Country Restaurants distribution (for any city)

&

Correlation between Inmigration & Restaurants (Toronto)

Index

1. OBJECTIVE

1- To create a graphical tool that allows for any city of the WORLD to analyze:

- The restaurants of which nationality predominate in each area of the city
- The distribution of restaurants of the desired country, grouped by area.

2- Analyze correlation between inmigration and number of national restaurants in Toronto

2. REQUIRED DATA

Mainly 2 types of data:

1- RESTAURANTS IN THE CITY FOR EACH COUNTRY:

The restaurants of the city within the circular areas in which we divide the city. For this we will use the foursquare API (with the SEARCH endpoint), although previously we will have to homogenize the catalog of categories using the CATEGORIES endpoint.

2- INMIGRATION TOWARDS CANADA AND AN STANDARDIZED LIST OF COUNTRIES

We will contrast the analysis using 2 different datasets:
- **Immigrants arriving to Canada between 1980-2013 (Dataset 1)**
- **Immigrants living in Canada in 2019 (Dataset 2)**

It is necesary standardize a list of countries to match the nationalities of the restaurants and the names of the countries.

3. METHODOLOGY

1. List of all categories

id	name	idfather	level	num_of_sons
4d4b7104d754a06370d81259	Arts & Entertainment	None	1	36
56aa371be4b08b9a8d5734db	Amphitheater	4d4b7104d754a06370d81259	2	0
4fceea171983d5d06c3e9823	Aquarium	4d4b7104d754a06370d81259	2	0
4bf58dd8d48988d1e1931735	Arcade	4d4b7104d754a06370d81259	2	0
4bf58dd8d48988d1e2931735	Art Gallery	4d4b7104d754a06370d81259	2	0

2. Category venues x level

level	id	name	idfather	num_of_sons
1	10	10	0	10
2	459	459	459	459
3	370	370	370	370
4	91	91	91	91
5	13	13	13	13

3. Food categories catalog (with the whole tree -5 levels)

	id	level	name1	name2	name3	name4	name5	id1	id2	id3	id4	id5
239	4bf58dd8d48988d108941735	2	Food	Dumpling Restaurant				4d4b7105d754a06374d81259	4bf58dd8d48988d108941735			
241	4bf58dd8d48988d109941735	2	Food	Eastern European Restaurant				4d4b7105d754a06374d81259	4bf58dd8d48988d109941735			
248	4bf58dd8d48988d10b941735	2	Food	Falafel Restaurant				4d4b7105d754a06374d81259	4bf58dd8d48988d10b941735			
255	4bf58dd8d48988d10c941735	2	Food	French Restaurant				4d4b7105d754a06374d81259	4bf58dd8d48988d10c941735			
275	4bf58dd8d48988d10d941735	2	Food	German Restaurant				4d4b7105d754a06374d81259	4bf58dd8d48988d10d941735			

3. METHODOLOGY

4- Select city

Draw first map with default values of the limits of the city to analyze

```
compute_circles(latitude,longitude,adjust_value)
draw_city_map (latitude,longitude,city_input,[],[],1)
```

City dimensions: Horizontal 16.11 km and vertical 22.26 km.
Area: 358.65 km2.
Radio of big circle: 14.47 km
Limits to adjust city(N,S,W,E): [0.1, 0.1, 0.1, 0.1]
Number of small circles: 99

5. Adjust the limits of the city

If you want to change the center of the city to analyse press YES?y
Adjust dimensions of the city to be analysed from the city center latitude a
longitud (initial default values were 0.1)
If you want to change it enter values between 0 and 0.2
North (0.1):.1
South (0.1):.005
West (0.1):.065
East (0.1):.065
Current small radio: 1500 m. If you want to changed it press YES

