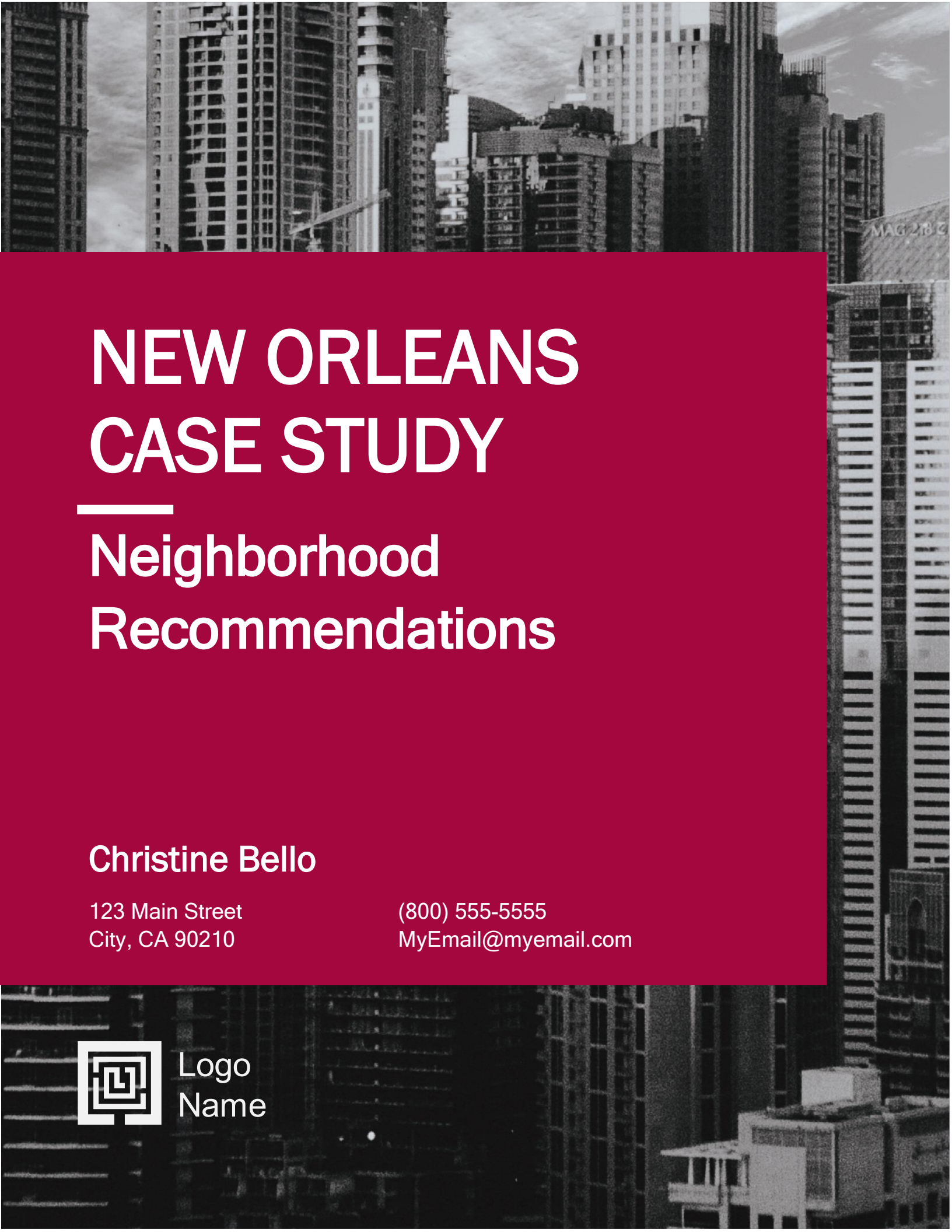

NEW ORLEANS CASE STUDY

Neighborhood Recommendations

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New Orleans District Recommendations

1. Introduction

1.1 Background

In 2005 America's Big Easy was ravaged by a devastating act of nature. Hurricane Katrina stole the lives and livelihoods of many American citizens, and while there are no words to describe the devastation or heartache of the victims, the disaster brought communities and the American people together to respond and rebuild.

Since that time New Orleans has seen remarkable growth! While the population remains at 80% of what it was pre-Katrina, according to the Census Bureau in 2012, New Orleans ranked # 1 for population growth at 4.9%. Which is more than six times the national average.

According to the World Population Review:

> *"There's no doubt that Hurricane Katrina was a terrible disaster and tragedy, but it gave New Orleans the money and opportunity to rebuild and reinvent itself [...] If current trends hold, New Orleans should have no trouble making its way back to pre-Katrina levels and possibly beyond before the next census in 2020."*

1.2 Objective

For individuals considering a move to the Big Easy, this presentation aims to provide district recommendations using information about demographics, economy, education, local venues and crime data.

1.3 Justification/Interest

The city is known for its rich culture and history, but during this period of regrowth has also embraced new technology, ideas, and businesses to drive population growth. Due to the renovations and investment into the area, New Orleans is a point of interest for individuals (stakeholders) looking to relocate.

2. Methodology

2.1 Business Problem

Our objective or business problem is to provide stakeholders with the necessary information to select a prospective neighborhood within New Orleans for relocation.

Step one in our project is determining what factors stakeholders are interested in concerning prospective neighborhoods.

