# Capstone Project: Why to open restaurants in Jacksonville, FL?

Introduction - Description & Discussion of Jacksonville, FL

Jacksonville is the largest city in the continental United States by area and the most populous city in the state of Florida. Spanning over 875 miles, Jacksonville has a population density of 1,239 people per square mile. There are about one million residents, but the population has been growing close to 2% per year.
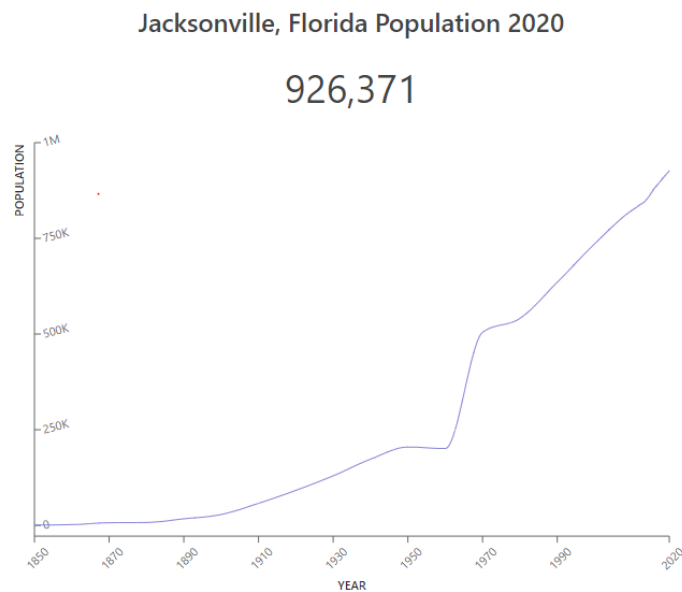
The city is divided into six boroughs divided over 33 zip codes. There are several hundred neighborhoods. Given the number of neighborhoods, I have limited the analysis to boroughs and zip codes.

Above is an image of the six divisions/boroughs of Jacksonville.

1. Urban Core - big business district, hospitals and hotels

2. Arlington - residential

3. Southside - residential

4. Westside - mostly rural and some development by St. John's river.

5. Northside mostly rural and industrial.

6. Beaches - residential

The Urban Core, Arlington, Southside and the Beaches area are the most populous and developed and would be the best area to open restaurants. Westside by the river would also be a good place.

Two great things about Jacksonville are there are more than 22 miles of white sand beaches just minutes from downtown Jacksonville and it is home to Florida's youngest population drawn to the city's historic neighborhoods, and vibrant nightlife. Jacksonville also operates the largest urban park system in the United States. A number of parks provide access for people to boat, swim, fish, sail, jet-ski, surf and water-ski. Jacksonville was ranked as the 10th-fastest growing city in the U.S.

My target audience is stakeholders that are looking for new areas to open restaurants, particularly in Jacksonville, FL. While there are some restaurants most are fast food restaurant chains and there is not much variety among the other restaurants. There are some Chinese and Mexican restaurants, but there are many other cultures, in Jacksonville. Thai, Filipino, Indian, Caribbean, South American and Ethiopian for example. Given the size and population growth in general, Jacksonville is prime to become truly a great city like that of New York City or Los Angeles. The two fastest growing population segments are Asians and Hispanics. Jacksonville has the country's tenth-largest Arab population and has Florida's largest Filipino American community. Jacksonville is becoming a more diverse city.

	2010	2000	1990	1970
Asian	4%	3%	2%	0%
Hispanic	8%	4%	3%	1%
Black	31%	29%	25%	22%
White	55%	62%	70%	76%
Other	2%	2%	0%	0%

Changing Demographic Percentages since 1970. https://en.wikipedia.org/wiki/Jacksonville,_Florida

The purpose of this is to convince restaurant entrepreneurs to take a chance with Jacksonville. Food is the way to most people's hearts. Given the ongoing growth and all that Jacksonville offers, this could be a win-win for restaurant entrepreneurs and Jacksonville to create a vibrant thriving diverse food culture.

