An Exploratory Analysis of Venues in Cabarrus County, NC - A Charlotte Metropolitan Suburb

----Venues Comparison for 2 Popular Zip Code Areas in the City of Concord

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1. Abstract

This project was to help people who are relocating to the Charlotte, North Carolina metro area to have a glimpse of its suburb area. Secondly, it's also meant to help corporate HR and hiring managers for an introduction of the area to the talents that they are trying to relocate or recruit to their operations in the Charlotte metro area. Exploratory analysis of venues data from Foursquare.com was performed to compare two zip code areas of the neighboring city Concord. Zip code area 28027 was shown to have 4 times more venue categories and venue counts than zip code area 28025. Both zip code areas have a wide variety of venues especially places to eat: fast foods, restaurants, and pizza places. The results are expected to help relocators to decide on which area to settle down in complementary to other data such as housing price, schools, ethnic composition, traffic, and crimes rate etc.

2. Introduction

2.1. Background

Charlotte, North Carolina was ranked among the country's fastest growing metro areas in the past 15 years or so [1]. It is home to some of the biggest financial institutions in the country including Bank of America, Wells Fargo, CapitalOne and Truist Financial. It also boasts the presence of such national attractions as the Carolina Panthers (NFL), the Charlotte Hornets (NBA), US National Whitewater Center, Charlotte Motor Speed Way/NASCAR All-Star Races, etc. According to the US Census Bureau 2019, the Charlotte-Concord-Gastonia Metropolitan area has a population around 2.6 million. Data presented by bizjournals.com indicated an average of 120 new people moving to this region every day [2].

Concord is the county seat and the largest city in Cabarrus County [3]. In terms of population, the city of Concord is the second-largest city in the Charlotte metropolitan area and is the 10th most populous city in North Carolina.

In recent years, an increasing number of companies are relocating headquarters or move operations in this area bringing in more jobs and more people. This area is bustling for years to come.

2.2. Problem

When companies try to relocate their employees to Charlotte area, they need to make a pitch about the benefits of relocation to this area and help the employees to learn about the area so that the top talents could be attracted to work for them in the new location. When families relocate, they typically try to find a suitable suburban area to buy a house, send kids to schools, enjoy after-work life and mingle with family or friends at the nearby venues. It is most helpful for HR, hiring managers or the relocation

assistants in the company to be equipped with knowledge about the surrounding areas when they talk to potential candidates when they try to relocate them to Charlotte area. Naturally people wanted to learn about eateries, venues in the suburbs where they may consider buy or rent residence.

2.3. Interest

Due to its proximity to uptown Charlotte, affordable housing price, excellent schools, the city of Concord in the Cabarrus County is naturally a hot spot for relocators to shop for a place to live or hang out after work, on weekends or holidays. Some guide on venues will definitely come in handy to attract visitors or new residents. Hence exploratory venue data analysis from geo-location websites such as foursquare.com is necessary to serve such purpose.

3. Data

3.1. Data sources

Master address datasets for all the recorded addresses from the State of North Carolina could be found for both year/version-2009, and most recently -2014 at the website of https://www.nconemap.gov/datasets/spatial-data-download-nc-emergency-management [4]. This master address dataset will be used to obtain county and city zip codes and names.

3.2. Data wrangling

At the above website for data source, under filter conditions, only select relevant data for Cabarrus County of North Carolina and save the file as a local csv file named: "NC_Master_Address_Dataset_-_2014_CAB.csv". Explore information and data types of relevant columns and save the unique zip codes to a new pandas dataframe called zipcode, which has only one column named "ZIPCODE" and has 17 rows in total.

Install and import python library pgeocode [5], get geo-coordinates as well as city names for each unique zip code in the dataframe, and populate 3 new columns for the dataframe: Latitude, Longitude, and City. The updated dataframe will be used to generate folium geo-maps of the county, the interested zip code areas, and create url requests to query venue data.