According to U.S.News factors of interest include:

- **Aesthetics:** An attractive neighborhood indicates the residents care about it. - Market Value Data
- **Affordability:** Sure, you want a cheap house, but you also want to be able to afford the cost of living in the neighborhood.
- Safe environment: Nobody wants a mugger or sex offender as a neighbor.
- **Easy access to goods and services:** Can you make a quick run to the bank or grocery store, or will every day be a headache behind the wheel due to traffic congestion or construction?
- **Walking distance to goods and services:** Even better, ditch the car. If exercise and a sense of community are important to you, find a house near the establishments you'll be frequenting.

Since we aren't solving the "Walkability" score (that would require us knowing exactly where a stakeholder wanted to purchase their house), we'll combine the last factors and tally how many goods and services points of interest are within each neighborhood.

2.2 Data

Step two in our project is to collect and clean data sources for each factor of interest, see the Data section below for more information.

- **Aesthetics:** Market Value Analysis provides information about recent construction. It's difficult to gauge aesthetics on paper alone, but this will give us some information. We'll also use population stats to see how dense the population is in any given neighborhood.
- **Affordability:** Market Value Analysis will provide the average housing cost per area. I will also gather some general cost of living information (median income)
- **Safe Environment:** Here we will collect data about calls for service in the different neighborhoods as well as what Emergency Services are available per neighborhood.
- **Goods and Services:** We will use both datasets from Data.Nola.Gov and the FourSquare API to see what goods and services are available locally or within each neighborhood.

2.3 Analysis and Visualizations

Step three in our project is to use the cleaned data to analyze the different neighborhoods offerings. See Analysis section below for more information.

Using the data we have collected in the previous step we will merge the datasets into one and calculate the various offerings per neighborhood.

- **Aesthetics** - For Aesthetics we want to know the percent of new construction in each neighborhood. The data we have contains multipolygon geometry. We'll use some GPD Intersection calculations to determine the percentages of new construction in our neighborhoods.
- **Affordabilty** - Affordability is straight forward thanks to the dataset we have that has the median income and housing cost per neighborhood. No analysis required. However, if we were basing our report off of the market value analysis dataset, we would need to use GPD Intersection calculations again to determine what incomes/housing costs were in each area.

- **Safe Environment -** To give a safe environment recommendation we are calculating both the number of incidents in each area as well as how many emergency services are available in each area. We will merge our Emergency Services datasets into one set and calculate the availability of each kind of service within each area.
- **Goods and Service** - Using the collected and cleaned data we will merge our datasets to see what neighborhood offers the most offerings and what kinds of goods and services are offered. We will also perform a cluster analysis from our FourSquare Results.

After our analysis is complete, we will use both Folium and Matplotlib to plot our data and show graphs that visualize our data.

- **Aesthetics** – Choropleth Map to show the percent of new construction visually throughout the 72 neighborhoods.
- **Affordabilty** – Choropleth Map to show the average home value for each of the 72 neighborhoods.
- **Safe Environment -** Folium Map with emergency services markers displayed. Secondary Summary map markers that display popup information (counts of the types of emergency services and total within each neighborhood). Choropleth map with crime density showing the higher crime neighborhoods.
- **Goods and Service**
    - **Residential** – Folium map showing schools/libraries/places of worship markers w/name and address. Folium map showing totals for each neighborhood. Choropleth map highlighting areas with the most residential points of interest.
    - **Hospitality** - Choropleth map highlighting areas with the most hospitality points of interest.
    - **Shopping** - Choropleth map highlighting areas with the most business points of interest
    - **FourSquare** – Folium graph showing color coded cluster analysis.

2.4 Results and Conclusions

We will conclude our report with an objective summary (summarize our objective) and results summary (summarize our findings).

3. Data

3.1 Required Data

To provide the stakeholders the necessary information factors of interest would include:

Neighborhood Boundaries: GeoJSON file for the Neighborhood Statistical Areas
Aesthetics: New Construction
Affordability: Home Value
Safe environment: Emergency Services, Crime Density
Goods and Services Availability: Residential, Hospitality, Shopping, FourSquare

3.2 Data Sources

The following data sources will be used to extract/generate the required information:

- **Neighborhood Data**
  - Neighborhood Statistical Areas of New Orleans
  - Coordinates for Neighborhoods within New Orleans
- **Aesthetics**
  - Market Value Analysis
- **Affordability**
  - Best Neighborhoods in New Orleans
- **Safe Environment**
  - *EMS Services*
    - Hospitals
    - Public Health Clinics
    - Drug Stores
    - Evacuspots
  - *Crime Data*
    - 2019 Calls for Service
- **Goods and Services**
  - *Residential Data*
    - Schools
    - Libraries
    - Places of Worship
  - *Hospitality/Tourism*
    - Hotels/Motels/Boarding
    - Visual Arts and Crafts (Museums/Arts/Galleries)
    - Restaurants
    - Entertainment
  - *Shopping*
    - Businesses
  - *Points of Interest* - *FourSquare API***

3.3 Data Collection and Cleaning

There was a lot of data to collect. First I installed the appropriate libraries to gather my data (geopy, geopandas, bs4. I also installed additional libraries for analysis and visualization (rtree, mapclassify, Descartes, and geoplot). I ran into some issues with the various versions of the libraries and had to troubleshoot. I reinstalled the libspatialindex version 1.9.3 to get the rtree library to run correctly. After installing the different libraries I imported more libraries that I would use (requests, json, pandas, BeautifulSoup, Kmeans (clusters), folium, matplotlib and contextily)

After importing all of the libraries I would need to run the report, I created two functions to easily gather my data from GeoJSON files to create GeoDataFrames. I created two different kinds of DataFrames ones that would be used for Analysis and ones that would be used for Visualization.

