

A low-angle, upward-looking photograph of several modern skyscrapers with glass facades. The buildings are filled with windows that reflect the sky and clouds, creating a complex pattern of blue and white. The perspective makes the buildings appear to converge towards the top of the frame.

Select a location for a Real Estate Project

Choosing a location for a 5-star hotel in Abidjan

A project submitted as a partial requirement to obtain the certificate of IBM Data Science Professional Certificate



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Introduction & Background

A Chinese group of investors has recently **expressed a will to build a five-star hotel** with all amenities, including a restaurant, a swimming pool, a gym, a mini shopping mall, and a nightclub in the capital city of Cote d'Ivoire, West Africa. They even planned to introduce a small health care center that should deliver essential medical treatments.

To maximize their profits, they want to pinpoint the best location in the hotel. Having heard about the professionalism of "**DataUnis**," a data science company located in Abidjan, they trusted them to handle the project.

As a junior data science in "**DataUnis**," I was asked to lead a team for this study and come up with a report to solve the problem of these Chinese investors.

Abidjan is the capital city of Côte d'Ivoire in West Africa. It is located on the southern Atlantic coast of the country. The country has recently been one of the fastest-growing economies in Africa since 2012, with GDP growth of 8% on average (World Bank).

The nation is best known internationally by the performance of its football team over the last decade, one of whom "Didier Drogba" the former Chelsea Fc striker is the most famous.

Despite such an economic growth, a lot of structural and social issues are yet to be tackled. Among them, accommodation issues are one of them. In other words, the relative climate of social peace, the progress the country has recently experienced give considerable opportunities to invest in real estate in the country and especially in Abidjan, which is the major urban center.

When the decision is made to invest in the real estate, the obstacle that comes next is to pinpoint the location, here is where data science and data scientist step in.

In this mini-project, geographical data are leveraged to handle a location problem in a real estate project, which is to find the best location to build a five-star hotel in the Ivorian capital city.

Data & Methodology

The data collected was the geographical coordinates of the districts in Abidjan. Then, the foursquare API algorithm was employed to get all the venues in the radius of 6km from the city of Abidjan.



Next, mapping and clustering of all hotels helped isolate promising locations. The clusters or groups were further examined, then the investigation reached the district level. The criteria mentioned above were used to screen each option to come up to the best location.

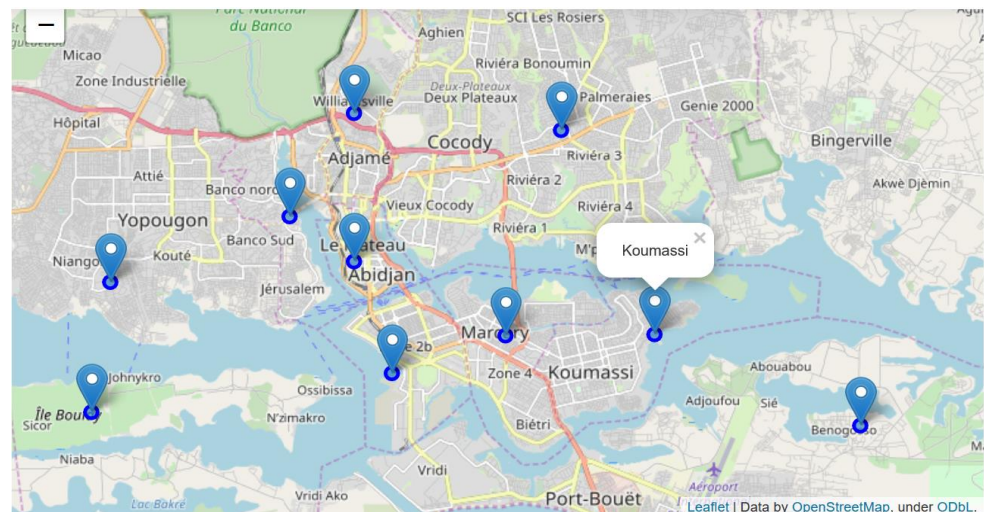
Results

With the data collected, the following have been gathered:

1. a dataframe compiling the geographical data of the main districts in Abidjan city

Districts	Latitude	Longitude
Abobo	5.4329	-4.0389
Adjame	5.3651	-4.0236
Yopougon	5.3177	-4.0900
Plateau	5.3233	-4.0236
Attécoubé	5.3362	-4.0414
Cocody	5.3602	-3.9674
Koumassi	5.3030	-3.9419
Marcory	5.3027	-3.9827
Port-Bouët	5.2773	-3.8859
Treichville	5.2921	-4.0134
Ile Boulay	5.2811	-4.0951

2. The above data frame and the folium library helped us map the eleven districts so as to explore them in terms of venues available in their vicinity.

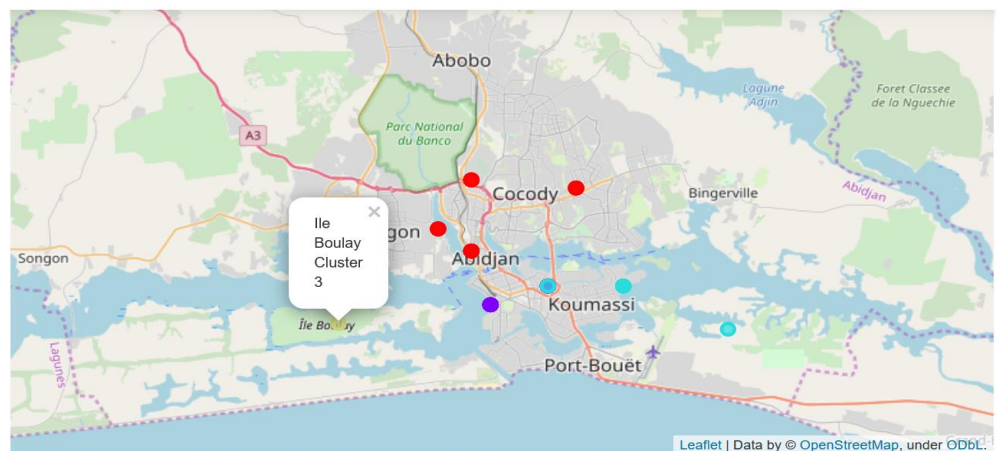


3. Next, the Foursquare API algorithm was able to fetch the top 500 venues within a radius of 6km around the city of Abidjan. The number '500' was chosen to get the maximum sites possible as the data are far less compared to European or American locations. The data frame obtained had a dimension of (412,7), which is quite low. Here is what it looks like.