4. Methodology

4.1. Foursquare venue exploratory analysis

Register a new developer's account at foursquare.com [6], get credentials, define credentials, version, limit, radius parameters for the venue exploratory url to be created. Clean up the returned json data structure and generate a new pandas dataframe with 4 columns: name, categories, lat and lng that store the returned data of venue name, venue category, and latitude and longitude of the venue.

Venue category and venue counts were obtained using python function df['column'].value_counts() and a new pandas dataframe of venue category/counts information for both zip code areas 28027 and 28025 were generated.

4.2. Folium map visualization

Generate map of Cabarrus County, NC using the latitude and longitude corelated to its address. Superimpose zip code areas as circular markers in the map with both zip code and city name as labels of each marker.

Maps of both zip code areas 28027 and 28025 were also generated with their latitudes and longitudes and super imposed with the markers labeled with venue name and category to visualize distribution of venues on the map.

4.3. Bar plot visualization

The dataframes of both zip code areas 28027 and 28025 with the venue category and venue counts were plotted in vertical bar charts. These bar charts provide a straight-forward visualization of the type of venues present in each zip code area and the number of such venues in the defined radius.

5. Results

5.1. Map of Cabarrus County with zip code areas superimposed.

Cabarrus county has 17 unique zip codes which represent 11 cities with some cities having 2 or more zip code areas. Cabarrus county has total land area of 940 km^2, with latitude and longitude of (35.4045503, -80.564371) and an estimated population of more than 0.2 million in year 2019 [7]. The city of Concord is county seat and other surrounding cities include Kannapolis, Harrisburg, Davidson, Huntersville, Gold Hill, Locust, Midland, Rockwell, Mount Pleasant and Charlotte.
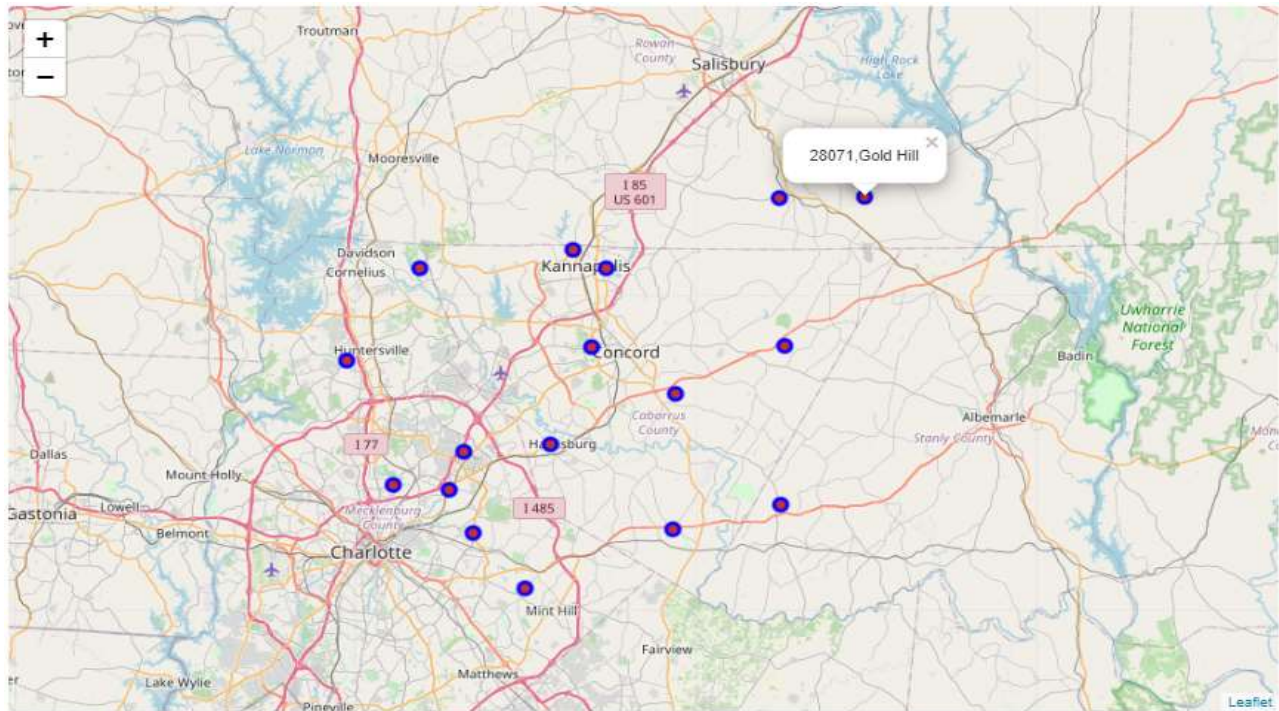