I created GeoDataFrames for the boundaries of the 72 districts (which would become our main data frame we merge for analysis and visualization).

Neighborhoods:

I used two different methods to acquire the coordinates for the 72 neighborhoods. I was able to extrapolate the coordinates from my GeoJSON file by performing a centroid method to the geometric boundaries in the geometry column of the GeoDataFrame which gave me a singular even point in the neighborhood. I also found a list on Wikipedia and scraped the data into a df.

Aesthetics: I created a gdf for market value analysis using the gpd.read_file() method using my geojson file.

Affordability: I chose to use the same df for Aesthetics as there was a column for Home Value in the original JSON. I also scraped data from a website called homesnacks.

Safe Environment Data: I created a DF using the function I created earlier for the individual datasets I had on Hospitals, Health Clinics, Evacuspots, and Drugstores. Then I used the same function to create a DF for the 2019 Calls for Service in New Orleans.

Goods and Services Data: Similar to our Emergency Services data, I created dfs using the function and pulling the information from json files on the following areas:

- Residential Data:
  - Schools
  - Libraries
  - Places of Worship
- Hospitality/Tourism:
  - Hotels/Boarding
  - Visual Arts and Crafts
  - Restaurants
  - Entertainment
- Shopping:
  - Businesses

FourSquare data was collected using the FourSquare API and our coordinates from our earlier Neighborhood datasets.

4. Analysis (Methodology/Results)

4.1 Aesthetics

To figure out the aesthetic quality in our neighborhoods, we're going to assume that new construction in the neighborhood means that improvements are being made to the area, thus a higher percent of new construction means a better aesthetic.

Using my nola_df with columns for neighborhood name, boundary geometry (geometry column with multipolygon information), coordinates, and lat and long and the mva df that had data related to the following: percentowneroccupied', 'percentsubsidizedrental', 'percentinspectionviolations', ‘objectid', 'mspxvlnd16', 'percentvacantlandsales', 'cluster', 'percentvacantlots', ‘percentforeclosure', 'percentshorttermrentals', 'percentresidentialaddressesvacant', 'percentnewconstruction', 'coefvar161', 'geoid', 'geometry' I was able to obtain the relevant information. Because I didn’t need

all of those variables I created new dfs for just the geometry and percentofnewconstruction from the mva df, then I used an sjoin to merge the two sets by their geometries.

The geometries for the mva data were broken up differently than the geometries for the nola boundaries data. To get the data per neighborhood we used a dissolve method.

Before dissolving the df, I reordered the columns to make sure that the aggfunc would apply to the 'percentnewconstruction' column. I also changed the column to numeric values using an astype function.

```
#Dissolve by Neighborhood and average the percent of new construction
mva_nbh = nola_mva.dissolve(by='Neighborhood', aggfunc='mean')
#Sort Values by the percent of new Construction with the highest values on top
mva_nbh = mva_nbh.sort_values(by=['percentnewconstruction'], ascending=False)
#Show top five results
mva_nbh.head()
```

Neighborhood	Boundary_Geometry	percentnewconstruction
IBERVILLE	POLYGON ((-90.07113 29.95976, -90.07065 29.959...	13.297393
FRENCH QUARTER	POLYGON ((-90.05626 29.96039, -90.05234 29.958...	12.635191
CENTRAL BUSINESS DISTRICT	POLYGON ((-90.07317 29.95744, -90.07269 29.957...	11.145962
LOWER GARDEN DISTRICT	POLYGON ((-90.05799 29.93802, -90.05794 29.938...	10.665407
ALGIERS POINT	POLYGON ((-90.04744 29.95819, -90.04538 29.958...	10.305526

4.2 Affordability

There isn't much analysis necessary for this factor of interest as the research led to a dataset with home values and median income already listed. However, I did perform the same analysis on affordability as I did with aesthetics using the median home value instead of the percent of new construction. The median home value for the mva data is labeled **"mspxvlnd16".** I then compared our results with our research table that we scraped from homesnacks.net.

I did need to replace some of the formatting in the df with the homesnacks information (affordability_df) so I could change the Home Value column to integers thereby allowing me to sort the values.

4.3 Safe Environment

To answer which neighborhood is the safest we are looking at what emergency type services are available in each neighborhood as well as the number of crimes within each neighborhood.

4.3.1 Emergency Services

Part of the analytical process was ensuring that the DFs we created were cleaned and organized for easy aggregation. I was able to easily merge the data into one DF by appending each DF to a

master DF(emergency_services). I set the geometry in the emergency_services df to the 'geometry' column. Next I used the sjoin method to combine the emergency_services df to the nola_df (the DF with the neighborhood boundaries). When I utilized the pandas pivot_table() method and columns.droplevel() method I was able to create a pivot table to tell me how many of each poi (Drugstore, Evacuspot, Health Clinic, and Hospital) were located in each neighborhood. I then summed all the pois in a neighborhood to give a 'ES Total' per neighborhood.