Data

Below is an explanation of where data and reference information were obtained.

Scraped data using BeautifulSoup from 'https://worldpopulationreview.com/us-cities/jacksonville-population. This was to obtain the population annual growth percentage for the last decade/

I found the population by zip code from https://www.zipdatamaps.com/zipcodes-jacksonville-fl. For this I created a file called JVilleZipsPop.csv. The zips are used to create markers on the matplotlib graph of Jacksonville.
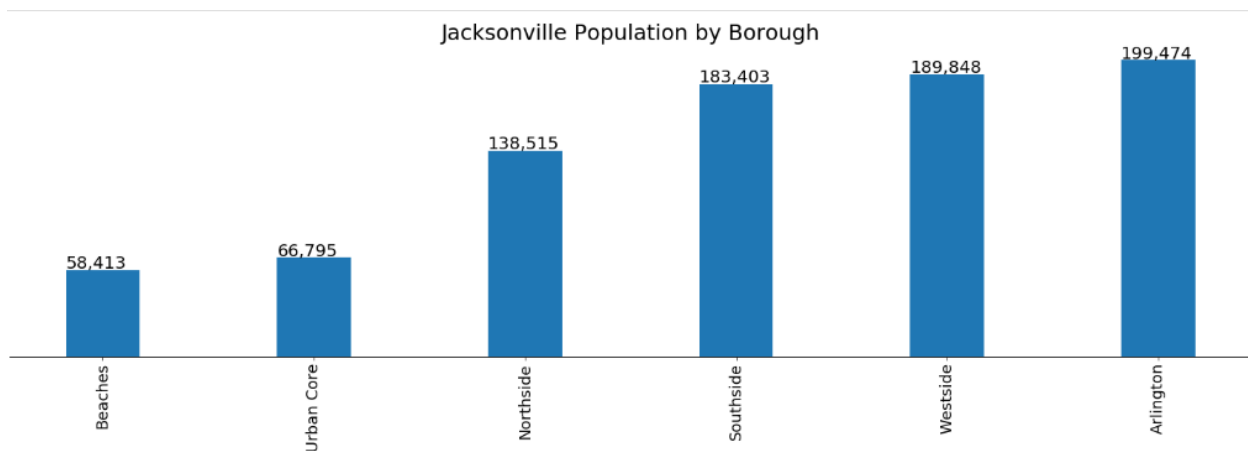
I obtained a list of latitude and longitude coordinates for the zip codes in Jacksonville from https://www.unitedstateszipcodes.org/zip-code-database/. I downloaded a file called Geospatial_Coordinates.csv. I obtained the coordinates using the zip codes from above.

I merged the data from the two files above on Zip Codes and used this to obtain venue category data using the **Foursquare API** using https://developer.foursquare.com/places, which was used for k-means clustering.

Methodology

I used IBM Skills Network Labs to create notebook. I imported and used various packages like beautifulsoup4, requests, Numpy, Pandas and Matplotlib to analyze data on the Boroughs, Zip Codes, Latitude and Longitude information for Jacksonville. I used I also looked at the population for each zip code to find where most populous areas.

	Borough	Zip Codes	Population
0	Urban Core	32202	7915
1	Urban Core	32204	6906
2	Westside	32205	28225
3	Urban Core	32206	17669
4	Arlington	32207	3306

Jacksonville Population by Borough

Beaches 58,413
Urban Core 66,795
Northside 138,515
Southside 183,403
Westside 189,848
Arlington 199,474

Latitude and longitude data by zip code sample.

|	zip	latitude	longitude
0	501	40.81	-73.04
1	544	40.81	-73.04
2	601	18.16	-66.72
3	602	18.38	-67.18
4	603	18.43	-67.15

Merge Neighborhood dataframe and geospatial data for Jacksonville sample.

	Borough	Zip Codes	latitude	longitude	Population
0	Urban Core	32202	30.33	-81.65	7915
1	Urban Core	32204	30.32	-81.68	6906
2	Westside	32205	30.30	-81.72	28225
3	Urban Core	32206	30.35	-81.64	17669
4	Arlington	32207	30.29	-81.64	3306

Use the zip code data with Foursquare data to find venues by Jacksonville zip code.