Figure 1. Map of Cabarrus County with zip code areas superimposed.

5.2. Venues list and location in zip code area 28027

A total of 41 venues were returned by foursquare.com and they come from 26 categories of venues. Fast Food Restaurant, Diner, and Mexican Restaurant are among the top 3 categories of venues and accounts for about 1 quarter of all venues that have been returned. Other popular venues include Convenience Store, Brewery, Gas Station, Car Rental, Ice Cream Shop, Shopping Mall, etc. In general, there are a great variety of venues in this zip code area.

	name	categories	lat	lng
0	The Smoke Pit	BBQ Joint	35.421965	-80.614559
1	The Depot Antique and Designer Mall	Shopping Mall	35.414700	-80.603026
2	Cabarrus Brewing Co.	Brewery	35.414246	-80.603316
3	High Branch Brewing Co.	Brewery	35.414306	-80.603357
4	Sonic	Fast Food Restaurant	35.403428	-80.608745
5	Punchy's Diner	Diner	35.413463	-80.612312
6	QuikTrip	Convenience Store	35.428672	-80.609508
7	Fiesta Mexicana	Mexican Restaurant	35.428205	-80.608472
8	BP	Gas Station	35.413560	-80.614920
9	Lowe's	Hardware Store	35.426144	-80.612610
10	Speedway	Gas Station	35.409320	-80.611786
11	Hertz	Rental Car Location	35.416542	-80.613469
12	Concord Family Restaurant	Diner	35.426262	-80.615162
13	Taco Bell	Fast Food Restaurant	35.429262	-80.608797
14	Whiteowl Antique Mall	Antique Shop	35.419795	-80.595864
15	Andele Mexican Resraunt	Mexican Restaurant	35.429781	-80.608060
16	Family Dollar	Discount Store	35.423488	-80.614548
17	Enterprise Rent-A-Car	Rental Car Location	35.400254	-80.609022
18	Miso Sushi & Grill	Asian Restaurant	35.399672	-80.610447
19	CVS pharmacy	Pharmacy	35.427063	-80.614417
20	Burger King	Fast Food Restaurant	35.399310	-80.609100
21	Subway	Sandwich Place	35.399729	-80.610677
22	Arby's	Fast Food Restaurant	35.397107	-80.610614
23	Little Caesar's	Pizza Place	35.411524	-80.614499
24	Precision Eye Center	Doctor's Office	35.421175	-80.615885
25	KFC	Fried Chicken Joint	35.400261	-80.609032
26	Luxury Nails	Spa	35.423488	-80.614548
27	TJ's Diner	Diner	35.414545	-80.603739
28	Masterbacon	Food Truck	35.414268	-80.603612
29	Vintage Motor Club	Auto Garage	35.414833	-80.603455
30	Cabarrus County Food Truck Friday	Food Truck	35.414407	-80.603216
31	Gibson Mill	Shopping Mall	35.414915	-80.602831
32	Carolina Rustica	Furniture / Home Store	35.413395	-80.602547
33	Big Lots	Big Box Store	35.397532	-80.612384
34	Food Lion Grocery Store	Supermarket	35.397729	-80.608035
35	RideNow Powersports Concord & Indian Motorcycl...	Motorsports Shop	35.400535	-80.611264
36	SpeeDee Oil Change & Auto Service	Automotive Shop	35.428064	-80.612824
37	Heavenly Cow Ice Cream	Ice Cream Shop	35.399415	-80.610280
38	QT	Hot Dog Joint	35.429000	-80.609499
39	Moo- Town Icecream	Ice Cream Shop	35.399376	-80.608849
40	Quick Stop Convenience Store	Convenience Store	35.429120	-80.609310