4.3.2 Crime

For our crime data I was only interested in the location of the incident and what kind of incident it was. I copied the relevant information from the initial DF (columns: typetext and geometry) into a new DF. Once again I merged the data frames containing my neighborhood boundaries and the crime stats and created a pivot table to tell me how many calls for service originated in each area.

Unfortunately, the dataset I used is live and changes daily, additionally I was only able to pull in 1000 rows of data(there were over 400,000 for that particular dataset). While it's not a cumulative report, the following figures are the results of 1000 rows of data – which is a good sample size.

4.4 Goods and Services

I applied the same analytical techniques to the rest of my datasets categorized between Residential, Hospitality, and Shopping. Finally I performed a cluster analysis on my neighborhoods to see what kinds of venues were most frequent in the various neighborhoods.

4.4.1 FourSquare

I used the FourSquare API to return information about our various neighborhoods. This analysis required the longitude and latitudes fore ach neighborhood. After creating a function to analyze one neighborhood I ran the rest of my dataframe through a loop to run an analysis on all the neighborhoods. My radius was 500 feet and I limited the data to 100 values.

I grouped all the venues by the neighborhood in which they were located and used the count method to see how many venues were in each location:

Sample:

CENTRAL BUSINESS DISTRICT	100	FRENCH QUARTER	100
CENTRAL CITY	6	FRERET	35
CITY PARK	5	GARDEN DISTRICT	54

Next I applied onehot encoding to return the venue type and arranged the values to get the top five venue types per neighborhood. I put those results in a pandas df and created a df to display the top ten venues for each neighborhood so that I could perform a cluster analysis.

Sample:

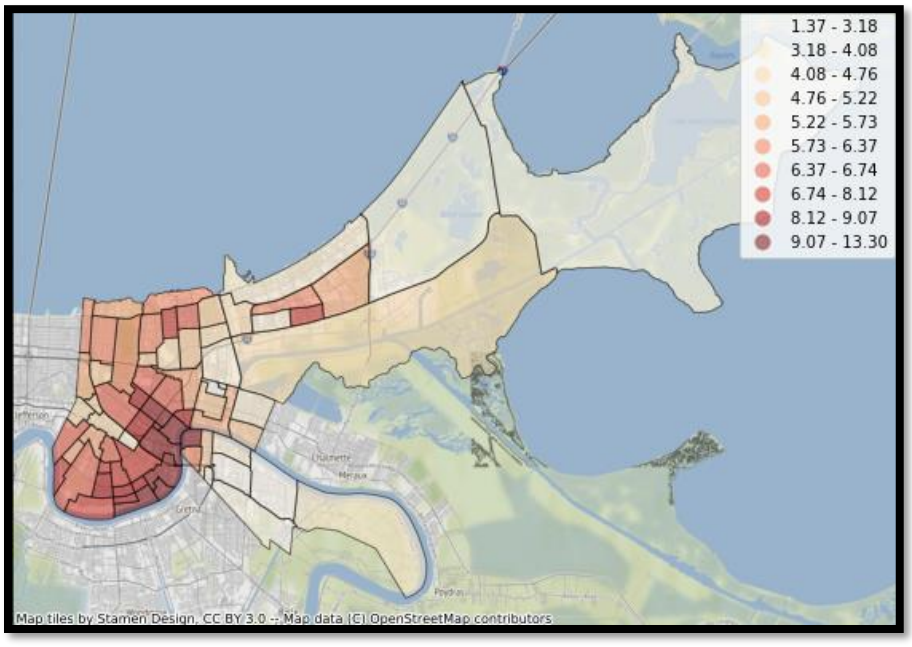
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	ALGIERS POINT	Boat or Ferry	Bar	Coffee Shop	Park	Pizza Place
1	AUDUBON	Park	Light Rail Station	College Arts Building	Coffee Shop	Sculpture Garden
2	B. W. COOPER	Breakfast Spot	Boxing Gym	Food Truck	Gym / Fitness Center	Fast Food Restaurant

5. Results

5.1 Aesthetics Results

The neighborhood with the most new construction was **Iberville with 13.3%.** New construction can also be indicative of the damages sustained from Katrina and the areas that needed the most care. It's clear by the choropleth map below that much of the lower central area of New Orleans has seen some repair or construction.

The top five areas were Iberville (13.3%), French Quarter (12.6%), Central Business District (11.1%), Lower Garden District (10.7%) and Algiers Point (10.3%).



It is important to note that Aesthetics are subjective to each individual stakeholder. We can't necessarily account for individual tastes when it comes to aesthetics, but we can provide information about new construction and improvements to areas.

5.2 Affordability

Affordability is also subjective to the stakeholder's income, but here are the results and comparison between the data analysis I did with my dataset and the set that was available on Homesnacks.

