

BUSINESS TRIP TO DOWNTOWN TORONTO

SIBUSISO NDABA

JUNE 2021

1. INTRODUCTION:

1.1 Background

An astute South African business woman, who runs multiple African cuisine restaurants, was able to identify a new window of opportunity. An opportunity that will symbolically be of unison with the term rainbow country, that South Africa is known for.

In recent years her restaurants have been doing well attracting a substantial amount of tourist particularly from Europe, America and numerous other countries that the country of South Africa normally attracts. Yet, she has decided that she needs a change of approach locally. She seeks to break through to a new and wider range of clientele, so she recently came up with the wonderful idea of establishing means of branching or incorporating her African cuisine with a more westernised or global touch to reach new targets in clientele on a national scale.

1.2 Interests

After numerous discussions with her associates and other critical stakeholders, it was decided that it would be her onus to further solidify her idea with concrete analysis to avoid any loss in revenue or clientele. By being the bold and courageous business woman she is, she decided to venture out on a business trip where eclectic cities are found to rapidly nourish her with all the first-hand knowledge she requires to back up her idea and finally provide other stakeholders with convincing facts that her idea is truly ingenious.

The west is far too vast to travel all of it and still come back in time and pursue a business adventure you intended to implement before your stake holders lose interest or invest somewhere else. So as you can see our business woman requires making an informed decision about her upcoming business trip. However her proactive nature helped her notice the influx of Africans migrating to countries such as Canada and immediately considered the fact that if those Africans are 1000 of miles away from home what do they possibly substitute their everyday African cuisine with?

1.3 Problem

Canada is a new world to her and requires our help to provide her with proficient and factual findings regarding its Geographic's, restaurant hot spot and volumes based in variety and lastly what other venues that are populated in a 1st world neighbourhood that attract people and potentially new business are located prior her departure.

Our aim is to make her trip economically favourable and highly intuitive using data science techniques and models

2. Data Requisites and Cleaning

Due to the nature of our problem at hand, we have outlined a couple of factors that we assumed will be crucial in our decision making:

- the total number of existing restaurants within the neighbourhoods in Toronto.
- Do any of these Neighbourhoods have any African restaurant and how many in total.
- the variety of restaurants would be essentially crucial in our decision.

2.1 Data Source

The following data sources will be needed to extract / generate the necessary information:

- CSV file from Wikipedia & (from geopy.geocoders) to convert an address into latitude and longitude values of Toronto neighbourhoods.
- in depth information of restaurants in every neighbourhood will be obtained using FOURSQUARE API

