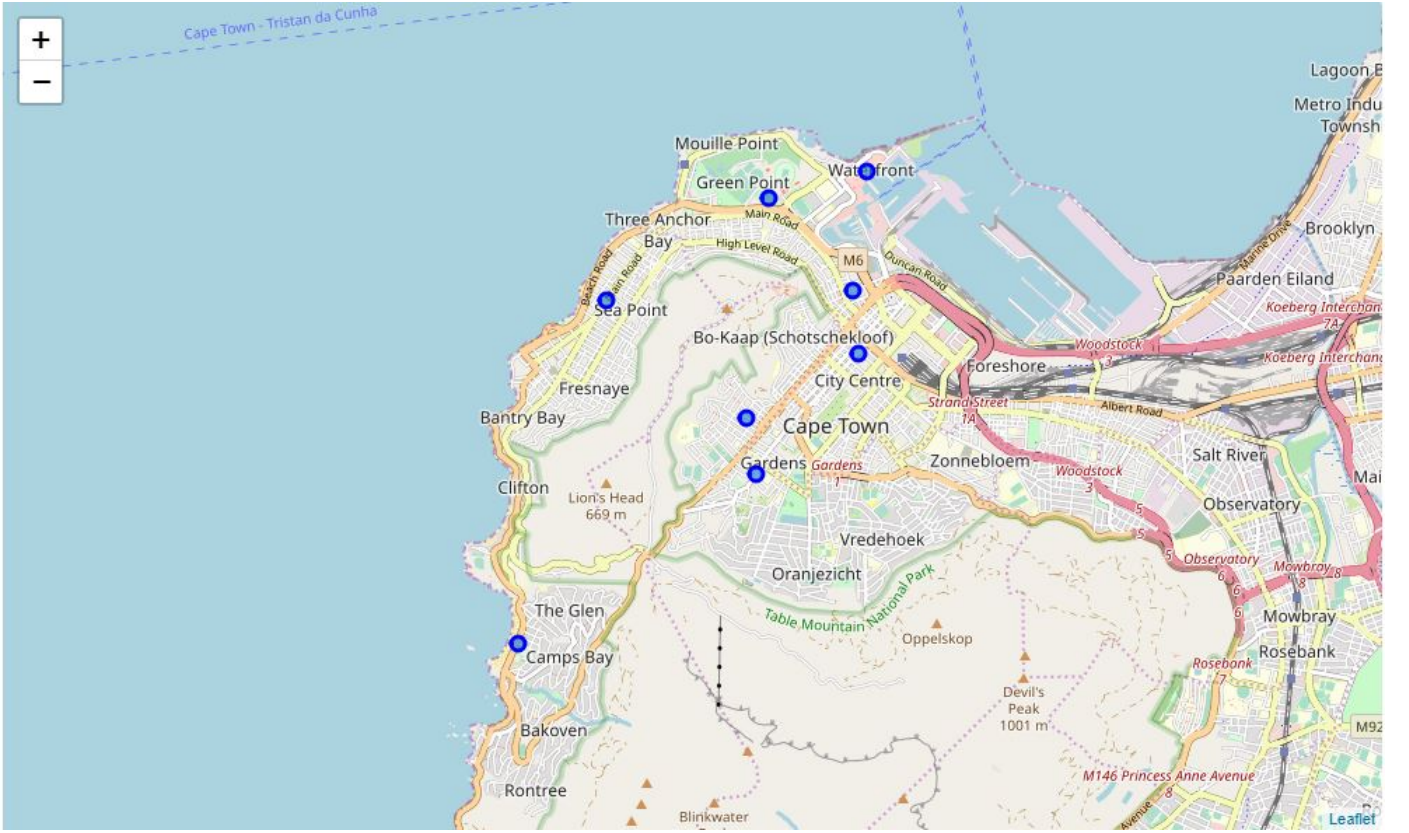


Figure 1: Part of Cape Town with the locations of the eight suburbs.

