

# THE BATTLE OF NEIGHBORHOODS FROM COURSERA CAPSTONE(Johannesburg)¶

## Introduction

*The problem:*

This project is related to understanding the appropriate location for having a gas station in **South Africa**. The city of choice is **Johannesburg**. **Johannesburg** is the largest city of **South Africa** and is also one of the 50 largest urban areas of the world. Apart from being the largest city, **Johannesburg** is also most populous city with a population density of >2000 /sq km. The urban population is also very high. The passenger car sales for the past two months(Dec-19 and Jan-20) was averaging at ~40000 cars in the country with a major contribution from **Johannesburg**. The purpose of this work is to locate an appropriate place for Gas station in **Johannesburg**. The existing Gas Stations locations and their proximity to each other will be analyzed as part of this work.

## Data

Based on definition of our problem, factors that will influence our decision are:

- List of location and neighborhoods of Johannesburg
- Number of and distance other Gas stations in the neighborhood, if any

## Data Sources

- Municipalities and neighborhoods of Johannesburg from Wikipedia ([https://en.wikipedia.org/wiki/City\\_of\\_Johannesburg\\_Metropolitan\\_Municipality](https://en.wikipedia.org/wiki/City_of_Johannesburg_Metropolitan_Municipality));
- Geocode information from Geopy;
- Gas stations in Johannesburg from Foursquare

Based on definition of our problem, factors that will influence our decision are:

- number of existing restaurants in the neighborhood (any type of restaurant)
- number of and distance to Italian restaurants in the neighborhood, if any
- distance of neighborhood from city center

## B. Methodology

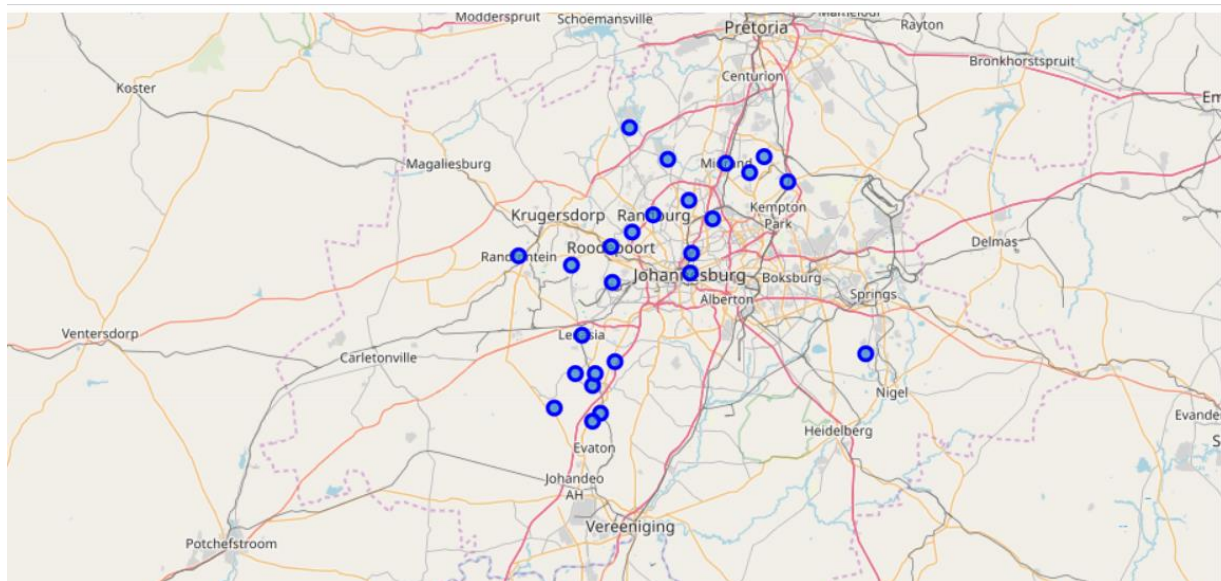
To understand geography of South Africa and in particular different municipalities ,I have used the data from Wikipedia  
[https://en.wikipedia.org/wiki/City\\_of\\_Johannesburg\\_Metropolitan\\_Municipality](https://en.wikipedia.org/wiki/City_of_Johannesburg_Metropolitan_Municipality).

We have used Nominatim to identify the latitude and longitude of different municipalities in Johannesburg.,

Place	Code	Population	Area	latitude	longitude
Johannesburg	798015	957,441	334.81	-26.205000	28.049722
Soweto	798026	1,271,628	200.03	-26.222778	27.890000
Randburg	798016	337,053	167.98	-26.096111	27.975000
Roodepoort	798022	326,416	161.50	-26.156389	27.885833
Midrand	798004	87,387	152.87	-25.999262	28.125912

We see out of the different municipalities in the city of Johannesburg , the bigger one is Johannesburg and followed by others. The population of the city is equally good to this study. The other city apart from Johannesburg is Soweto, which is larger than Johannesburg with respect to population. For the sake of this study we use Johannesburg(code:798015).

I used python **folium** library to visualize geographic details of Johannesburg and its other municipalities and I created a map of Johannesburg and its other municipalities superimposed on top. I used latitude and longitude values to get the visual as below:



As the study is interested in Gas stations in Johannesburg, I utilized the Foursquare API to explore the city and segment them. I designed the limit as **100 results** and the radius **10000 meter** for the given municipality from their given latitude and longitude information.