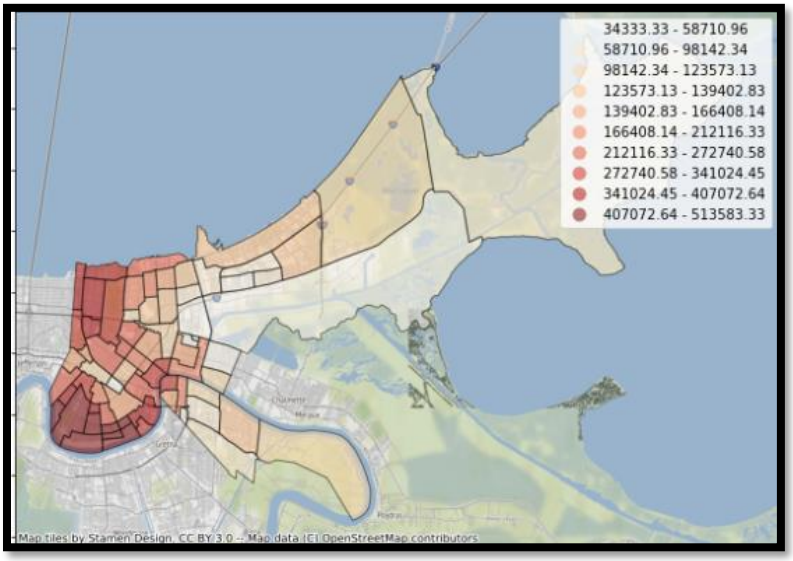
Neighborhood	Population	Home Value
Garden District	2,072	628700
Audubon	16,424	625889
Touro	2,906	522400
Lakewood	1,812	472767
French Quarter	3,286	470483
Uptown	6,504	444700
Lake Shore-Lake Vista	2,957	440800
Black Pearl	1,622	429100
East Carollton	3,961	386800
West Riverside	4,866	382857

Table 1: Homesnacks

Neighborhood	Boundary_Geometry	mspxvlnd16
BLACK PEARL	POLYGON ((-90.12855 29.93858, -90.12815 29.938...	513583.333333
AUDUBON	POLYGON ((-90.11052 29.94188, -90.10964 29.941...	503469.027778
WEST RIVERSIDE	POLYGON ((-90.11603 29.92108, -90.11503 29.920...	496099.285714
UPTOWN	POLYGON ((-90.10195 29.92659, -90.10192 29.926...	486737.250000
TOURO	POLYGON ((-90.08820 29.92439, -90.08773 29.923...	435895.454545
EAST RIVERSIDE	POLYGON ((-90.09983 29.91725, -90.10096 29.917...	433296.428571
GARDEN DISTRICT	POLYGON ((-90.07985 29.92891, -90.07921 29.928...	415803.048750
IRISH CHANNEL	POLYGON ((-90.07671 29.92466, -90.07609 29.923...	407170.000000
EAST CARROLLTON	POLYGON ((-90.11966 29.94973, -90.11943 29.949...	406196.428571
LAKESHORE - LAKE VISTA	POLYGON ((-90.08255 30.02623, -90.08252 30.026...	401570.000000

Table 2: Nola.Gov Data

There was a lot of overlap between the two results. Which says that the more expensive areas have retained their value, but a lot can change in a couple of years. The data we scraped from homesnacks is more recent and possibly more reliable. From that information we can also see that home value in New Orleans has increased all around. New Orleans is a major U.S. City so home value is going to be higher than the average in Louisiana.



5.3 Safe Environment

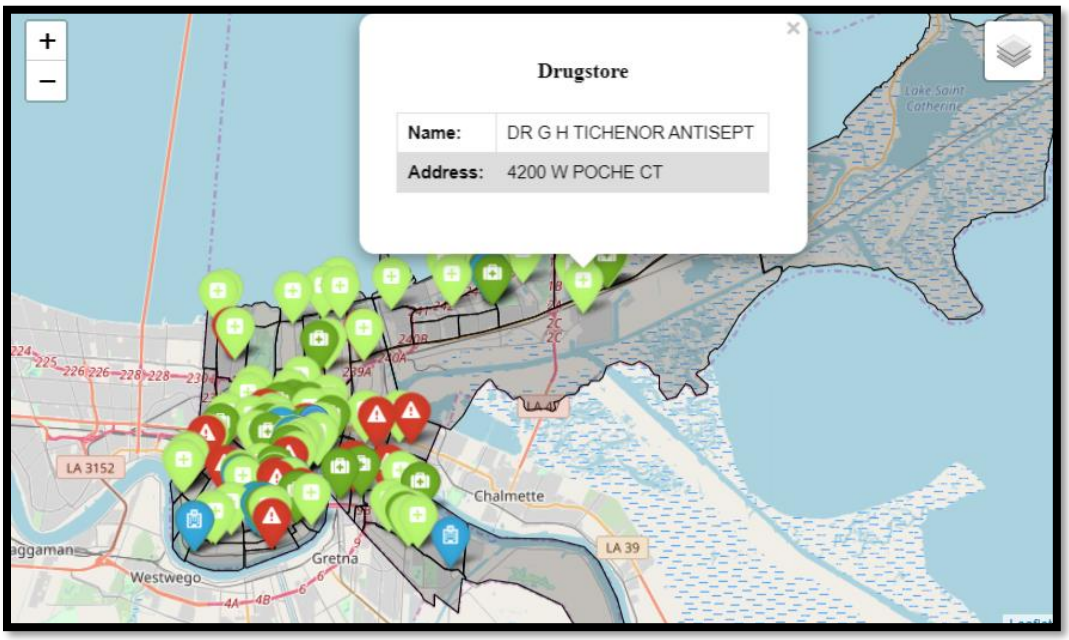
5.3.1 Emergency Services

Neighborhood	Drugstore	Evacuspots	Health Clinic	Hospital	ES Total
CENTRAL BUSINESS DISTRICT	12.0	1.0	3.0	1.0	17.0
CENTRAL CITY	3.0	2.0	3.0	1.0	9.0
TULANE - GRAVIER	5.0	NaN	2.0	1.0	8.0
TOURO	1.0	NaN	4.0	3.0	8.0
LEONIDAS	5.0	2.0	NaN	NaN	7.0