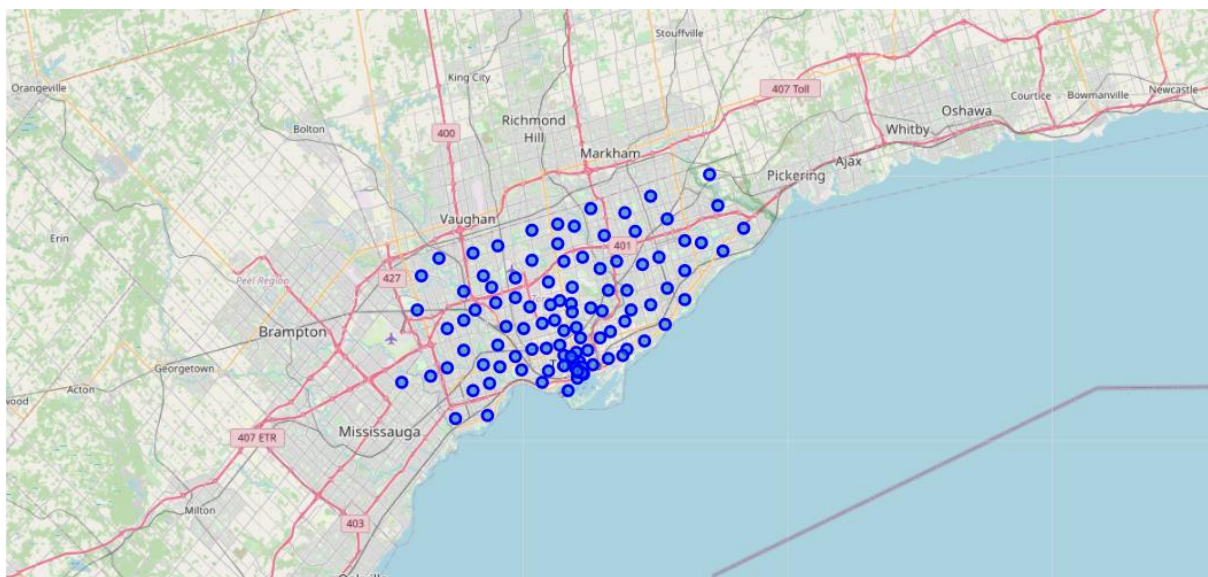
3. Methodology

Regarding this project will emphatically impose our efforts in keeping a transparent step by step approach with our client regarding every discovery we unravel from the business problem phase upon conclusion.

In the very beginning phase of our project we collected the required data and populated into our pandas data frame as shown below.

	PostalCode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park, Harbourfront
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Queen's Park	Ontario Provincial Government
5	M9A	Etobicoke	Islington Avenue
6	M1B	Scarborough	Malvern, Rouge
7	M3B	North York	Don Mills North
8	M4B	East York	Parkview Hill, Woodbine Gardens
9	M5B	Downtown Toronto	Garden District, Ryerson

Snapshot of Toronto neighbourhoods dataframe

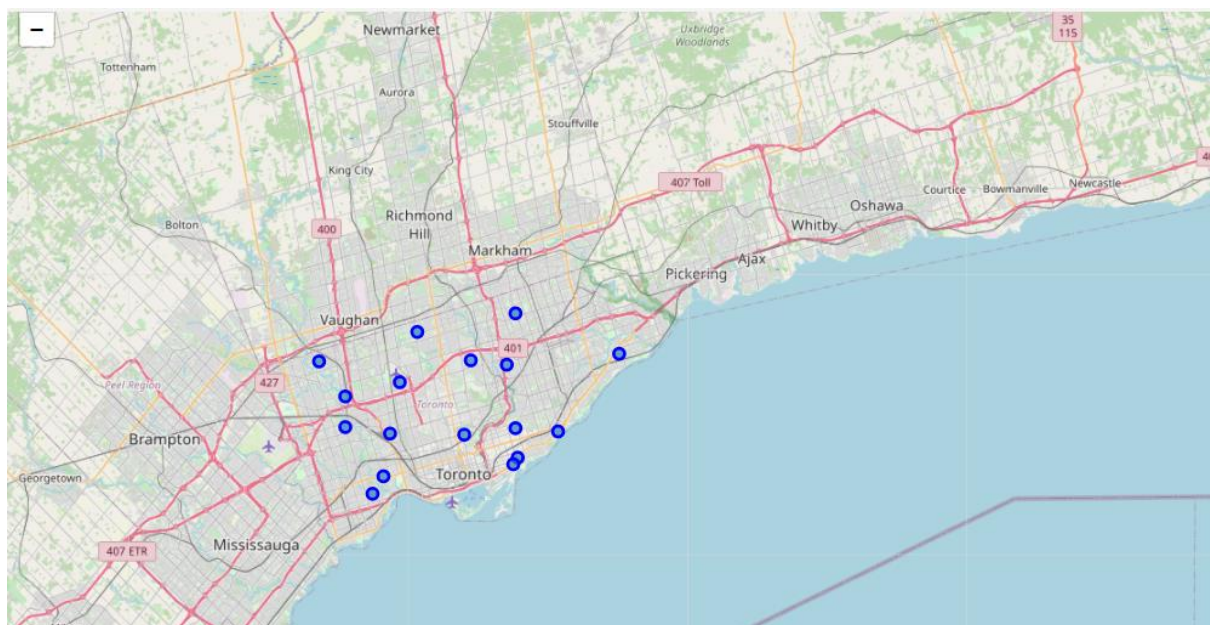


Map of the City of Toronto – blue dots represents all of Toronto neighbourhoods

location based on the clients business admirations and travel requisites, which was determined to be DownTown Toronto(derived from wikipedia and a CSV files with coordinates and geocoder) we managed scrap out cordinates and a visual map for our clients for her perusal, as shown below