We used the venues that were collected from Foursquare at the time of the study and nowhere else.

For exploratory data analysis we created bar graphs to show the total occurrences of different restaurant categories and another graph for the total number of restaurants for each suburb. These graphs will give us a good idea of how the different restaurant categories are spread out across the suburbs. We also listed the top 10 most common restaurant categories for each suburb.

We chose to use  $k$ -means clustering to cluster the suburbs into different groups depending on how different they are based on the restaurant categories. We chose to use this algorithm because it is a well known unsupervised machine learning algorithm that we found to be the best tool to assist in achieving our goal. We clustered with  $k = 4$  on the 5 most common restaurant categories per suburb.

## 4 Results

### 4.1 Exploratory data analysis

The bar graph in Figure 2 shows the restaurant categories and the total number of times they each occur. We can see from the graph that the top five most popular restaurant categories are Italian Restaurant with a total of 19, Seafood with 14, Sushi with 12, Burger Joint and the generic Restaurant category both having totals of 10 each. Other popular restaurant categories according to the graph are Pizza Places, Indian, Tapas, African, Portuguese and Mediterranean restaurants.

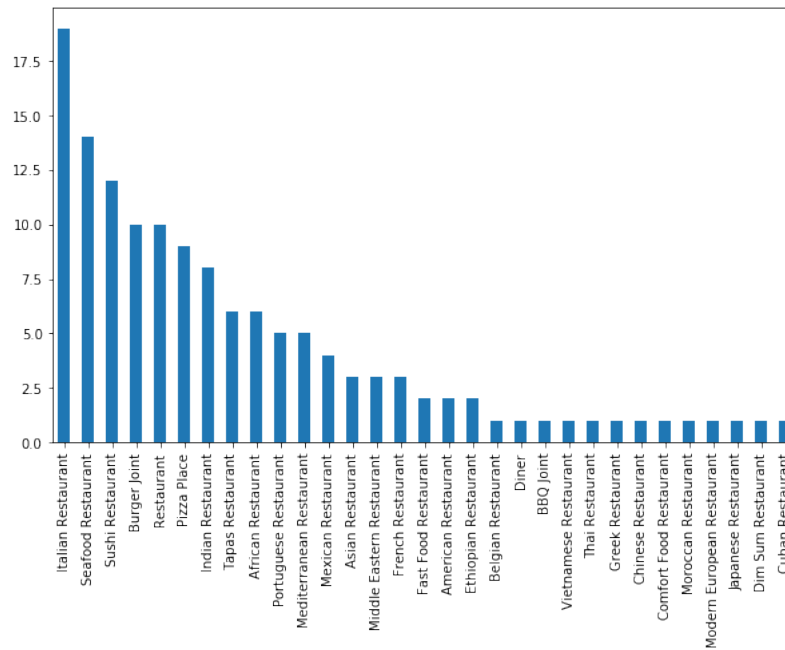


Figure 2: A bar graph of the restaurant categories and the total number of times they each occur.

Figure 3 shows a bar graph of each suburb and the total number of restaurants they contain. The suburbs with the most number of restaurants include Waterfront, Cape Town City Centre, Gardens and Sea Point with a total of 29, 28, 24 and 20 restaurants respectively.