I have searched the category of Gas stations from the Foursquare website and found the category id as “ 4bf58dd8d48988d113951735 “

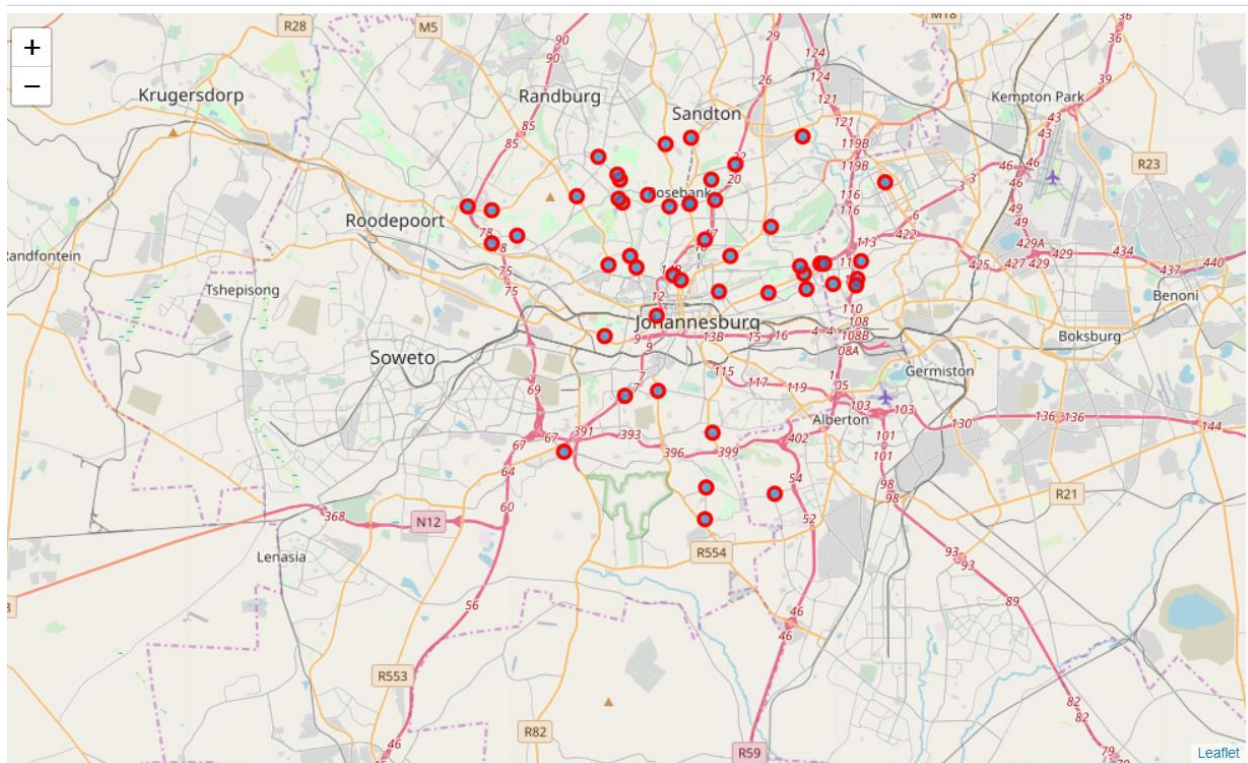
Here is a head of the list Venues name, latitude and longitude , distance , city and state information from Foursquare API.

	name	location.lat	location.lng	location.distance	location.city	location.state
0	BP	-26.197840	28.050016	797	Downtown Johannesburg	IGauteng
1	Engen Parktown Convenience Centre	-26.183036	28.036445	2781	EGoli	IGauteng
2	BP	-26.199933	28.012203	3789	Mayfair	IGauteng
3	Sasol Minty's Bree Street	-26.202648	28.027566	2228	EGoli	IGauteng
4	BP Empire	-26.185516	28.040268	2365	EGoli	IGauteng

In summary of this data 50 gas stations were returned by Foursquare.

## C. Results

The results have provided the names of the Gas stations from the Foursquare API. 80% of the Gas stations in the city are either owned or a franchise of BP, Shell, ENGEN, the rest 20 owned by TOTAL, Sasol and others. The closer look on the map, shows that the Gas stations are mostly placed on the city main roads.



## **D. Discussion**

As I mentioned, Johannesburg is a big city in South Africa with a high population in region. The total number of population and proximity to the capital city and to the gold mine industry makes Johannesburg a city with more population and city with moving traffic. The data showed that there are no Gas stations on the National Highways(as shown by the Foursquare api). There is also a complexity in knowing if the roads are two ways with a divider or not.

In a major cities across the world, the gas stations are usually placed on either side of the road in order not to interrupt the traffic travelling in both the direction. To do this analysis we need further information.

For a city of million people and a city where car sales of 40000 was noticed(in the entire country), more number of gas stations are needed.

## **F. Conclusion**

As the city is getting denser and wider roads are being constructed, the need for gas stations that can host convenience stores and rest area, plays a major role. With the boom of electric vehicles spreading across the world, the gas stations need to be planned well and needs further study with population density and active vehicle movement across different areas.