Figure 2. List of Venues in Zip Code 28027 Area That Have Been Returned from foursquare.com.
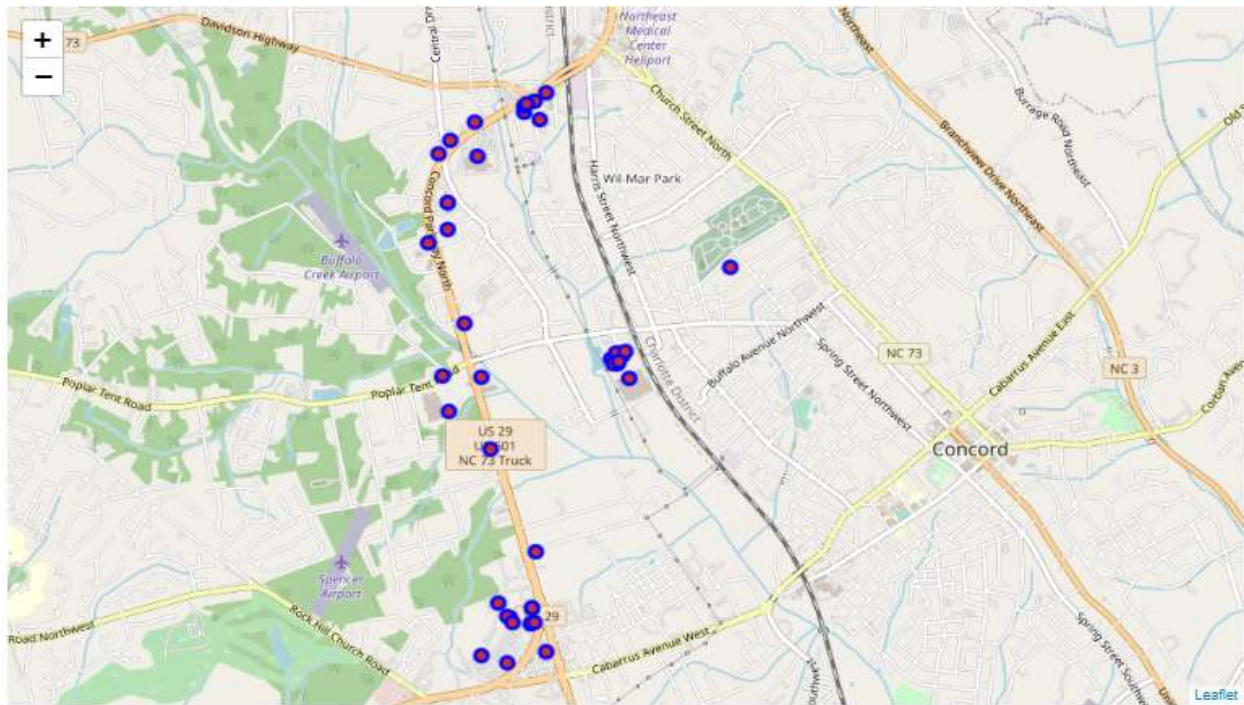
Figure 3. Venue locations on the map of zip code 28027 area.
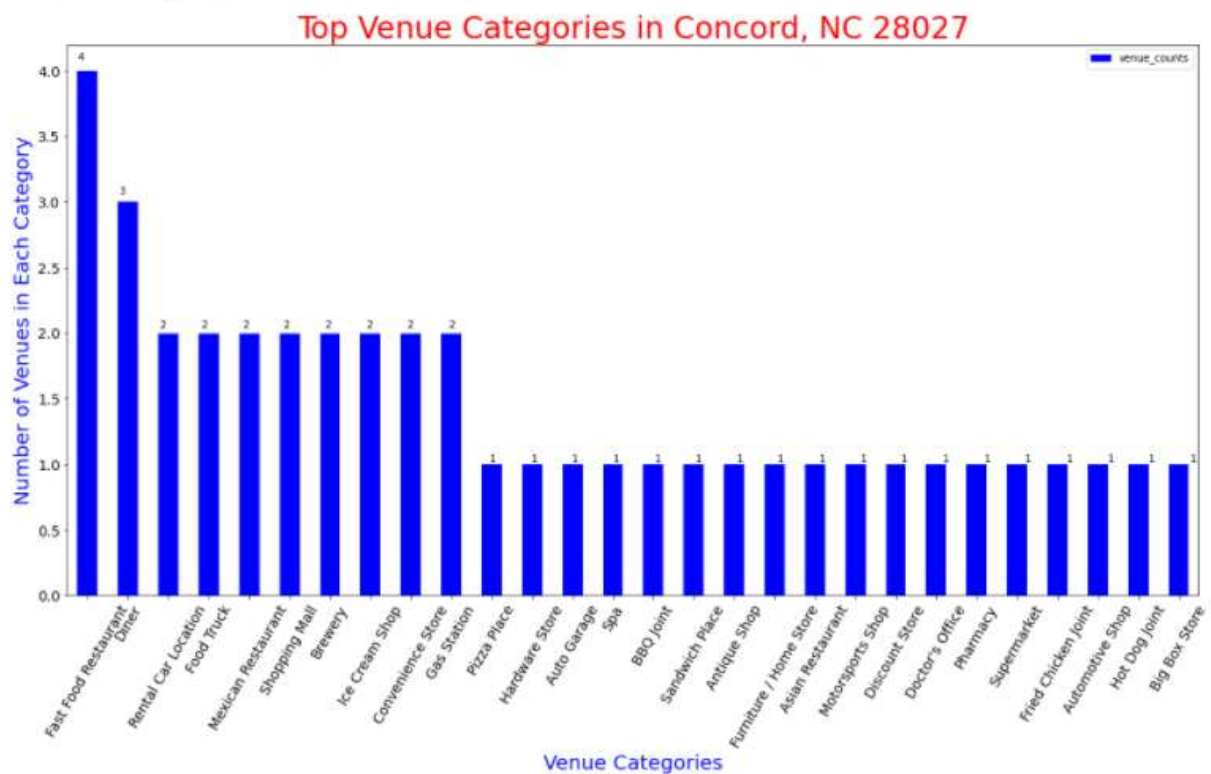
5.3. Venues distribution in zip code area 28027.

