

IBM data science Professional certificate

CAPSTONE PPROJECT: Where to set up a new Bank of America branch in Rochester, New York?

Introduction

Background

When companies are growing, there will be a need to expand their services or operations by opening new branches or offices. Most of the time, studies need to be done to make decision on where to setup a new office or branch. Bank managers are usually faced with this decision of where to open a new branch. There is usually a correlation between where the bank is situated and how well it performs. At this time, Rochester has 6 offices in Rochester.

These decisions are made based on the population density, neighborhood, competitors and others. In this, we are going to use some analysis tools to advice Bank of America managers on how to determine the best location for their business. Two factors will be considered: competitors and shopping malls or centers. A decision to set a new branch needs to be well thought and data are needed to facilitate such decision. In this report, we use some analytics tools to find the ideal place to set a new branch for Bank of America (BOA).

Business Problem

Where to set up a new branch for BOA? It is a challenging decision to pick a location for new branch. These decisions have to consider several factors. Bearing in mind that there is a correlation between where the bank is located and how it performs. This report will facilitate the choice by using some data science tools to predict where to set up a new branch in the city of Rochester, New York.

Interest

This analysis might be helpful for decision-makers or stakeholders as they are exploring possibilities to set up a new branch. It will also help decision-makers to know who are the competitors in terms of the number of branches in the town.

Methodology

2.1 Data source

We will need to get the data related to all banks and different malls around Rochester city. We are going to need to import and install some libraries. The Foursquare API will be used as the main data source. A request to foursquare URL will help us to get data related to all banks and all shopping malls or centers that will help us in our analysis

2.2 Data cleaning

We are going to use some functions and tools in python to clean our json data, pulled from Foursquare API. The request function will be used to get json data from URL. We are also going to use json-normalize to normalize the json data. The panda library will be used to place all these data into dataframe (dataframe_filtered). And dataframe will be filtered based on categories column (bank). The table below is the result of the filter.

	id	name	categories	referralId	hasPerk	location.address	location.crossStreet	location.lat	location.lng
0	4d87a9f75ad3a093333610fe	Northwest Bank	[[{'id': '4bf58dd8d48988d10a951735', 'name': 'B...'}]]	1592552152	False	36 W Main St	Fitzhugh St N	43.155613	-77.614059
1	4bc12cb774a9a593ce84d1f6	First National Bank Building	[[{'id': '4bf58dd8d48988d130941735', 'name': 'B...'}]]	1592552152	False	35 State St	NaN	43.155553	-77.613362
2	4b981117f964a520182a35e3	Canandaigua National Bank	[[{'id': '4bf58dd8d48988d10a951735', 'name': 'B...'}]]	1592552152	False	45 E Main St #1	NaN	43.155792	-77.611320
3	4cb88081035d236ab88bcd4e	Citizens Bank	[[{'id': '4bf58dd8d48988d10a951735', 'name': 'B...'}]]	1592552152	False	260 E Main St Ste 1000	NaN	43.157845	-77.605636

After filtering the raw dataframe using the column categories, we will end up with the dataframe below.

name	categories	address	crossStreet	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country
Northwest Bank	Bank	36 W Main St	Fitzhugh St N	43.155613	-77.614059	[{'label': 'display', 'lat': 43.155612945555664...	208	14614	US	Rochester	NY	United States
Canandaigua National Bank	Bank	45 E Main St #1	NaN	43.155792	-77.611320	[{'label': 'display', 'lat': 43.15579192510671...	357	14614	US	Rochester	NY	United States
Citizens Bank	Bank	260 E Main St Ste 1000	NaN	43.157845	-77.605636	[{'label': 'display', 'lat': 43.15784452570644...	780	14604	US	Rochester	NY	United States
Five Star Bank	Bank	100 Chestnut St	NaN	43.154870	-77.602616	[{'label': 'display', 'lat': 43.15487, 'lng': ...	1057	14604	US	Rochester	NY	United States
Bank of America	Bank	4 State St	NaN	43.156313	-77.611850	[{'label': 'display', 'lat': 43.156313, 'lng': ...	293	14614	US	Rochester	NY	United States
Upstate National Bank	Bank	1 W Main St	NaN	43.155548	-77.612869	[{'label': 'display', 'lat': 43.15554809570312...	271	14614	US	Rochester	NY	United States