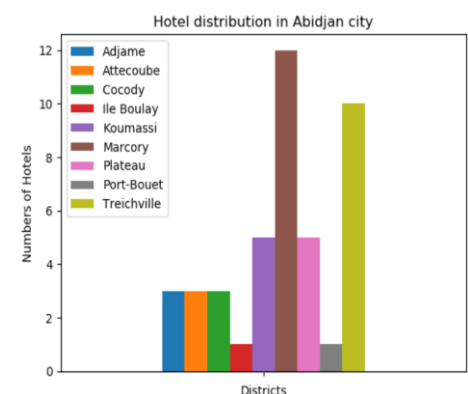
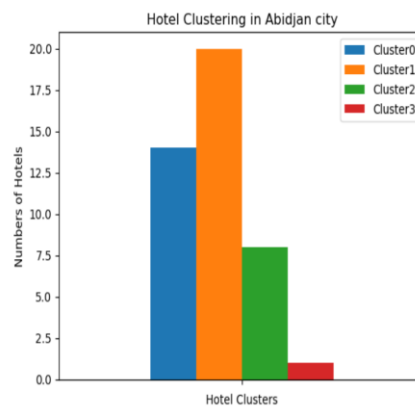


Districts	Districts Latitude	Districts Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Abobo	5.4329	-4.0389	Ebimpe	5.451773	-4.073543	Train Station
Abobo	5.4329	-4.0389	Zoo	5.382706	-4.022097	Zoo
Adjame	5.3651	-4.0236	Norima	5.363668	-3.992067	American Restaurant
Adjame	5.3651	-4.0236	le pub	5.375782	-3.998315	Bar
Adjame	5.3651	-4.0236	Bao Café	5.348778	-3.996881	Coffee Shop
Adjame	5.3651	-4.0236	Des Gateaux & Du Pain	5.360270	-3.989671	Bakery
Adjame	5.3651	-4.0236	Casino Mandarine Danga	5.345053	-4.010700	Supermarket
Adjame	5.3651	-4.0236	Sofitel Abidjan Hôtel Ivoire	5.327029	-4.004621	Hotel
Adjame	5.3651	-4.0236	Hollywood Boulevard	5.375848	-3.990464	Lounge
Adjame	5.3651	-4.0236	Nuit De Saigon	5.371588	-3.990445	Vietnamese Restaurant

4. The previous data frame was grouped, and districts having venue categories of Hotels were retrieved for a clustering work. It should help to obtain groups of hotels based upon their location. A 4-k means clustering was applied and mapped as follows:



5. As the map shows the density of hotels based on the clusters, we decided to deepen the analysis by producing bar plots to get more insights into the distribution and the frequency of hotels not only for each group but also for the individual district. It should help the team select promising locations.





Discussion

When we superimpose the plots with the map of clusters, a few observations enable us to narrow down good prospects for the future 5-star hotel

1. **Cluster 0** that represents northern Abidjan has more hotels. Those areas consist of the districts of Cocody, Adjame, Plateau, and Cocody. Unless Adjame, the other hotels listed are all at least 4-stars. Among these locations, Plateau and Cocody have the highest number of 5-star hotels in Abidjan. We, therefore, canceled Cluster 0 is our list.
2. Among the remaining clusters (cluster 1, 2 and 3), the district of Treichville has ten hotels alone with each having a standing being 3-stars or higher. An investigation of the standard of living of dwellers testifies that people belong to the middle-class. A 5-star hotel requires wealthier people.
3. The list has therefore been narrowed down to 4 prospects: Marcory, Port-Bouet and Koumassi and Ile Boulay
4. Another screening considering social aspects such as the **average standard of living, the criminality, state of the roads, accessibility of the area**, landscape helped **came up with only two prospects that are Port-Bouet and Ile Boulay**.
5. After discussing the pros and cons of the two areas, **Port-Bouet district, Bietry area were preferred to Ile Boulay**. The two zones have a lovely landscape and coastal exposure, which is always attractive for this kind of real estate project. Besides, the criteria, as suggested earlier, were almost all met.
6. Bietry is a luxury place with well-off people with a fair proportion of foreign nationals. It is also an entertainment hub for VIPs. A five-star Hotel will be a great success there.
7. Unlike Bietry, which is in the city, Ile Boulay is an island. It is its advantage and disadvantage at the same time. It is suitable for people aiming to escape the noise of the daily rat-race, something like a private or family getaway. While it might constitute an excellent prospective opportunity, the site is still underpopulated, and remained in a rather under-developed state. The team concluded that for the time being, small-scale real estate projects might be the best options for Ile Boulay.

Conclusion

- Data collected was considered very little. Therefore, more work needs to be carried out at the national level for a better cartography of the country. It helps potential investors in fields like real estate
- The power of data science in elucidating a given problem was attempting
- There is room for improving such as build a comprehensive and complex decision model including all possible influencing factors