City dimensions: Horizontal 10.47 km and vertical 11.69 km.
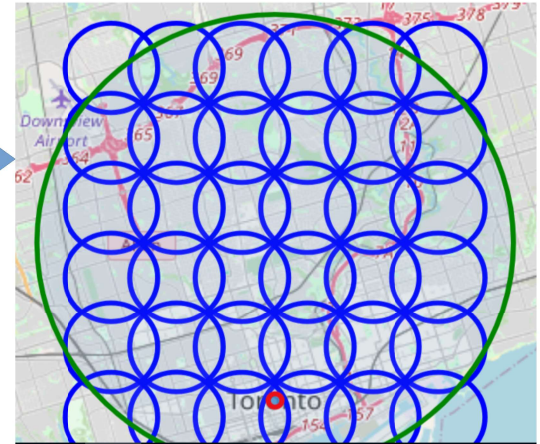Area: 122.40 km2.
Radio of big circle: 7.60 km
Limits to adjust city(N,S,W,E): [0.1, 0.005, 0.065, 0.065]
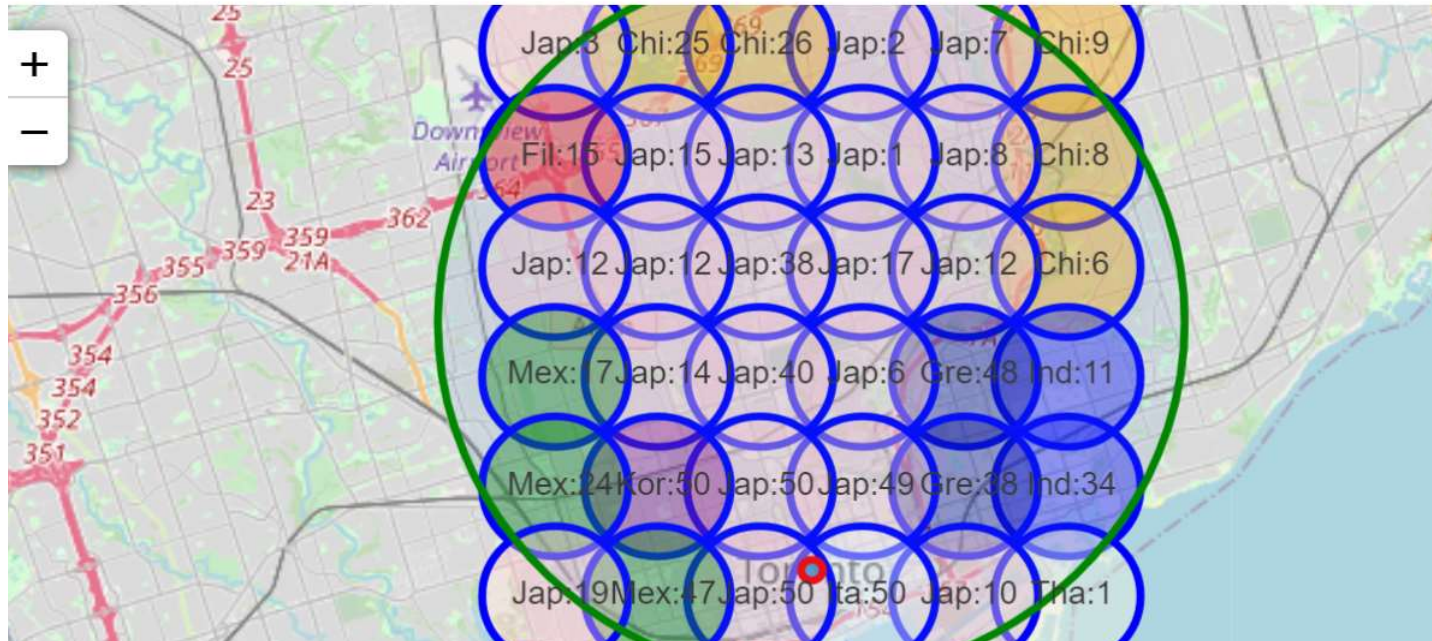New radio for small circles (in meters): 1500
Number of small circles: 36

