



# The Battle of Neighborhoods

*Coffee Shop Location Analysis*

# Introduction

Jeddah is the second largest city in Saudi Arabia, it is located at the red-sea coast in the western province, it is far from the holy city of Makkah by 70km. However; in this project I will try to find a suitable location for to start a coffeeshop business point at specific districts that are located between street of Tahlia south to north, Madinah road east to west. Since there are lots of coffeeshops in the areas mentioned I will try to detect locations that are not already crowded with coffeeshops. I will also particularly be interested in areas with no or few coffeeshops in the neighborhood. I would also prefer locations as close to Salamah, Zahra districts circle as possible, assuming that first two conditions are met. I will use the data science powers to generate a few most promising neighborhoods based on this criterion. Advantages of each area will then be clearly expressed so that best possible final location can be selected.

# Data

Based on the criteria of the business problem, the factors that will affect our decision are:

1. Number of existing coffeeshops in the neighborhood.
2. Number of and distance to coffeeshops in the neighborhood, and
3. Distance from neighborhood of Salamah, Zahra center.

Hence; we decided to use regularly spaced circular grids of locations, centered around Salamah, Zahra Circle center, to define our neighborhoods. Following data sources will be needed to extract/generate the required information:

1. Centers of candidate areas will be generated algorithmically and approximate addresses of centers of those areas will be obtained using Google Maps API reverse geocoding
2. Number of coffeeshops and their type and location in every neighborhood will be obtained using Foursquare API.
3. Coordinate of center will be obtained using Google Maps API geocoding of well-known Salamah, Zahra districts in Jeddah city.

# Methodology

Limiting the analysis to area ~6km around city center according to the following steps:

1. Collecting the required data location and type (category) of every coffeeshop within 6km from Jeddah center, and identified coffeeshops (according to Foursquare categorization).
2. The analysis will be a calculation and exploration of 'coffeeshop density' across different areas of Jeddah.
3. The Analysis will focus on most promising areas and within those create clusters of locations that meet some basic requirements.
4. Considering locations with no more than two coffeeshops in radius of 250 meters, and locations without coffeeshops in radius of 400 meters.
5. Using map in the analysis to present locations and create clusters using k-means clustering of those locations to identify general zones / neighborhoods / addresses which should be a starting point for final 'street level' exploration and search for optimal venue location by stakeholders.

	Address	Latitude	Longitude	X	Y	Distance from center
0	Unnamed Road, Al Andalus, Jeddah 23311	21.526354	39.111886	3.052336e+06	2.585954e+06	5992.495307
1	Unnamed Road, Al Andalus, Jeddah Saudi Arabia	21.525541	39.117171	3.052936e+06	2.585954e+06	5840.376700
2	Unnamed Road, Al Andalus, Jeddah 23311	21.524727	39.122457	3.053536e+06	2.585954e+06	5747.173218
3	Unnamed Road, Al Andalus, Jeddah 23311	21.523914	39.127742	3.054136e+06	2.585954e+06	5715.767665
4	Unnamed Road, Al Andalus, Jeddah 23311	21.523101	39.133026	3.054736e+06	2.585954e+06	5747.173218
5	Unnamed Road, Al Andalus, Jeddah Saudi Arabia	21.522287	39.138311	3.055336e+06	2.585954e+06	5840.376700
6	Unnamed Road, Al Andalus, Jeddah Saudi Arabia	21.521473	39.143595	3.055936e+06	2.585954e+06	5992.495307
7	Unnamed Road, Al Andalus, Jeddah 23311	21.531856	39.104710	3.051436e+06	2.586474e+06	5855.766389
8	Unnamed Road, Al Andalus, Jeddah 23311	21.531043	39.109996	3.052036e+06	2.586474e+06	5604.462508
9	Unnamed Road, Al Andalus, Jeddah 23311	21.530230	39.115281	3.052636e+06	2.586474e+06	5408.326913

# Visualization

- There are 15 addresses representing centers of zones containing locations with low number of coffeeshops and no coffeeshops nearby, all zones being fairly close to city center (all less than 4km from Salamah, and about half of those less than 2km from Salamah).
- Although zones are shown on map with a radius of ~500 meters (green circles), their shape is actually very irregular, and their centers/addresses should be considered only as a starting point for exploring area neighborhoods in search for potential coffeeshop locations.
- Most of the zones are located in Salamah, Rawdah, and Khaldia boroughs, which we have identified as interesting due to being popular with customers.



# Results and Discussion

- The analysis shows that although there is a great number of coffeeshops in Jeddah (~1000 in our initial area of interest which was 12x12km around Salamah), there are pockets of low coffeeshop density fairly close to city center.
- Highest concentration of coffeeshops was detected south and west from Salamah, so we focused our attention to areas south, south-east and east, corresponding to boroughs Salamah, Khaldiah.
- Another borough was identified as potentially interesting is Rawdah, but our attention was focused on Salamah and Rawdah which offer a combination of popularity among young customers, closeness to city center.
- After directing our attention to this narrower area of interest (covering approx. 5x5km south-east from Salamah) we created a dense grid of location candidates (spaced 100m apart); those locations were then filtered so that those with more than two coffeeshops in radius of 250m and those with a coffeeshop closer than 400m were removed.
- The candidate's locations were then clustered to create zones of interest which contain greatest number of location candidates.
- Addresses of centers of those zones were also generated using reverse geocoding to be used as markers/starting points for more detailed local analysis based on other factors.
- Result of all 15 zones containing largest number of potential new coffeeshop locations based on number of and distance to existing venues, both coffeeshops in general and Specialized coffeeshops particularly.
- The purpose of this analysis was to only provide info on areas close to Jeddah center but not crowded with existing coffeeshops, the Specialized in particular, it is entirely possible that there is a very good reason for small number of coffeeshops in any of those areas, reasons which would make them unsuitable for a new coffeeshop regardless of lack of competition in the area.
- Recommended zones should therefore be considered only as a starting point for more detailed analysis which could eventually result in location which has not only no nearby competition, but also other factors taken into account and all other relevant conditions met.

# Conclusion

The purpose of this project was to identify Salamah areas close to center with low number of coffeeshops (particularly specialized coffeeshops) in order to aid stakeholders in narrowing down the search for optimal location for a new coffeeshop.

By calculating coffeeshop density distribution from Foursquare data we have first identified general boroughs that justify further analysis (Salamah and Rawdah), and then generated extensive collection of locations which satisfy some basic requirements regarding existing nearby coffeeshops. Clustering of those locations was then performed in order to create major zones of interest (containing greatest number of potential locations) and addresses of those zone centers were created to be used as starting points for final exploration by stakeholders.

Final decision on optimal coffeeshop location will be made by stakeholders based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location (proximity to park or water), levels of noise / proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood etc.