2-3 Data analysis

By using panda dataframe, we are going to filter the table to get all Bank of America (BOA) branches. Applying a filter on our dataframe, return 6 Bank of America offices in Rochester, New York. It is shown in the table below

name	categories	address	crossStreet	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country
Bank of America	Bank	4 State St	NaN	43.156313	-77.611850	[{'label': 'display', 'lat': 43.156313, 'lng': ...	293	14614	US	Rochester	NY	United States
Bank of America	Bank	1 East Ave	Main St	43.157201	-77.604152	[{'label': 'display', 'lat': 43.15720111998941...	898	14604	US	Rochester	NY	United States
Bank of America	Bank	671 Park Ave	Berkeley St	43.148046	-77.577845	[{'label': 'display', 'lat': 43.14804578407385...	3204	14607	US	Rochester	NY	United States
Bank of America	Bank	1394 Norton St	Portland Ave	43.187911	-77.585202	[{'label': 'display', 'lat': 43.187911, 'lng': ...	4190	14621	US	Rochester	NY	United States
Bank of America	Bank	1381 E. Ridge Rd	NaN	43.197979	-77.580366	[{'label': 'display', 'lat': 43.19797926281372...	5340	14621	US	Rochester	NY	United States

2.3.1 Competitors

Competitors are all other banks in Rochester. A count, done on our dataframe, will give us the list of all the banks in Rochester and it gives us the number of branches that each bank has in Rochester city. From the table below, we could easily infer that M&T Bank and Chase Bank are the main competitors of BOA.

M&T Bank	7
Citizens Bank	5
Bank of America	5
Chase Bank	4
KeyBank	4
Canandaigua National Bank	4
Northwest Bank	3
Upstate National Bank	1
Genesee Regional Bank	1
Five Star Bank	1
M&T Bank in Tops	1
Name: name, dtype: int64	

2.3.2 Shopping Malls

We are going to do a new query search with “shopping Mall”. This request will identify shopping malls or shopping centers around Rochester city. Using panda dataframe, we are going filter and get all the shopping malls in the city. The table below shows all the malls in Rochester. The table below shows some of the shopping centers and malls. We have identified 50 shopping malls.

	name	categories	address	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country
0	Rochester Plaza Hotel and Conference Center	Hotel	70 State St	43.156692	-77.612992	[{'label': 'display', 'lat': 43.15669191206731...	192	14614	US	Rochester	NY	United States
1	First Federal Plaza Building	Office	28 E Main St	43.156371	-77.611503	[{'label': 'display', 'lat': 43.15637130284806...	318	14614	US	Rochester	NY	United States
2	Rochester Plaza Gym	Gym	70 State St	43.156906	-77.613007	[{'label': 'display', 'lat': 43.15690612792969...	184	14614	US	Rochester	NY	United States
3	Plaza Tobacco and Gifts	Convenience Store	28 E Main St	43.156313	-77.611850	[{'label': 'display', 'lat': 43.156313, 'lng':...	293	14614	US	Rochester	NY	United States
4	Rochester Plaza Pool	Pool	NaN	43.156903	-77.612556	[{'label': 'display', 'lat': 43.15690324055638...	219	14614	US	Rochester	NY	United States