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M5A	Downtown Toronto	Regent Park, Harbourfront	43.763573	-79.188711
1	M5B	Downtown Toronto	Garden District, Ryerson	43.692657	-79.264848
2	M5C	Downtown Toronto	St. James Town	43.799525	-79.318389
3	M5E	Downtown Toronto	Berczy Park	43.757490	-79.374714
4	M5G	Downtown Toronto	Central Bay Street	43.782736	-79.442259
5	M6G	Downtown Toronto	Christie	43.753259	-79.329656
6	M5H	Downtown Toronto	Richmond, Adelaide, King	43.737473	-79.464763
7	M5J	Downtown Toronto	Harbourfront East, Union Station, Toronto Islands	43.695344	-79.318389
8	M5K	Downtown Toronto	Toronto Dominion Centre, Design Exchange	43.668999	-79.315572
9	M5L	Downtown Toronto	Commerce Court, Victoria Hotel	43.689574	-79.383160
10	M5S	Downtown Toronto	University of Toronto, Harbord	43.691116	-79.476013
11	M5T	Downtown Toronto	Kensington Market, Chinatown, Grange Park	43.651571	-79.484450
12	M5V	Downtown Toronto	CN Tower, King and Spadina, Railway Lands, Har...	43.662744	-79.321558
13	M4W	Downtown Toronto	Rosedale	43.636258	-79.498509
14	M4X	Downtown Toronto	St. James Town, Cabbagetown	43.756303	-79.565963
15	M5X	Downtown Toronto	First Canadian Place, Underground city	43.724766	-79.532242
16	M4Y	Downtown Toronto	Church and Wellesley	43.696319	-79.532242

Snapshot of Downtown Toronto neighbourhoods dataframe



Map of Downtown Toronto – Blue dots represent 17 neighbourhoods

Second step in our analysis once again incoherently determined by our client (The South African business woman) it was decided to explore not only restaurants or rather a variety of restaurants but also determine frequently visited venues (**USING FOURSQUARE**) within

our recommended location, so as to assist her further regarding her own business model as to what other venues attract people within a given geographical area.

In our third and final step we narrowed in further into neighbourhoods in the Downtown Toronto area and created **clusters of some locations that meet our clients basic business insights so as to inform her stakeholders in depth upon her return to South Africa** of how 1st world class cities are geographically structured to enhance the restaurant industry and if any african cuisines are made available within their spectrum of eatery.

4. Analysis (explained in step by step exploratory analysis method)

- *However, for illustration purposes, let's simplify the above map and segment and cluster only the neighborhoods in Downtown Toronto which we'll name DT_toronto. (This also came at discussions with client based on the map visuals above)*
- *To provide our client with a subtle taste of what Down Town Toronto posses we further explored one of its Neighbourhoods in depth - Regent Park, Harbourfront*
- *We now create a GET request URL-name url!*
- *Made a limit of 100 number of venues to be returned by FourSquare and a radius of 500*
- *Upon send our get request we examined the details carefully and ran functions that gave us optimum results from the json file to later equip in pd dataframe, as shown below(A snapshot of our dataframe representing only top results)*

	name	categories	lat	lng
0	RBC Royal Bank	Bank	43.766790	-79.191151
1	G & G Electronics	Electronics Store	43.765309	-79.191537
2	Sail Sushi	Restaurant	43.765951	-79.191275
3	Big Bite Burrito	Mexican Restaurant	43.766299	-79.190720
4	Enterprise Rent-A-Car	Rental Car Location	43.764076	-79.193406

- *As you can imagine our client is now eager to unveil more of what Toronto has to offer , with that being we will now explore all neighbourhoods in Downtown Toronto. So next we will create a function that to repeat the same process to all the neighbourhoods in Downtown Toronto(this function will assist us to derive venues in all neighbourhoods.*
- *As you can imagine our client would essentially be more interested in how many venues were returned. (please see below)*