Toronto

Toronto

3. METHODOLOGY
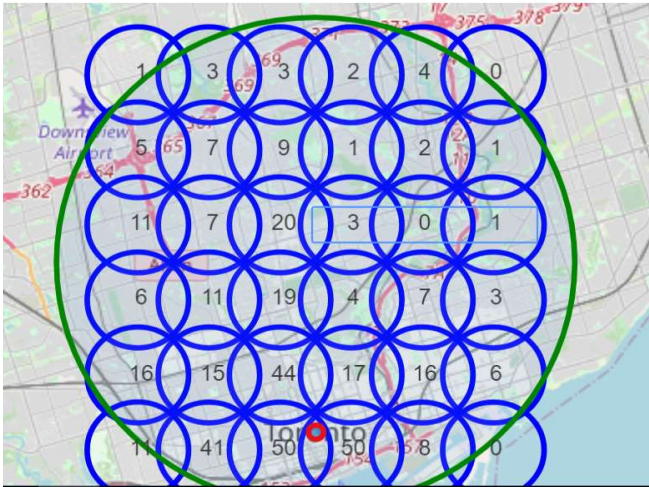## 6. Predominant country restaurants x Area

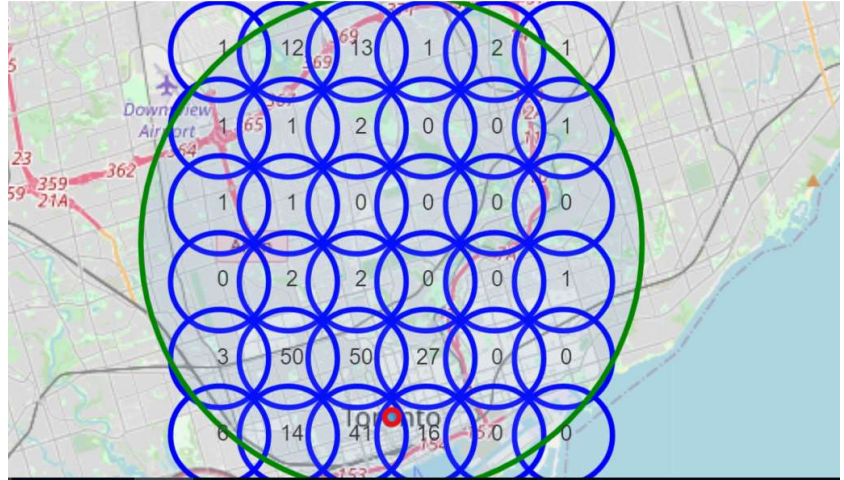Toronto: Most popular country restaurant by Area
(country:Num. Restaurants)

3. METHODOLOGY

7. Number of restaurants of a country in each area

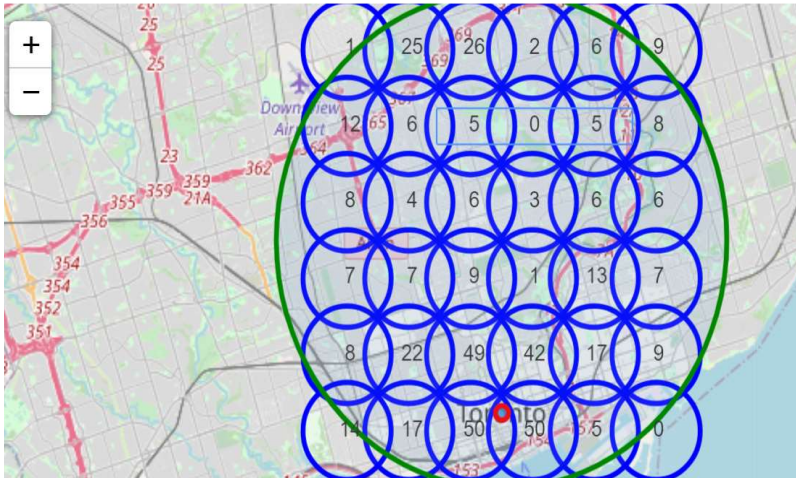**Restaurants from Italy in Toronto**

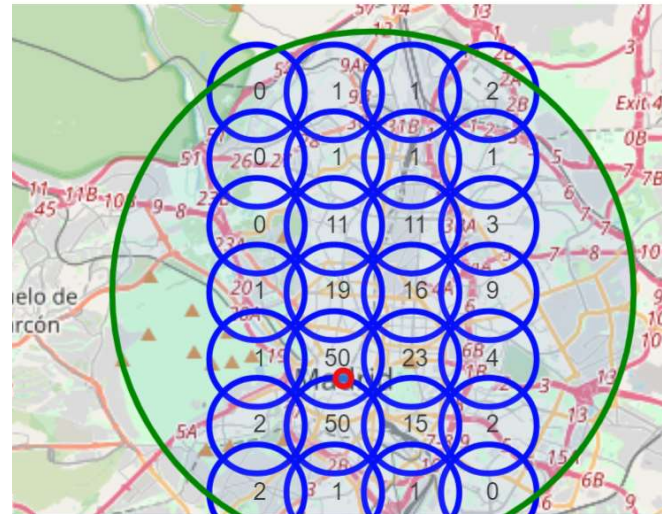**Restaurants from Republic of Korea in Toronto**