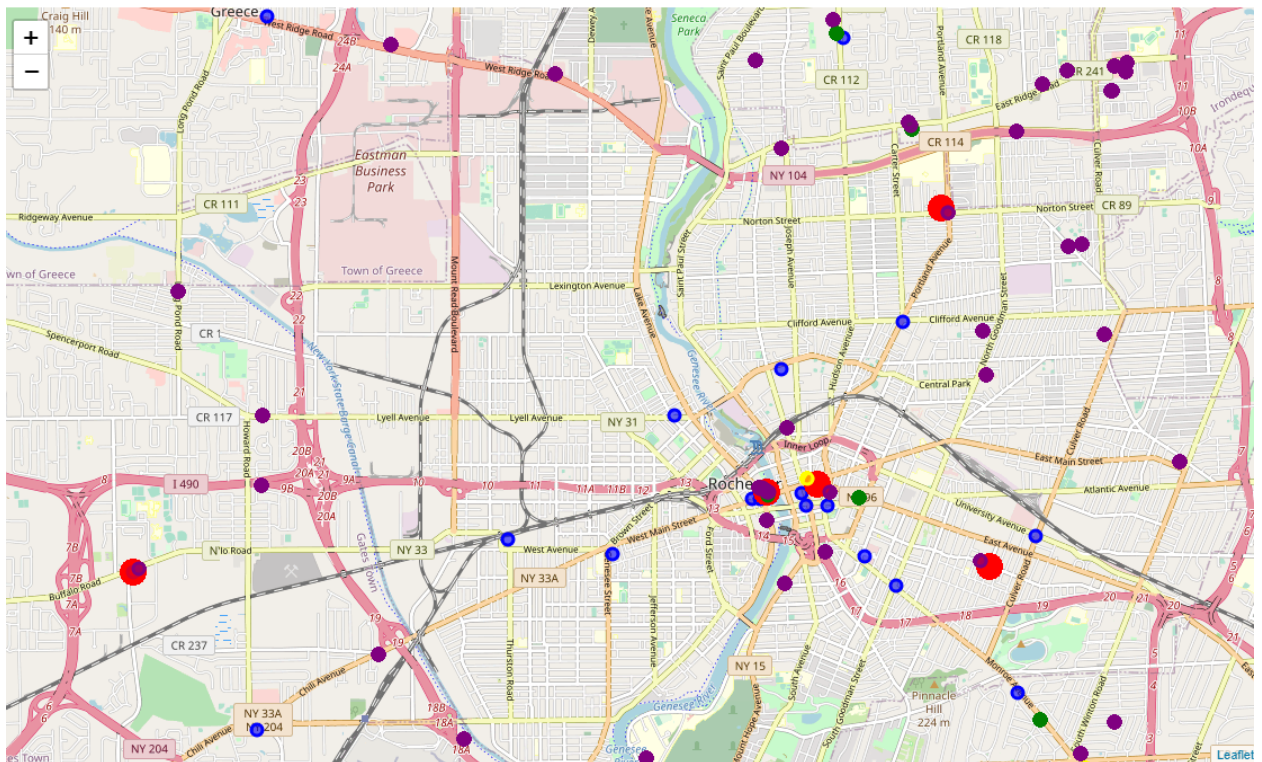
Results

From this analysis, it turns out that M&T Bank and Citizen bank are the main competitors of Bank of America.

We are going to use folium to be able visualize our data in a map and try to predict the feasible location for a new BOA branch. The map below is the illustration of our analysis.

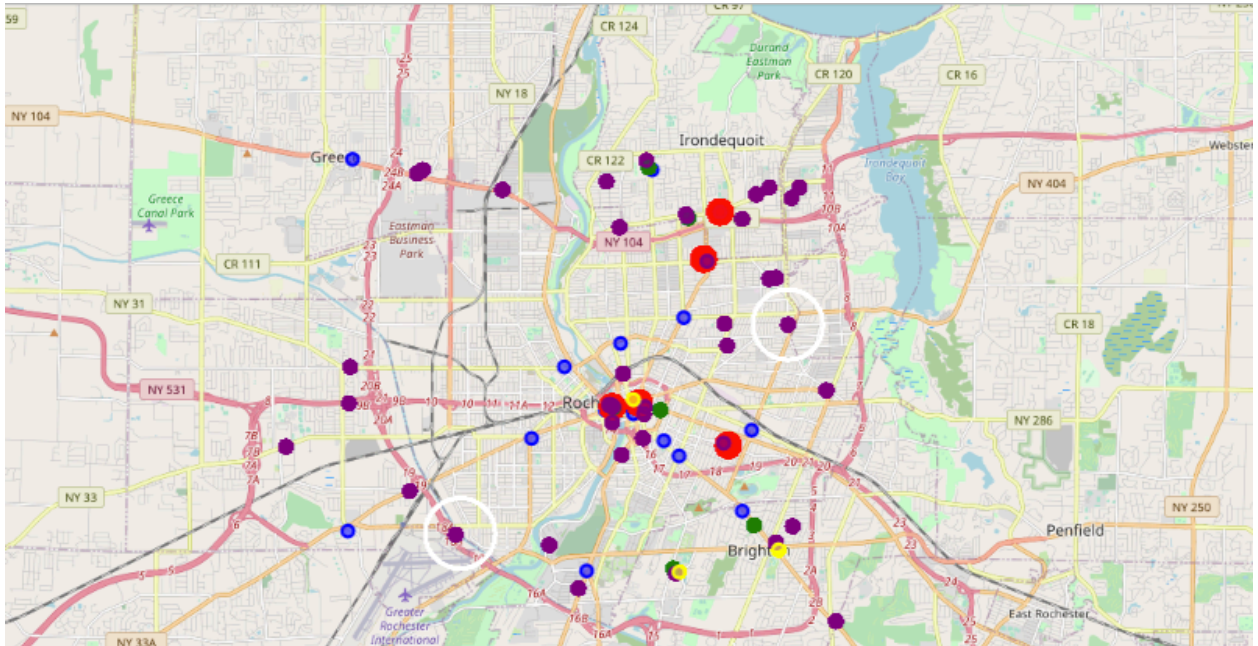
Map legend:

- Red Circle: Bank of America
- Green Circle: M&T Bank
- Yellow Circle: Citizen Bank
- Blue Circle: Other Banks
- Purple Circle: all shopping malls and centers



3.1 Locating new branch for BOA

We have identified two potential locations that could be used by BOA managers set up a new branch. On the map, the two circles in white indicate these locations. These locations are situated in neighborhood surrendered by shopping malls. It could also be seen that competitors are not present. The map below indicates the two location with while circle.



Conclusion

This report has explored where to locate a new BOA branch based on competitors and shopping malls. The analysis shows that there are certain locations that would be beneficial for BOA. We have identified two locations. These two locations are well situated with some shopping malls around and BOA competitors do not have a presence there too. This report will evidently help BOA stakeholder on where deploy the new branch. These two locations