Figure 4. Venue distribution bar chart "category vs. counts" in the zip code area of 28027.

5.4. Venues in zip code area 28025

A total of 11 venues were returned by foursquare.com. There are 8 categories of venues for the 11 returned venue names. Pizza Place, Fast Food Restaurant, and Supermarket are among most numbered venues. The remaining venue categories are Pet Service, Chinese Restaurant, Construction & Landscaping, and Hunting Supply. It seems that both the categories and number of venues are scarce in this zip code area compared to those of 28027 area. Foursquare.com needs to update its database to include most if not all of the venues in that area. Given that the version is older, we could assume that the current version may have overcome this problem and will have returned more venues than here.

	name	categories	lat	lng
0	Brooklyn's Pizzeria	Pizza Place	35.370512	-80.548243
1	Food Lion Grocery Store	Supermarket	35.370149	-80.548096
2	Pizza Hut	Pizza Place	35.370409	-80.550117
3	China Garden Restaurant	Chinese Restaurant	35.370475	-80.548159
4	Bojangles' Famous Chicken 'n Biscuits	Fast Food Restaurant	35.370871	-80.548965
5	Tesh-Troxler Landscapes & Designs	Construction & Landscaping	35.371746	-80.513842
6	Brooklyn's Pizza	Pizza Place	35.370647	-80.548134
7	Southgate Commons Shopping Center	Market	35.370127	-80.548286
8	Swiftdogz	Pet Service	35.371082	-80.548411
9	Ideal Sportsman	Hunting Supply	35.370491	-80.550095
10	McDonald's	Fast Food Restaurant	35.371397	-80.549346