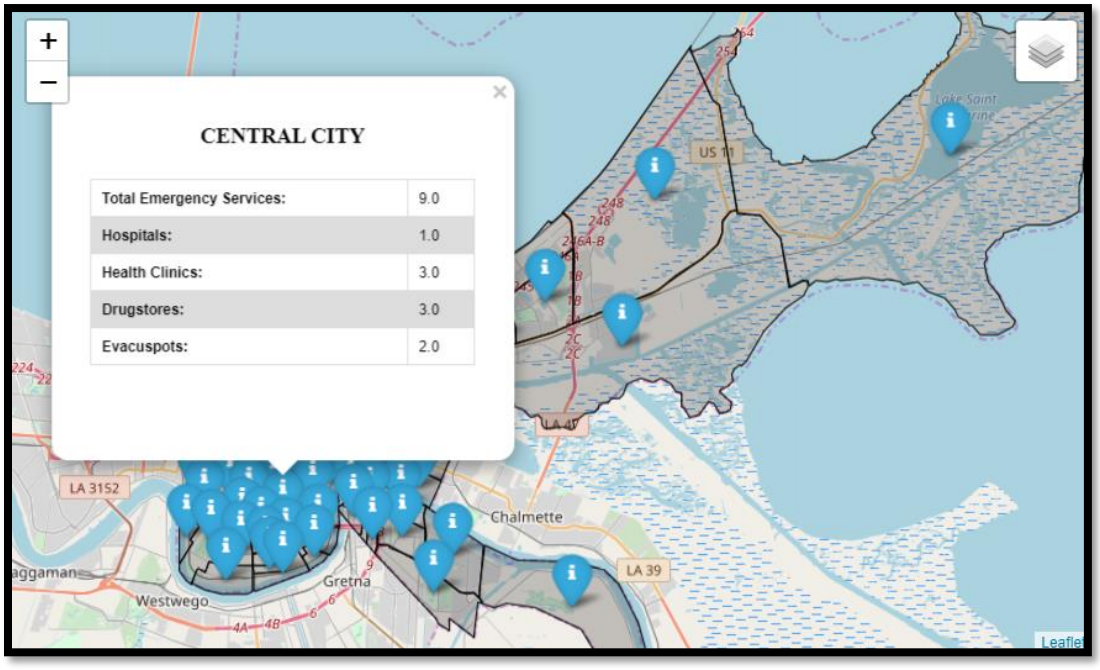
The area offering the most emergency services was the Central Business District, followed by Central City, Tulane – Gravier, Touro, and Leonidas.

I used a choropleth map through matplotlib (ctx or contextily was used to overlay the choropleth map on a map of New Orleans).

I also created an interactive folium map for stakeholders viewing the report on a digital device. I added markers with varied colors and icons indicating what kind of emergency service was available. Clicking on a marker reveals the name and address for that emergency service:



The last map I created for this set was a cumulative information map. Using folium once again I created an interactive map with 72 markers relating to each neighborhood. By clicking on one of the markers the totals for each subtype and an overall total for each neighborhood are displayed:



Various maps allow individual stakeholders to make decisions based upon their own values and needs in accordance to what they place importance upon.

5.3.2 Crime

Not surprisingly the French Quarter boasts the most calls for service. While the Central Business District ranked #1 in our emergency services analysis, it also ranked pretty high in our crime analysis. It's probably that the Central Business District is a highly populated area, same as Central City. How did our other high ranking emergency services neighborhoods do?

Neighborhood	Crime Total
FRENCH QUARTER	73.0
MID-CITY	67.0
CENTRAL BUSINESS DISTRICT	64.0
CENTRAL CITY	55.0
LITTLE WOODS	46.0

- Tulane - Gravier (31 calls)
- Leonidas (15 calls)
- Touro (9 calls)