	Borough	Zip Code	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Urban Core	32202	30.33	-81.65	Redbox	30.331273	-81.652633	Video Store
1	Urban Core	32202	30.33	-81.65	Harvey's Supermarket	30.330947	-81.651863	Grocery Store
2	Urban Core	32202	30.33	-81.65	Family Dollar	30.332724	-81.653231	Discount Store
3	Urban Core	32202	30.33	-81.65	Winn-dixie	30.330840	-81.651657	Grocery Store
4	Urban Core	32202	30.33	-81.65	No Compromise Records	30.329086	-81.651305	Record Shop

Below is summary of the restaurant venue category. The majority of the restaurant are fast food.
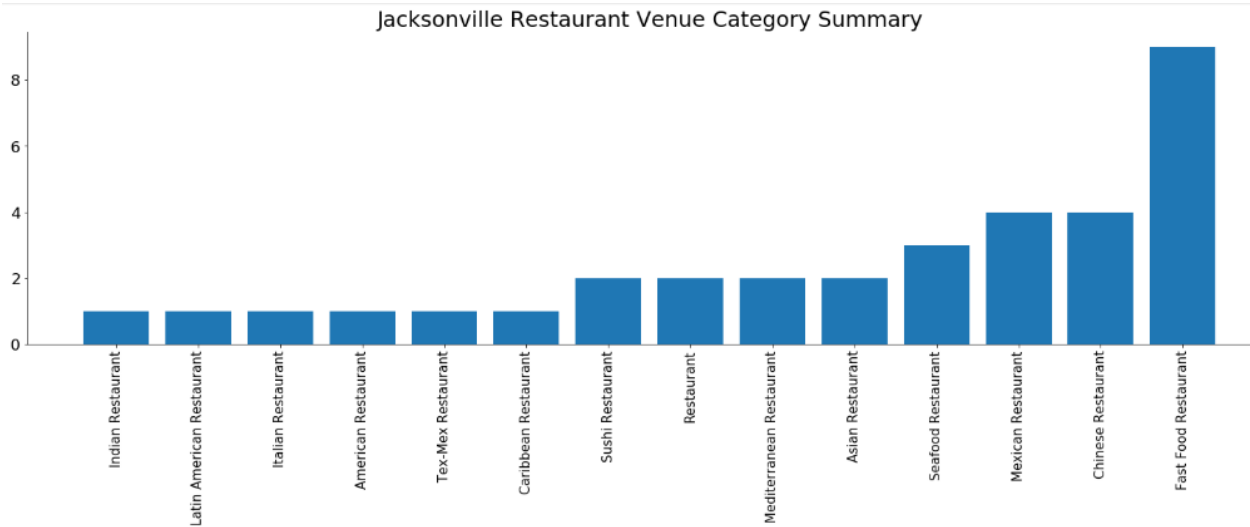
One hot encoding - the get_dummies() function is used to convert categorical variable into dummy/indicator variables. There were 103 categories. Below is a sample.

	Zip Code	ATM	Airport	American Restaurant	Art Museum	Asian Restaurant	Athletics & Sports	Auto Workshop	BBQ Joint	Bank	...	Speakeasy	Sporting Goods Shop	Sports Bar	Supplement Shop
0	32202	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	...	0.0	0.0	0.0	0.0
1	32204	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	...	0.0	0.0	0.0	0.0
2	32205	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	...	0.0	0.0	0.0	0.0
3	32206	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	...	0.0	0.0	0.0	0.0
4	32207	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.333333	0.0	...	0.0	0.0	0.0	0.0

5 rows × 104 columns

Used function to sort in descending order the five most common venues by zip code. Below is a sample.