Figure 5. List of Venues in Zip Code 28025 Area That Have Been Returned from foursquare.com.
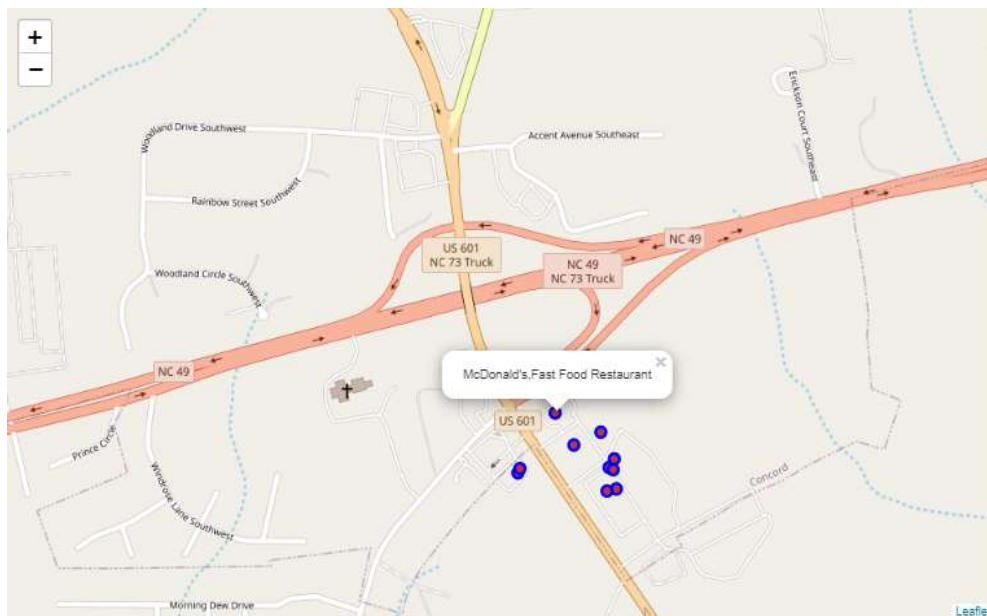