3. METHODOLOGY

7. Number of restaurants of a country in each area

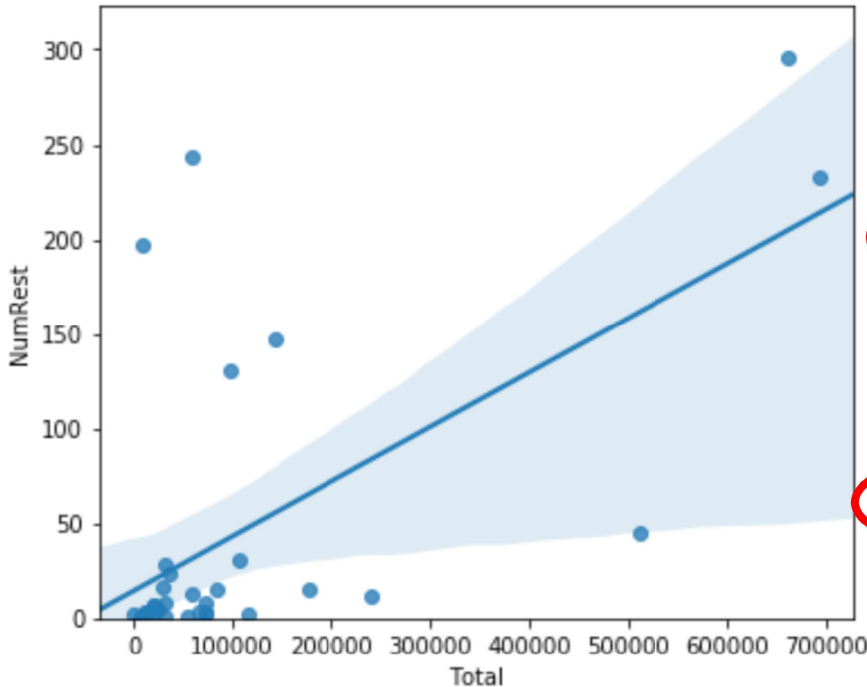Restaurants from China in Toronto

Restaurants from India in Madrid

8. Correlation between inmigrants and restaurant


```
51 countries with restaurants in Toronto
Correlation between inmigrants and nº of restaurants
              Total    NumRest
Total      1.000000   0.339179
NumRest    0.339179   1.000000
Interept: [34.33222338] Coeficiente: [[0.00020059]]


33 UNDEVELOPED countries with restaurants in Toronto
Correlation between inmigrants and num. of restaura
              Total    NumRest
Total      1.000000   0.612478
NumRest    0.612478   1.000000
Interept: [14.32106312] Coeficiente: [[0.0002883]]


18 DEVELOPED countries with restaurants in Toronto
Correlation between inmigrants and nº of restaurants
              Total     NumRest
Total      1.000000   -0.067878
NumRest   -0.067878    1.000000
```

4. RESULTS

The outputs of the project are:

1- Dataframe with all the 'venues' categories used by Foursquare with their Id and level; as well as the Id and name of all their ancestors. In total, 943 venues categories were detected, of which 349 are from the Food subcategory and of these 68 (along with all their descendants), they have been able to match country names.

2- Tool that allows:
To choose for a city its limits and a reasonable radius for Foursquare searches (approx. 1000-1500m)
Visualize the restaurants of which country predominate in each area
Distribution of the restaurants of the chosen country in that city.

3- Correlation between immigrants from Canada and national restaurants opened in Toronto.

5. CONCLUSIONS

1- There is a correlation, although not too strong (around 0.6) between the number of immigrants living in the city of Toronto and the number of restaurants of their nationality, but ONLY for inmigrants from developing countries and NOT from developed countries.

There are important exceptions in both directions:
- Countries with a very high number of immigrants and very few restaurants (Philipines, Pakistan and Iran).
- Countries with a very high number of restaurants and very few immigrants (Mexico, Thailand).

2- Immigrants set up the restaurant preferably near their homes.
The high density of restaurants of their countries partially matches with their residential areas. (p.e: In Toronto: Italians in little Italy, Chinese in Chinatown, Greeks in Little Greek and Portuguese in small Portugal).