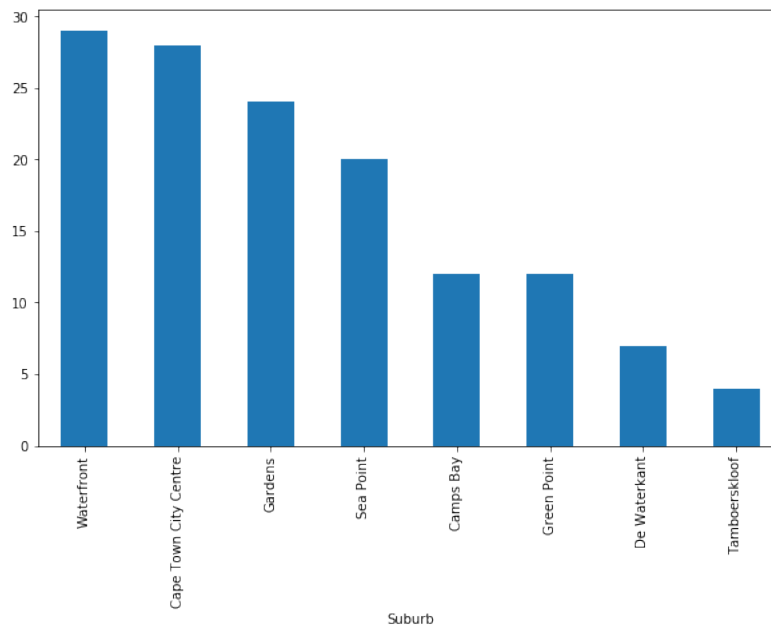


Figure 3: A bar graph of each suburb and the total number of restaurants they contain.

Figure 4 gives a list of each suburb and their top ten most common restaurant categories.

----Camps Bay----			----Green Point----		
	venue	count		venue	count
0	Seafood Restaurant	3	0	Italian Restaurant	2
1	Restaurant	3	1	Burger Joint	2
2	Mexican Restaurant	1	2	Sushi Restaurant	2
3	American Restaurant	1	3	Mediterranean Restaurant	1
4	Japanese Restaurant	1	4	Thai Restaurant	1
5	Italian Restaurant	1	5	Restaurant	1
6	Indian Restaurant	1	6	Mexican Restaurant	1
7	Pizza Place	1	7	Pizza Place	1
8	Sushi Restaurant	0	8	Cuban Restaurant	1
9	Modern European Restaurant	0	9	Ethiopian Restaurant	0

----Cape Town City Centre----			----Sea Point----		
	venue	count		venue	count
0	Italian Restaurant	4	0	Sushi Restaurant	4
1	Indian Restaurant	4	1	Italian Restaurant	3
2	Burger Joint	3	2	Pizza Place	2
3	African Restaurant	2	3	Middle Eastern Restaurant	2
4	Ethiopian Restaurant	2	4	Burger Joint	1
5	Tapas Restaurant	2	5	Chinese Restaurant	1
6	Sushi Restaurant	2	6	BBQ Joint	1
7	Restaurant	2	7	Modern European Restaurant	1
8	Pizza Place	2	8	Greek Restaurant	1
9	Dim Sum Restaurant	1	9	Indian Restaurant	1

----De Waterkant----			----Tamboerskloof----		
	venue	count		venue	count
0	African Restaurant	2	0	Asian Restaurant	1
1	Sushi Restaurant	2	1	Comfort Food Restaurant	1
2	Seafood Restaurant	1	2	Italian Restaurant	1
3	Italian Restaurant	1	3	Seafood Restaurant	1
4	Middle Eastern Restaurant	1	4	African Restaurant	0
5	Mexican Restaurant	0	5	Sushi Restaurant	0
6	Diner	0	6	Moroccan Restaurant	0
7	Burger Joint	0	7	Portuguese Restaurant	0
8	BBQ Joint	0	8	Restaurant	0
9	Vietnamese Restaurant	0	9	Thai Restaurant	0

----Gardens----			----Waterfront----		
	venue	count		venue	count
0	Italian Restaurant	3	0	Seafood Restaurant	8
1	Mediterranean Restaurant	2	1	Italian Restaurant	4
2	French Restaurant	2	2	Tapas Restaurant	3
3	Burger Joint	2	3	Mediterranean Restaurant	2
4	Portuguese Restaurant	2	4	Fast Food Restaurant	2
5	Indian Restaurant	2	5	Burger Joint	2
6	Pizza Place	2	6	Restaurant	2
7	Moroccan Restaurant	1	7	Portuguese Restaurant	2
8	Mexican Restaurant	1	8	Sushi Restaurant	1
9	Asian Restaurant	1	9	African Restaurant	1

Figure 4: Suburbs and their top ten most common restaurant categories.