Figure 6. Venue locations on the map of zip code 28025 area.
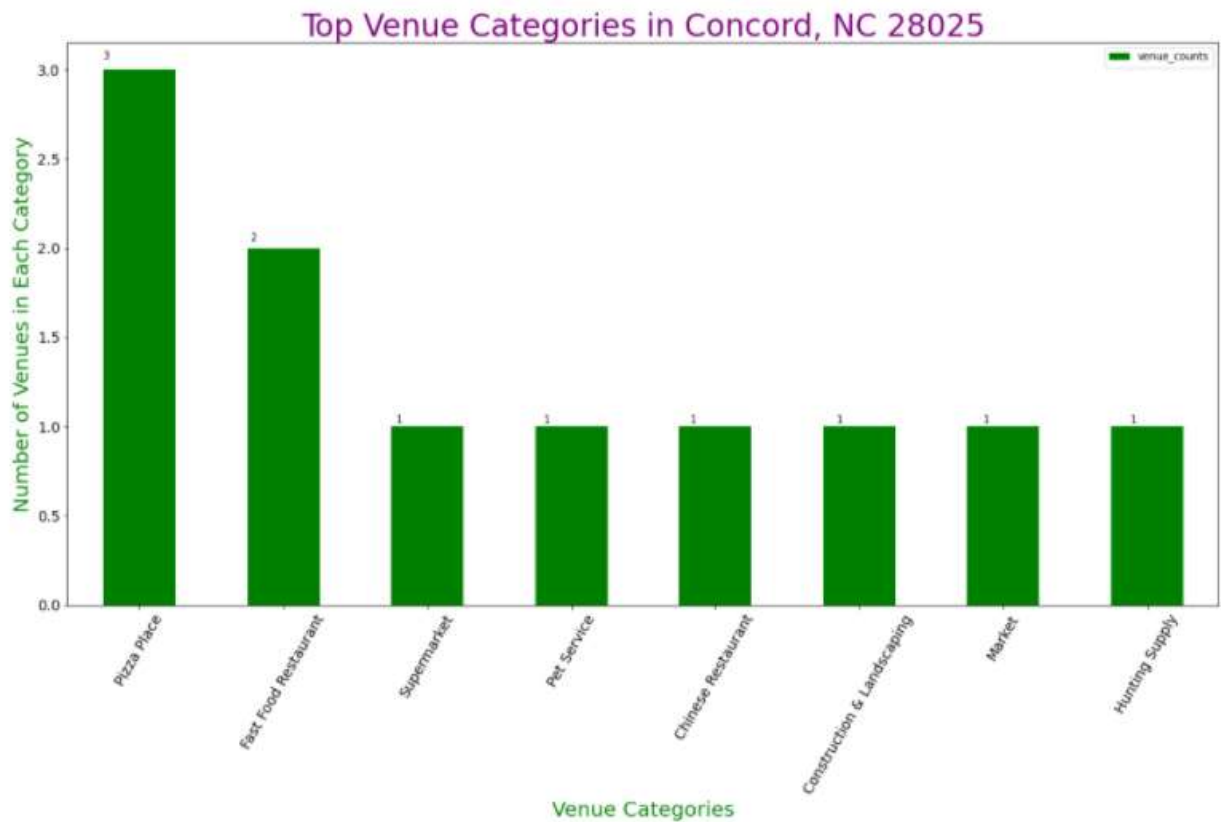
5.5. Venues distribution in zip code area 28025.

Figure 7. Venue distribution bar chart "category vs. counts" in the zip code area of 28025.

6. Discussion

Zip code area 28027 has more venue categories as well as number counts than zip code 28025 area.

Under the chosen conditions, zip code area 28027 has returned about 4 times more venue categories and number of venues than zip code area 28025. It seems that zip code 28027 area is the area of choice to hang out for more activities, more options of ethnic food choices, and potentially more fun if you like to eat out and enjoy a busy bustling life. In contrast, zip code 28025 area best suits you if you look for less traffic, more quiet surroundings, typical mom-pop's places to eat, and have your shopping done in a less congested area.

According to data from usa.com, zip code 28027 area has land area of about 63% of that of 28025 but a population of 111% of that in zip code 28025 area. With more houses under construction and businesses expanding, zip 28027 area seems to have attracted and is still attracting more relocators to move in. Two of the notable attractions in the 28027 area, namely the Concord Mills Mall, and the Charlotte Motor Speedway are most likely the major contributors of such diverse and dense venue spread.

7. Conclusion

Geo-coordinates coupled with foursquare.com venue information provided a glimpse of two sought-after zip code areas in the Charlotte-Concord-Gastonia metro area. Both venue locations and venue

distribution help relocators learn more about the area when considering relocation, visiting or settling down in this area.

Foursquare.com is a powerful tool to gather general information about venues in areas with known geo-coordinates. If such information is used in combination with other information including housing, schools, crime rate, demographics etc, professionals will make more informed and intelligent decisions when considering relocation to the metro area. By the same token, corporate HR and hiring managers that work on attracting top talents to the Charlotte metro region could use the information as educational material for an introduction of the region.

In summary, results from the current project are beneficial not only to corporate HR and hiring managers but also job seekers who are looking forward to relocation to this area.

8. Acknowledgments

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- Last but not least, thank you to all who contributed and improved the python libraries for millions of users to use.

9. References

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