	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighborhood						
CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport	16	16	16	16	16	16
Central Bay Street	4	4	4	4	4	4
Christie	3	3	3	3	3	3
Church and Wellesley	8	8	8	8	8	8
Commerce Court, Victoria Hotel	2	2	2	2	2	2
First Canadian Place, Underground city	1	1	1	1	1	1
Garden District, Ryerson	5	5	5	5	5	5
Harbourfront East, Union Station, Toronto Islands	8	8	8	8	8	8
Kensington Market, Chinatown, Grange Park	34	34	34	34	34	34
Regent Park, Harbourfront	9	9	9	9	9	9
Richmond, Adelaide, King	3	3	3	3	3	3
Rosedale	2	2	2	2	2	2
St. James Town	16	16	16	16	16	16
St. James Town, Cabbagetown	2	2	2	2	2	2
Toronto Dominion Centre, Design Exchange	17	17	17	17	17	17
University of Toronto, Harbord	4	4	4	4	4	4

- *In total 71 unique venues were returned.*
- *for further analysis and convenience we now print each neighbourhood along with 5 most common venues(please see below)*

----CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport----

	venue	freq
0	Smoke Shop	0.06
1	Spa	0.06
2	Fast Food Restaurant	0.06
3	Pizza Place	0.06
4	Comic Shop	0.06

----Central Bay Street----

	venue	freq
0	Pizza Place	0.25
1	Coffee Shop	0.25
2	Supermarket	0.25
3	Pharmacy	0.25
4	Liquor Store	0.00

----Christie----

	venue	freq
0	Fast Food Restaurant	0.33
1	Park	0.33
2	Food & Drink Shop	0.33
3	ATM	0.00
4	Movie Theater	0.00

----Church and Wellesley----

	venue	freq
0	Playground	0.12
1	Sandwich Place	0.12

2	Pizza Place	0.12
3	Coffee Shop	0.12
4	Chinese Restaurant	0.12

----Commerce Court, Victoria Hotel----

	venue	freq
0	Park	0.5
1	Tennis Court	0.5
2	ATM	0.0
3	Light Rail Station	0.0
4	Movie Theater	0.0

----First Canadian Place, Underground city----

	venue	freq
0	Baseball Field	1.0
1	ATM	0.0
2	Light Rail Station	0.0
3	Park	0.0
4	Movie Theater	0.0

----Garden District, Ryerson----

	venue	freq
0	Skating Rink	0.2
1	General Entertainment	0.2
2	College Stadium	0.2
3	Farm	0.2
4	Café	0.2

----Harbourfront East, Union Station, Toronto Islands----

	venue	freq
0	Skating Rink	0.25
1	ATM	0.12
2	Beer Store	0.12
3	Intersection	0.12
4	Park	0.12

----Kensington Market, Chinatown, Grange Park----

	venue	freq
0	Coffee Shop	0.15
1	Italian Restaurant	0.06
2	Café	0.06
3	Sushi Restaurant	0.06
4	Pub	0.06

----Regent Park, Harbourfront----

	venue	freq
0	Electronics Store	0.11
1	Bank	0.11
2	Intersection	0.11
3	Rental Car Location	0.11
4	Restaurant	0.11

----Richmond, Adelaide, King----

	venue	freq
0	Airport	0.33
1	Park	0.33
2	Business Service	0.33
3	Pharmacy	0.00
4	Movie Theater	0.00

----Rosedale----

	venue	freq
0	Baseball Field	0.5
1	Business Service	0.5
2	ATM	0.0
3	Liquor Store	0.0
4	Pet Store	0.0

----St. James Town----

	venue	freq
0	Fast Food Restaurant	0.19
1	Pizza Place	0.06
2	Sandwich Place	0.06
3	Intersection	0.06
4	Bank	0.06

----St. James Town, Cabbagetown----

	venue	freq
0	Pizza Place	0.5
1	Furniture / Home Store	0.5
2	Light Rail Station	0.0
3	Park	0.0
4	Movie Theater	0.0

----Toronto Dominion Centre, Design Exchange----

	venue	freq
0	Fast Food Restaurant	0.12
1	Movie Theater	0.06
2	Brewery	0.06
3	Coffee Shop	0.06
4	Sandwich Place	0.06

----University of Toronto, Harbord----

	venue	freq
0	Turkish Restaurant	0.25
1	Bar	0.25
2	Sandwich Place	0.25
3	Discount Store	0.25
4	ATM	0.00