## 4.2 Clustering

Figure 5 shows the map with the four clusters. Cluster 0 contains Waterfront and Cluster 1 is the largest cluster with De Waterkant, Tamboerskloof, Camps Bay, and Green Point clustered together. Cape Town City Centre and Gardens are clustered together in Cluster 2, and Sea Point is alone in Cluster 3. Figure 6 shows the clusters in more detail. Cluster 0 has the categories Seafood, Italian and Tapas Restaurant as the most common categories. Cluster 1 has Seafood and Italian Restaurant as the top categories in common, appearing in three suburbs out of the



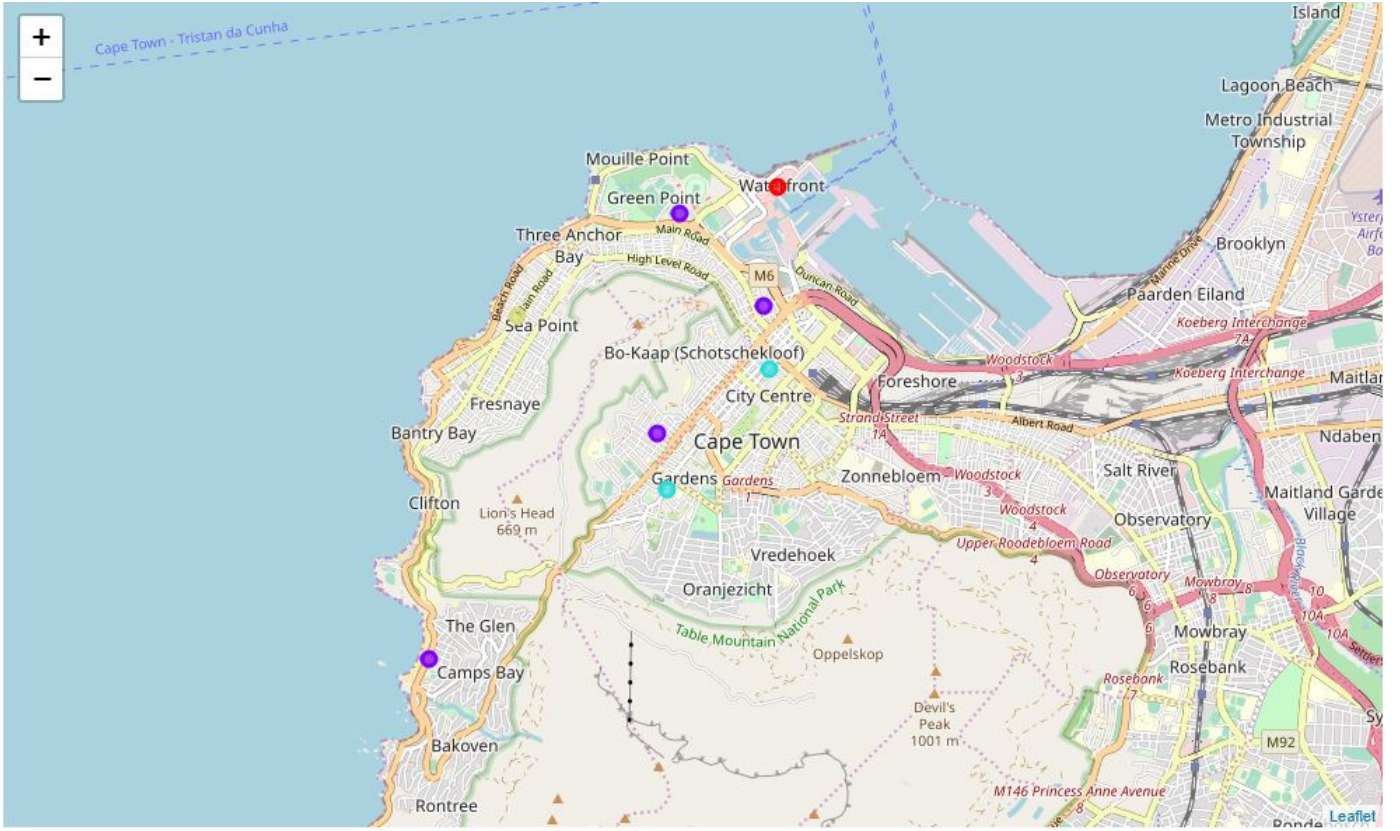


Figure 5: The map of the city with the four clusters.

four; and Sushi Restaurant and Pizza Place appearing in two out of the four. Cluster 2 has Indian and Italian Restaurant and Pizza Place as the top most common categories. Finally, Cluster 3 has Sushi and Italian Restaurant and Pizza Place categories as the most common restaurant categories.

## 5 Discussion

The Italian Restaurant is the most common restaurant category among all the suburbs. Any person who prefers Italian restaurants will have no problem finding one nearby to where they stay. People who prefer to stay in close proximity to seafood restaurants can choose to stay in most suburbs grouped in Clusters 0 and 1. Anyone who enjoys sushi will want to stay in the suburb in Cluster 3 as this is the cluster where it is most common. Those who prefer Indian restaurants will find them in suburbs from Cluster 2. Pizza lovers will find pizza places in most suburbs from Clusters 1 and 2. People who would love to live in suburbs with the most variety and abundance of restaurants can choose to live in or close to Waterfront, Cape Town City Centre and Gardens. Green Point and Sea Point also offer a wide range of restaurant categories.

If someone wants to open a restaurant they can now be aware of the common and uncommon restaurant categories in each cluster, and which suburbs have the most restaurants, so that they can make their decision accordingly.

Cluster 0:

	Suburb	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1	Waterfront	Seafood Restaurant	Italian Restaurant	Tapas Restaurant	Mediterranean Restaurant	Restaurant

Cluster 1:

	Suburb	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
3	De Waterkant	African Restaurant	Sushi Restaurant	Middle Eastern Restaurant	Italian Restaurant	Seafood Restaurant
4	Tamboerskloof	Asian Restaurant	Comfort Food Restaurant	Seafood Restaurant	Italian Restaurant	Pizza Place
5	Camps Bay	Restaurant	Seafood Restaurant	Japanese Restaurant	Mexican Restaurant	Indian Restaurant
7	Green Point	Sushi Restaurant	Burger Joint	Italian Restaurant	Pizza Place	Cuban Restaurant

Cluster 2:

	Suburb	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Cape Town City Centre	Indian Restaurant	Italian Restaurant	Burger Joint	Pizza Place	Sushi Restaurant
2	Gardens	Italian Restaurant	Pizza Place	Portuguese Restaurant	French Restaurant	Indian Restaurant

Cluster 3:

	Suburb	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
6	Sea Point	Sushi Restaurant	Italian Restaurant	Pizza Place	Middle Eastern Restaurant	Restaurant

Figure 6: The four clusters in more detail.

## 6 Conclusion

In this report, focusing on specific suburbs in Cape Town, we used the  $k$ -means clustering algorithm to cluster the suburbs together based on the different restaurant categories they contain. We clustered eight suburbs into four groups and observed how they differentiate from each other. We found that the most common restaurant categories in this part of the city were Italian, seafood and sushi restaurants. We also found that the majority of restaurants were in Waterfront, Cape Town City Centre and Gardens. We highlighted which clusters of suburbs visitors and prospective residents would be interested to stay in based on which restaurant categories are more common. In future a report, a more thorough study can be done than the one presented here. For example, more suburbs can be included, more restaurants and restaurant categories should be added, the model should be evaluated to find the best value for  $k$  and the model should be run on different values for the radius to find the value that provides the best results.