	Zip Code	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	32202	Grocery Store	Video Store	Record Shop	Discount Store	Dog Run
1	32204	Sandwich Place	Park	Gay Bar	Playground	Historic Site
2	32205	Wings Joint	Home Service	Food	Smoke Shop	Electronics Store
3	32206	Food	Wings Joint	Fast Food Restaurant	Convenience Store	Cosmetics Shop
4	32207	Motel	Rock Club	BBQ Joint	Wings Joint	Electronics Store

k-means Clustering Analysis - I used the elbow method to obtain the optimal K. Below is the elbow method graph. I found k = 7 to be optimal. Also is a sample of the clustering results.

Elbow Method For Optimal k
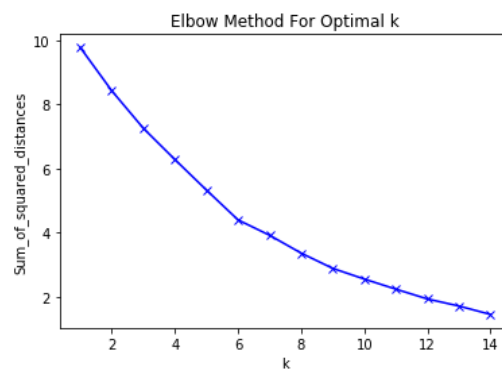
	Borough	Zip Codes	latitude	longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Urban Core	32202	30.33	-81.65	0.0	Grocery Store	Video Store	Record Shop	Discount Store	Dog Run
1	Urban Core	32204	30.32	-81.68	0.0	Sandwich Place	Park	Gay Bar	Playground	Historic Site
2	Westside	32205	30.30	-81.72	0.0	Wings Joint	Home Service	Food	Smoke Shop	Electronics Store
3	Urban Core	32206	30.35	-81.64	2.0	Food	Wings Joint	Fast Food Restaurant	Convenience Store	Cosmetics Shop
4	Arlington	32207	30.29	-81.64	0.0	Motel	Rock Club	BBQ Joint	Wings Joint	Electronics Store

Results

Below are the results of the cluster analysis and graph of the Jacksonville show the clusters.

Cluster 1 Dining/Misc

	Zip Codes	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Clusters
1	32204	Sandwich Place	Park	Gay Bar	Playground	Historic Site	Dining/Misc
2	32205	Wings Joint	Home Service	Food	Smoke Shop	Electronics Store	Dining/Misc
3	32206	Food	Wings Joint	Fast Food Restaurant	Convenience Store	Cosmetics Shop	Dining/Misc
4	32207	Motel	Rock Club	BBQ Joint	Wings Joint	Electronics Store	Dining/Misc
5	32208	Fast Food Restaurant	Chinese Restaurant	BBQ Joint	Convenience Store	Discount Store	Dining/Misc
7	32210	Discount Store	Wings Joint	Fast Food Restaurant	Convenience Store	Cosmetics Shop	Dining/Misc
17	32223	Food Truck	Electronics Store	Wings Joint	Fast Food Restaurant	Convenience Store	Dining/Misc
21	32227	Gym	Fast Food Restaurant	Gym / Fitness Center	Baseball Field	Motel	Dining/Misc
25	32246	Food Truck	Grocery Store	ATM	Café	Sandwich Place	Dining/Misc
27	32254	Sandwich Place	Caribbean Restaurant	Seafood Restaurant	Cosmetics Shop	Business Service	Dining/Misc
29	32257	Gym Pool	Butcher	Gas Station	BBQ Joint	Wings Joint	Dining/Misc
30	32258	Mexican Restaurant	Sandwich Place	Gift Shop	Gym	Pizza Place	Dining/Misc

Cluster 2 Parks

	Zip Codes	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Clusters
8	32211	Park	Dog Run	Lounge	Wings Joint	Gym / Fitness Center	Parks
11	32217	Gym / Fitness Center	Athletics & Sports	Gym Pool	Gym	Grocery Store	Parks
19	32225	Disc Golf	Soccer Field	Wings Joint	Fast Food Restaurant	Convenience Store	Parks

Cluster 3 Harbor/Marina

	Zip Codes	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Clusters
9	32212	Harbor / Marina	Volleyball Court	Fast Food Restaurant	Convenience Store	Cosmetics Shop	Harbor/Marina