- *To give our client an intuitive analysis in a concise manner we then display the top 10 venues for each neighbourhood.*

	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	CN Tower, King and Spadina, Railway Lands, Har...	Garden	Farmers Market	Park	Pizza Place	Burrito Place	Brewery	Light Rail Station	Gym / Fitness Center	Skate Park	Restaurant
1	Central Bay Street	Coffee Shop	Pharmacy	Pizza Place	Supermarket	Falafel Restaurant	Dance Studio	Diner	Discount Store	Donut Shop	Electronics Store
2	Christie	Park	Food & Drink Shop	Fast Food Restaurant	Farm	Dance Studio	Diner	Discount Store	Donut Shop	Electronics Store	Falafel Restaurant
3	Church and Wellesley	Coffee Shop	Middle Eastern Restaurant	Chinese Restaurant	Pizza Place	Playground	Discount Store	Sandwich Place	Intersection	Farm	Falafel Restaurant
4	Commerce Court, Victoria Hotel	Tennis Court	Park	Yoga Studio	Farm	Dance Studio	Diner	Discount Store	Donut Shop	Electronics Store	Falafel Restaurant

- *For this project we chose the K-means CLUSTERING machine learning algorithm based on its accuracy and simplicity. (With that being said we will Run K-means to cluster the neighbourhoods into 5 clusters.)*

Cluster labelled 0

	Borough	Clustering Labels	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	10th Most Common Venue
14	Downtown Toronto	0	0	Pizza Place	Gym	Yoga Studio	Electronics Store	Convenience Store	Dance Studio	Diner	Discount Store	Donut Shop	Falafel Restaurant

Cluster labelled 1

	Borough	Clustering Labels	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	10th Most Common Venue
1	Downtown Toronto	1	1	Donut Shop	Electronics Store	Medical Center	Rental Car Location	Restaurant	Intersection	Mexican Restaurant	Bank	Falafel Restaurant	Farmers Market
1	Downtown Toronto	1	1	Skating Rink	Café	General Entertainment	College Stadium	Food & Drink Shop	Fish & Chips Shop	Fast Food Restaurant	Farmers Market	Falafel Restaurant	Comic Shop
2	Downtown Toronto	1	1	Fast Food Restaurant	Sandwich Place	Coffee Shop	Chinese Restaurant	Bank	Supermarket	Pharmacy	Pizza Place	Breakfast Spot	Donut Shop
1	Downtown Toronto	1	1	Pharmacy	Discount Store	Pizza Place	Butcher	Supermarket	Coffee Shop	Comic Shop	Convenience Store	Dance Studio	Diner
5	Downtown Toronto	1	1	Food & Drink Shop	Hotel	Fast Food Restaurant	Park	Yoga Studio	Donut Shop	Convenience Store	Dance Studio	Diner	Discount Store
7	Downtown Toronto	1	1	Skating Rink	Beer Store	Dance Studio	Park	Athletics & Sports	French Restaurant	Food & Drink Shop	Fish & Chips Shop	Fast Food Restaurant	Garden
1	Downtown Toronto	1	1	Fast Food Restaurant	Movie Theater	Sandwich Place	Italian Restaurant	Food & Drink Shop	Park	Burrito Place	Pizza Place	Brewery	Pub
10	Downtown Toronto	1	1	Skating Rink	Convenience Store	Fast Food Restaurant	Sandwich Place	Electronics Store	Dance Studio	Diner	Discount Store	Donut Shop	Yoga Studio
11	Downtown Toronto	1	1	Coffee Shop	Italian Restaurant	Sushi Restaurant	Grocery Store	Café	Pizza Place	Pub	French Restaurant	Indie Movie Theater	Health Food Store
12	Downtown Toronto	1	1	Light Rail Station	Garden	Skate Park	Park	Pizza Place	Burrito Place	Brewery	Restaurant	Comic Shop	Gym / Fitness Center
16	Downtown Toronto	1	1	Pizza Place	Chinese Restaurant	Intersection	Playground	Sandwich Place	Middle Eastern Restaurant	Discount Store	Coffee Shop	Electronics Store	Donut Shop