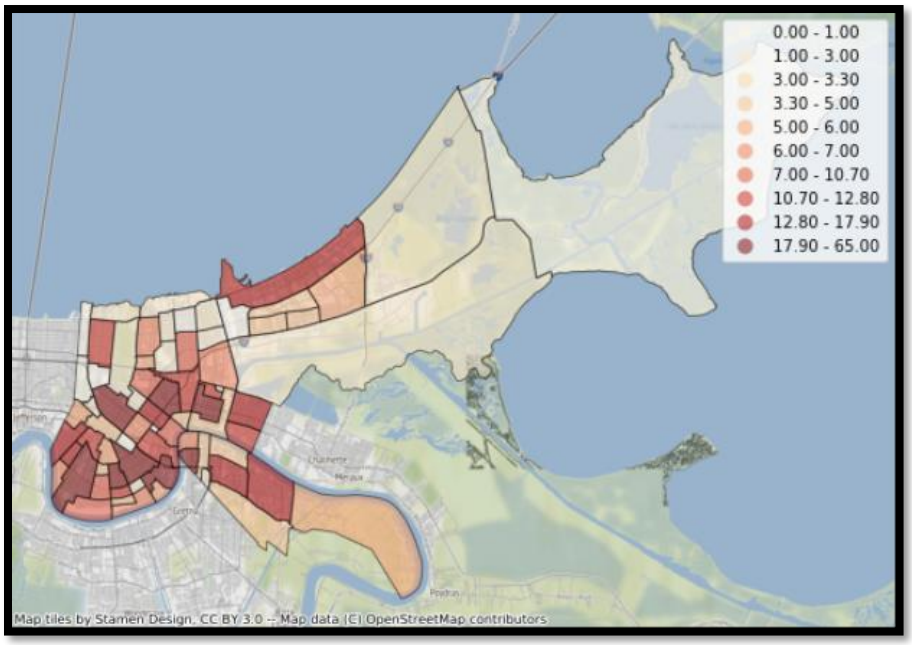
Not bad. Though by aggregating the data we lose sight of what type of incident occurred. It's normal to see a higher incident rate where there are larger populations.

5.4 Goods and Services

5.4.1 Residential

Neighborhood	Library	Place of Worship	Schools	Residential Total
CENTRAL CITY	1.0	57.0	7.0	65.0
SEVENTH WARD	1.0	23.0	5.0	29.0
AUDUBON	NaN	14.0	8.0	22.0
ST. CLAUDE	1.0	17.0	2.0	20.0
MID-CITY	1.0	9.0	9.0	19.0

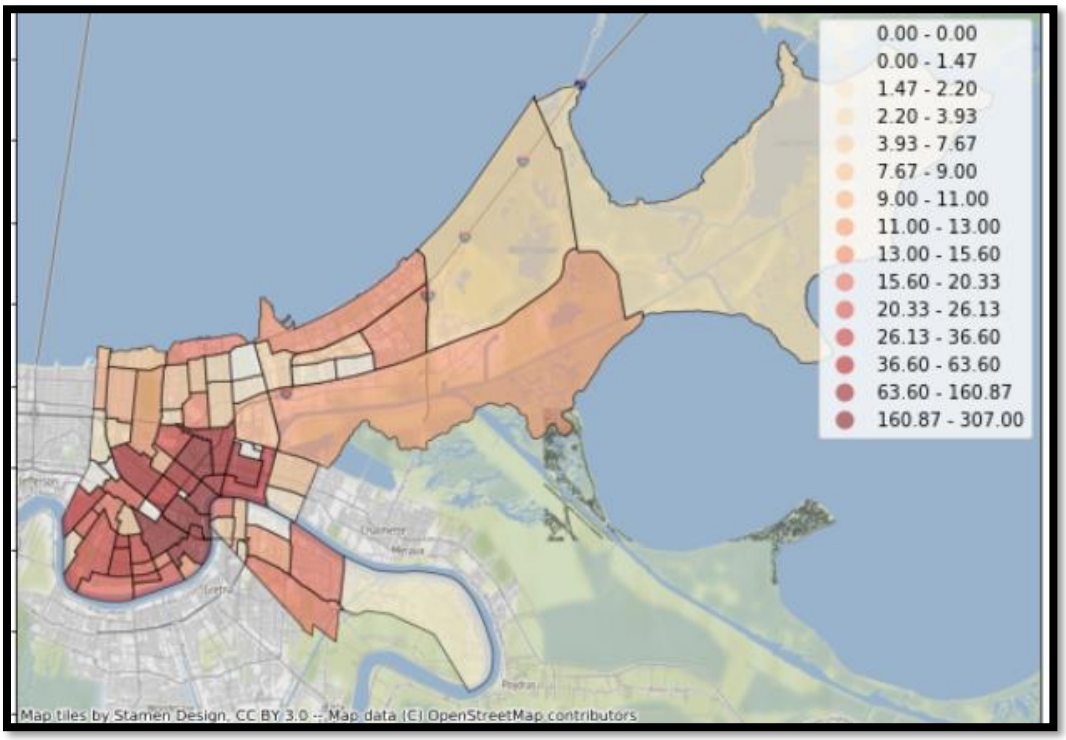
The neighborhood with the most “residential” offerings was Central City. There are double the amount of religious locations in Central city than any other place, but otherwise seem to line up with the average amount of Schools. I was surprised that Audubon did not have a library.



