INTRODUCTION

A. Background to the Study

With two-thirds of the world's population now connected by mobile devices, location data has emerged as one of the most powerful and important data sources. Location data is used to solve hard problems—from providing firefighters and emergency medical technicians key information during times of human crisis, helping us avoid bad traffic, helping us make a better choice in situating important parastatals such as companies, restaurants and business enterprises and to making self-driving cars smarter.

At the same time, data overall has hit a rough patch in our public discourse. California granting the state's citizens unprecedented control of their data, while Facebook's Cambridge Analytica troubles made headline news for several days in Spring, 2018, shining an intense spotlight on digital platforms' data-sharing practices. It's imperative that businesses be transparent and responsible for the information they collect. We cannot violate customers' trust and lose out on the opportunities for location data to make lives better. Businesses need to address these issues and create standards for how marketers access, use and share data.

We are in an era of big data and with more devices, the amount of data generated will keep increasing, data will be more accessible than ever before and location data will become more accurate.

B. Statement of the problem

Decision to bring up an organization is a tough decision. After an entrepreneur decided what type of business he want to set up, there comes the problem of where and how it should be set up. Location of a business affect the profit of the business therefore getting a good location cannot be taken with levity.

Location data have proved resourceful in many areas and have affect our life. In this data research, location data will be utilized in exploring Oyo State Local Government Areas. Oyo State is an inland state in south-western Nigeria, with its capital at Ibadan which is the third most populous city in Nigeria and the country's largest city by geographical area. These qualities of hers make it popular among other state in the country and make it a good spot for situating commercials, industries, recreational centres and refreshment centres.

C. Significance of the Study

This study will be of great benefit to entrepreneurs, government and other parastatals who might want to start up something significant. Exploring the city will give insights into where a business could be situated given the large state it is. It could also help bridge the gaps between customers and producers, government and citizens as decision making will be made easier with the study.

DATA ACQUISITION

The data used for this project was sourced from the Oyo state website, oyostate.gov.ng. The data features were local government, the headquarters where the local government is situated, date of creation of the local government, total number of wards in the local government, area population from 2006 census and landmass of the local government.

The data was not labelled as it was in the web page when we scrape it using pandas html reader therefore effort was made in naming the columns as it was supposed to be, the index was also set to the S/N columns of the data frame.

For this work, the features; total number of wards and date of creation of the local government wasn't needed, therefore it was dropped. However, area population and landmass of the local government was used in doing some exploratory data analysis to gain some insight from the data.

METHODOLOGY

DATA EXTRACTION AND EXPLORATORY DATA ANALYSIS

The data to be used was scrapped from the Oyo State Government website, subsequently, columns were renamed and index was reset.

From the website, 33 local government were extracted and verification was also made on the number of local governments that were in the state which results in 33 also. Simple exploratory data analysis was performed using pandas package which were:

1. Finding the local government with the highest population.
2. Finding the local government with the lowest population.
3. Finding the local government with the highest landmass.
4. Finding the local government with the lowest landmass.

The results of all this analysis are discussed in the result section.

VISUALIZATION AND FOURSQUARE API

The map of Oyo state was visualized using Folium package in python after verifying the package is already installed. Each local government was superimposed into the map.

Utilizing the Foursquare API

Foursquare is a social location services that allow users to explore the world around them. Foursquare launched its API in November 2009, allowing application developers to extend the platform in interesting ways. Developer can build location management tools, custom search engines and even games and other tools that interact with the Foursquare API. The API can be used to return a list of recent check-ins from a restaurant, allow to check in to a place, return a list of venues near the area specified etc.

This project utilized the Foursquare API to get venues that are close to an area, in this case each local government in Oyo State.

It was first used to explore the venues within 30 kilometres close to Afijio Local Government, where we get 7 returned values. The returned values depend on the time of searching. It might change next time the same statement is run.

Next, all Local government in the state were explored using the API in which a total of 270 venues were returned. The number of venues for each local government that was returned were determined. Also, the number of unique venues returned were determined.

In analysing the local government area further, the venue category returned was one-hot encoded for each venue in the local government. The table resulted was grouped by the local government area with the mean of each venue category. This helped determine the frequency of each venue category in each local government area.

Furthermore, the top five most common venues were extracted from the frequency table for each local government area.

MACHINE LEARNING (CLUSTERING)

A form of clustering algorithm, K-mean clustering from the scikit-learn package was used to cluster the local government area into three clusters based on their five most common venues. And each cluster was added to the table to gain an insight about each cluster

RESULTS SECTION

Performing exploratory analysis that give us the local government with the minimum population and with the maximum population and local government with the least landmass and with the maximum landmass yields the following results:

1. The local government area with the most population was Ibadan North with population of 856,988

2. The local government area with the least population was Ogbomosho South with population of 73,939

3. The local government with the most landmass is Oyo West with landmass of 5193.77 square kilometres.

4. The local government area with the least landmass is Ogbomosho North with landmass of 15.0 square kilometre.

Using the Foursquare API on the Afijio Local Government Area gives Ola Royal Hotel, Oparinde market, Ice cream joint, Durbar Stadium, Yellow Corner, Munchies, and Port Harcourt.

Other local government areas were analysed and 49 unique venue categories were returned with the most venues situated in Oluyole local government area with 22 returned venues and Itesiwaju Local government area was the least with only 1 venue returned.

After applying the clustering algorithm, three clusters were used.

Cluster one can be named a set of local government area where reception services, restaurants and relaxations centres are highly concentrated and consist mostly local government area in Ibadan.

Cluster two can be named a set of local government area where sport centre and recreational centres are located. All local government in this cluster except Iseyin, which itself is close to Oyo West local government were in this cluster

Cluster three tends to be a commercial area because of the presence of airport in the two returned local government area.

DISCUSSION SECTION

OBSERVATION & RECOMMENDATION

From the geospatial analysis performed, these observations were noted:

1. Some local government area when visualized on the world map using Folium package was found to be located far away from Oyo state, for example; Ido Local Government was located around Benin City, Olorunsogo local government area was located around Ondo State and Egbeda local government area was located around Abia state. This called for suspicions and need further check on in future works.

2. Most of the local government in the state returned very few venues which might be because of lack of recognition of most of the venues in the area or there were indeed less venues in the area. This call for further studies on local government in Oyo state. This could also be a keynote interest for entrepreneurs looking to extend their industries to other state or government who wish to establish more public parastatals in the state.

3. Ibadan, being the capital of the state returned more venues than other. This is no surprise. But it is something that is important and should be taken note of when wanting to establish in Oyo state.

4. A town named Oyo town in the state seems to have a stadium in the centre of the town as the clustering algorithm used clustered all local government areas in the town together with the principal decider being the stadium.

5. Oyo West is the local government with the highest landmass and also with significantly high population. From my analysis, it was found the local government area lack many

important venues that the area could have accommodated such as restaurants. It will therefore be a great decision to situate industries, restaurants and other start-up in the area.

CONCLUSION

From my analysis of the local government in Oyo state, I was able to conclude that Oyo state has low level of socialization and industrialization. It makes it a convenient and resourceful place to situate business, industries, recreation centres, restaurants and shops and many more.

This study was performed to gain insights about how location data of Oyo state can be used to achieve great feat in decision making; from entrepreneurs to government. This study was not an official study and there are still room for many analyses to explore.

Future study might include;

1. Considering the population of each local government area and how sparse the venues within the area is, how viable is it to set up a business or company in the area?

2. Considering the social and financial status of family in each local government area and how the venues in the area are distributed, what is the probability of sale increase if a restaurant or coffee shop is established in the area?

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