Cluster labelled 2

	Borough	Clustering Labels	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	10th Most Common Venue
6	Downtown Toronto	2	2	Airport	Park	Garden	French Restaurant	Food & Drink Shop	Fish & Chips Shop	Fast Food Restaurant	Farmers Market	General Entertainment	Electronics Store

Cluster labelled 3

	Borough	Clustering Labels	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	10th Most Common Venue
9	Downtown Toronto	3	3	Tennis Court	Restaurant	Yoga Studio	Electronics Store	Convenience Store	Dance Studio	Diner	Discount Store	Donut Shop	Falafel Restaurant

Cluster labelled 4

	Borough	Clustering Labels	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	10th Most Common Venue
13	Downtown Toronto	4	4	Baseball Field	Yoga Studio	Farmers Market	Dance Studio	Diner	Discount Store	Donut Shop	Electronics Store	Falafel Restaurant	Fast Food Restaurant
15	Downtown Toronto	4	4	Baseball Field	Yoga Studio	Farmers Market	Dance Studio	Diner	Discount Store	Donut Shop	Electronics Store	Falafel Restaurant	Fast Food Restaurant

This concludes our analysis and must say we have unearthed quite fruitful information. We have created 16 neighbourhoods with 68 varying venues as per our client insisted that it is not only restaurants that she is primarily focused on but the variety in venues that make up the whole neighbourhood. These results has provided our client with a much less vivid idea of what Downtown Toronto can offer her as a tourist and as a business woman. These analysis will now provide her with a more equipped approach specifically as a starting point to fulfil her busisness requirements before she boards a plane to the wonderful city of Toronto.

5. Results and Discussion

Again our analysis revealed a great number of of venues within the eclectic mix of neighbourhoods in Downtown Toronto. Thus popularly known for having the third most skyscrapers in North America, it is seemingly obvios why our client from South Africa showed a strong attraction to this particular area of Toronto. This only left us with the opportunity to unveil geographically and slightly street level what is expected of this eccentric area, with maps created by our tools to give her an instant navigational experince prior her physical engagement with the city.

The **Result** of all this is 16 neighbourhoods equipped with a total of 68 unrelated venues. From what we have gathered and what our client is familiar with in South Africa proves to our client that her journey to Downtown Toronto will be far more intuitive and less discomfoting compared to visiting new frontiers blindly (lacking precise factual information). With that in mind during the analysis we have worked on predominately deriving and providing our client with an advantageous starting point geographically thus

minimizing cost and time of seeking for the optimum business and tourist experience she requires to enhance her business desires, and most importantly impress her South African stakeholders in venturing into a new window of business opportunities through her restaurant foodchain upon her informative and business driven journey across the globe.

6. Conclusion

The ideal purpose of this project was to assist A South African business woman venture into a foreign country with two things in mind. *1. To explore the city of Toronto (with the confidence of a regular visitor) so as to adapt its fast paced ideological culture and its mixed blend of variety in restaurants and return the knowledge and experience home for new foreign business models to expand their customer range. 2. To provide the business woman with enough factual information to minimise any unnecessary expenditure or an excruciating tourist and business experience.*

By acquiring data from the web and using data scrapping techniques extracted from wikipedia and CSV files we were able to create logical dataframes, which in turn assisted us in gathering coordinates using geoacoders to geographically pinpoint Toronto and populate it visually on a map. With foursqaure we were able to locate venues within the Downtown Toronto area which interested our client due to its unmistakeble skyscrappers.

With Further analysis of Downtown Toronto we were able to discover 16 neighbourhoods and 68 venues of various kinds despite restuarnts ran through our impressive K-means alorithm.

Final decision on the optimal location within the Downt Town Toronto region based on a comprehensive and mostly volume based characteristic of neighbourhoods venues and direct business needs encapsuled with a great tourist experience. It was decided that **Cluster 5 eminating from our algorithm proved to provide more variety than all other clusters, and the follwing locations were chosen to be her priority upon landing in the city of Toronto -*Kensington Market, Chinatown, Grange Park {these locations were chosen predominately due to its high volume of venues and variety in restaurants.** With these results we are determined that our client and her assosciated stakeholders will be able to make further informed and acute business models upon her return to South Africa