5.4.2 Hospitality

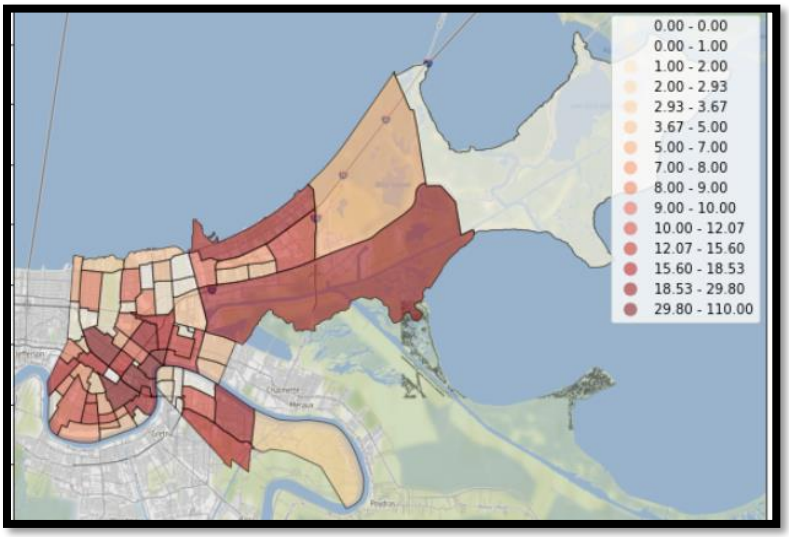
Unsurprisingly the neighborhoods with the most hospitality type goods and services (Boarding, Cultural Venues, Entertainment Venues, and Restaurants) are the tourist locations: CBD, French Quarter and Central City. The entire lower area in New Orleans is attractive to tourists and hosts a variety of festivals and entertainment throughout the year.

Neighborhood	Boarding	Cultural Venue	Entertainment	Restaurant	Hospitality Total
CENTRAL BUSINESS DISTRICT	27.0	12.0	27.0	241.0	307.0
FRENCH QUARTER	1.0	73.0	38.0	117.0	229.0
CENTRAL CITY	155.0	1.0	10.0	34.0	200.0
LOWER GARDEN DISTRICT	115.0	8.0	11.0	40.0	174.0
SEVENTH WARD	139.0	NaN	9.0	18.0	166.0



5.4.3 Shopping

The top five neighborhoods for shopping/business access are the French Quarter (110), Central Business District (102), Mid-City (65), Central City (63) and Marigny (32).

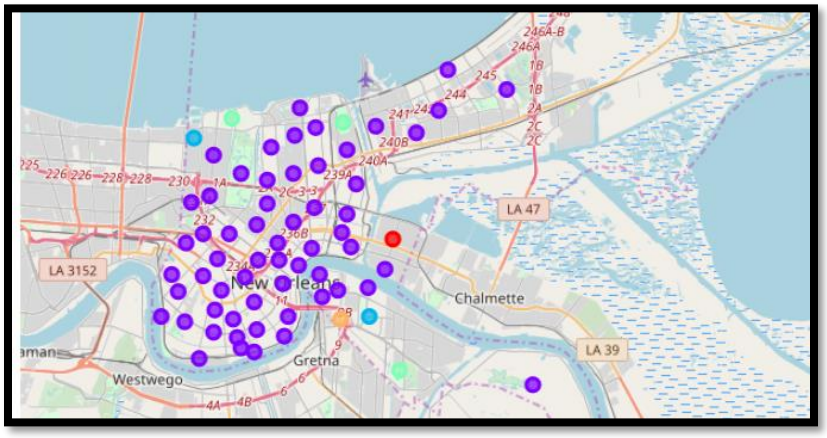


5.4.4 FourSquare

For all 72 neighborhoods there were 210 unique categories of venues. The Central Business District and French Quarter were the only two neighborhoods to hit the maximum of 100 venues. Marginy had quite a bit of venues as well (94).

I arranged for five different cluster groups and mapped them using a folium map:

- Purple = Residential/Hospitality/Business
- Turquoise = Parks/Marina
- Blue = Playgrounds
- Red = Food
- Orange = Nightclub



6. Discussions and Observations

New Orleans is a bustling metropolis and popular tourist destination, but most every neighborhood has it's own value proposition. While the more popular areas had more to offer in terms of hospitality and emergency services they also had more crime. There was an even spread of goods and services throughout the neighborhoods with exception to sparsely populated swamp areas.

Based upon the analysis and results I would look into the lower left to lower mid section of New Orleans.

7. Conclusion

7.1 Objective Summary

The objective of this report was to provide New Orleans neighborhood recommendations using public information about demographics, economy, local venues and crime data.

Our methodology for researching stakeholder interest was categorized by the U.S. News report on factors that influence homebuying. These factors were: Aesthetics, Affordability, Safe Environment, and Goods and Services. The process I followed began with gathering, cleaning and organizing data from GeoJSON files to GeoDataFrames. After the data was prepped I was able to do simple aggregation and pivot tables to get counts of points of interest in the different neighborhoods. I was also able to do cluster analysis from the FourSquare API. I used these GeoDataFrames to also create visual maps to display the results.

7.2 Results Summary

After conducting an in-depth analysis for the various neighborhoods throughout New Orleans, the results are as follows:

- Aesthetics: Iberville
- Affordability: The cheapest neighborhoods according to our data was Desire and Florida Dev, but that may be because there isn't much data for those areas/the cost is for the land/smaller cabin homes. The Cheapest Neighborhood according to HomeSnacks website is Tall Timbers-Brechtel, however you get what you pay for. These homes sell for roughly $127k.
- Safe Environment: The Central Business District offered the most emergency services, but that was largely due to the 12 drugstores available in the area. Touro actually boasts the most hospitals (3) and Health Clinics (4). There are no Evacuspots in Touro, though. As for Crime the areas with the lowest crime were Freret and Florida Dev. Accordingly the Garden District and Uptown have historically had a lower crime rate.
- Goods and Services: The French Quarter and Central Business District have the most offerings.

In conclusion, the best neighborhood recommendation depends on the stakeholder's values, but this report contains enough summary information to make an educated decision.