Cluster 4 Beaches

|	Zip Codes	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Clusters
22	32233	Beach	Baseball Field	Wings Joint	Flower Shop	Cosmetics Shop	Beaches
26	32250	Beach	Bar	Breakfast Spot	Hotel	Cocktail Bar	Beaches
31	32266	Beach	Wings Joint	Fast Food Restaurant	Convenience Store	Cosmetics Shop	Beaches

Cluster 5 Shopping

	Zip Codes	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Clusters
0	32202	Grocery Store	Video Store	Record Shop	Discount Store	Dog Run	Shopping
18	32224	Pharmacy	Shop & Service	Playground	Pool	Sculpture Garden	Shopping
20	32226	Flower Shop	Fast Food Restaurant	Convenience Store	Cosmetics Shop	Credit Union	Shopping

Cluster 6 Business Services

	Zip Codes	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Clusters
6	32209	Business Service	Wings Joint	Cocktail Bar	Convenience Store	Cosmetics Shop	Business Services
10	32216	Business Service	Restaurant	Wings Joint	Electronics Store	Convenience Store	Business Services

Cluster 7 Airport (JAX International Airport)

	Zip Codes	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Clusters
12	32218	Airport	Parking	General Travel	Wings Joint	Fast Food Restaurant	Airport
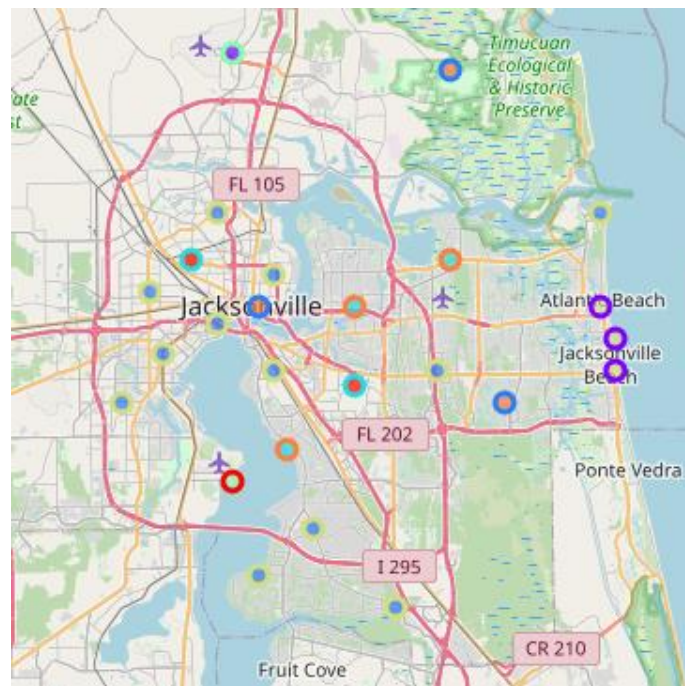
Discussion

Jacksonville is the largest city in the United States by area and has been growing steadily over the last decade and has been becoming more diverse. Also, there are miles of beaches and home to one of the youngest populations is Florida.

Looking over the clusters, most of the dining options are fast food, wing joints and BBQ options. I also noticed but not many Mexican, Chinese and a Seafood restaurant. There are not many options. There are many other types of food.

While the Northside has a large population, it is mostly industrial and rural. I do not think this would be a great area for restaurants, at least not initially. The best areas are Arlington, Southside, Urban Core, Westside, and the Beaches as they are near the beaches and the St John's river, which offer waterfront views as they are highly developed.

Further analysis, could involve population growth and average income by zip code to better decide location.

Conclusion

The purpose of this report was to convince restaurant entrepreneurs to take a chance with Jacksonville.

I have shown the growth in population and diversity, as well as, shown the lack of options for dining. There are many areas with either beachfront or riverfront views, as well as, a vibrant downtown and youthful population.

Jacksonville welcomes restaurant entrepreneurs to embark on a new venture to greatly enhance the dining experiences available.

Food is the way to most people's hearts.