

Marketing Security Services for the Asheville, NC

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Introduction

Problem

A security firm in Asheville, NC is wanting to expand their business. They currently offer security system monitoring and in person security patrols. They have a limited budget for expansion and need to identify potential new clients with a focused process. They are also interested in potential new services that they could add to their business. The security firm has no expertise on how to do this, so they hire a marketing group that uses data science to guide their recommendations.

Background

Asheville, NC can be broken down into several neighborhoods. Some of these are residential and some are business. The business neighborhoods have a variety of business that range from offices to bars and restaurants. Most businesses have some type of security system. Alarms, cameras, night security and full-time security guards are examples. As in all cities some areas are more prone to crime than others. The higher crime areas are in greater need for security than the lower crime areas. Crime and business data will be combined and compared to create targeted marketing materials for security services.

Data

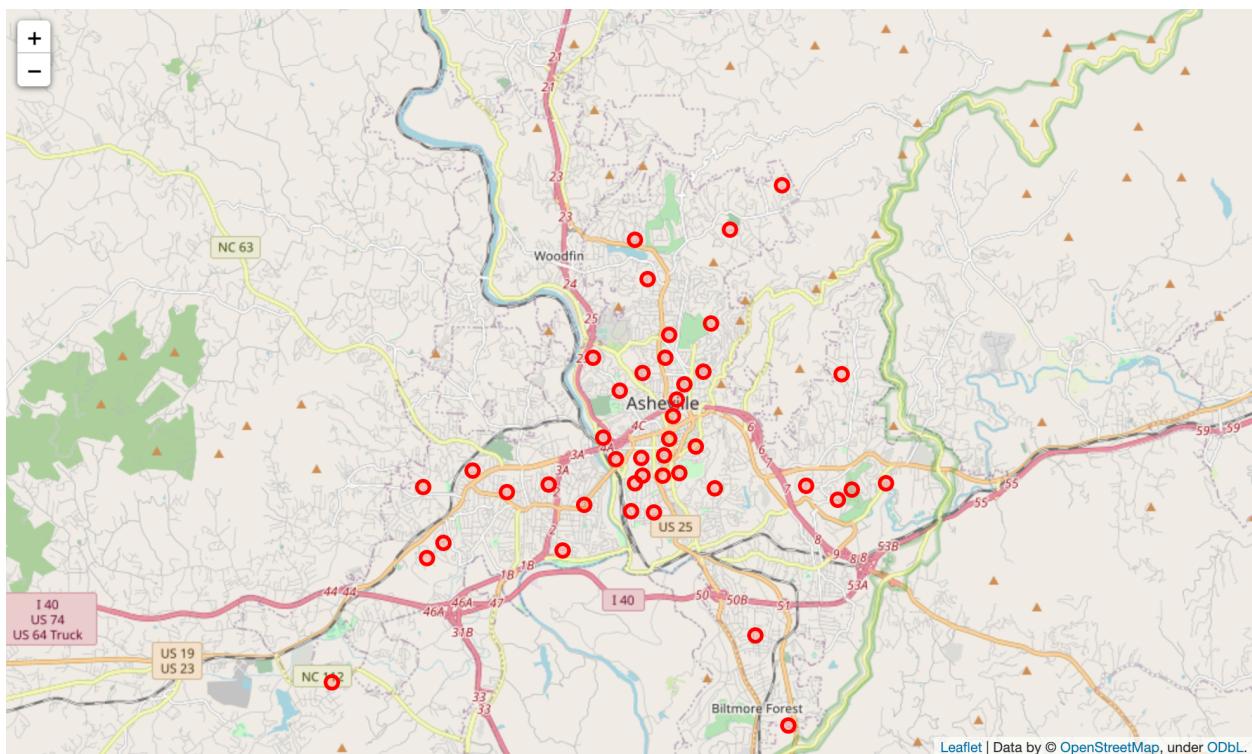
Data specific to Asheville, NC will be pulled from <https://data-avl.opendata.arcgis.com/>. The website has API access to many diverse data sets about the city. Neighborhood information will be extracted to identify each neighborhood name and their location in the city. The downloaded data already has latitude and longitude for each neighborhood boundary. The center point of the boundary coordinates will be used as the neighborhood location. Data for arrests will be also be extracted. The arrest data contains the street address, type of crime, and the date (along with many other details). A python client, geopy, will be used to identify the coordinates of the address for each arrest. The location data will be added to the arrest data. The data will be reduced to by date to include only arrests in the past year. This crime data will be combined with the arrest data to identify a neighborhood for each crime.

The Foursquare API, from <https://developer.foursquare.com/> will be used to extract business/venue information for the neighborhoods in Asheville. The arrest data and venue data will be clustered individually and combined to identify businesses in areas where certain crimes and business are clustered together. Marketing materials can then be designed specifically for

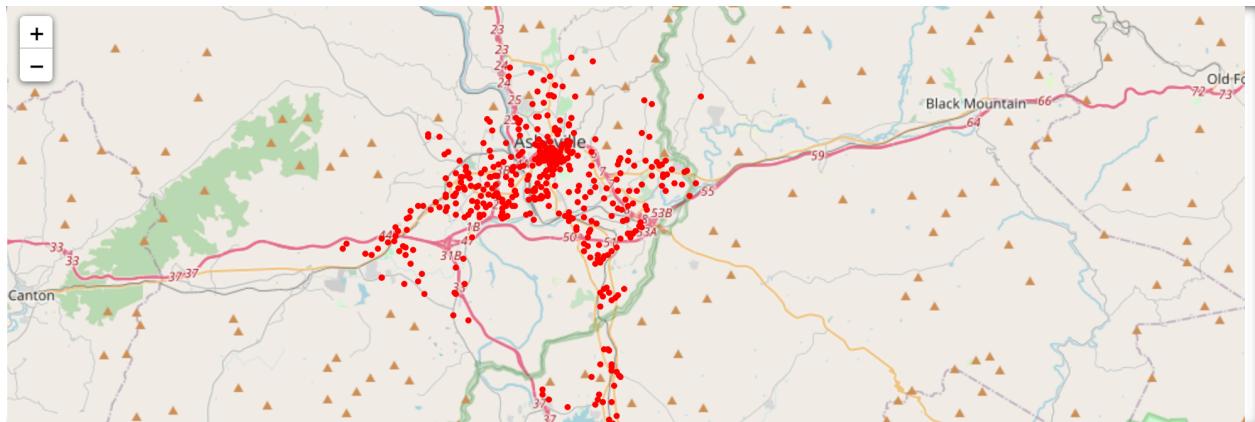
the type of business and crimes that are committed in the same area. For example, if a neighborhood has a cluster of bars and restaurants with arrests of disorderly conduct then onsite security services could be recommended. If a cluster of trespassing and retail might only need security monitoring. The data will also be gleaned for new business opportunities by searching for untapped business/crime combinations.

Methodology

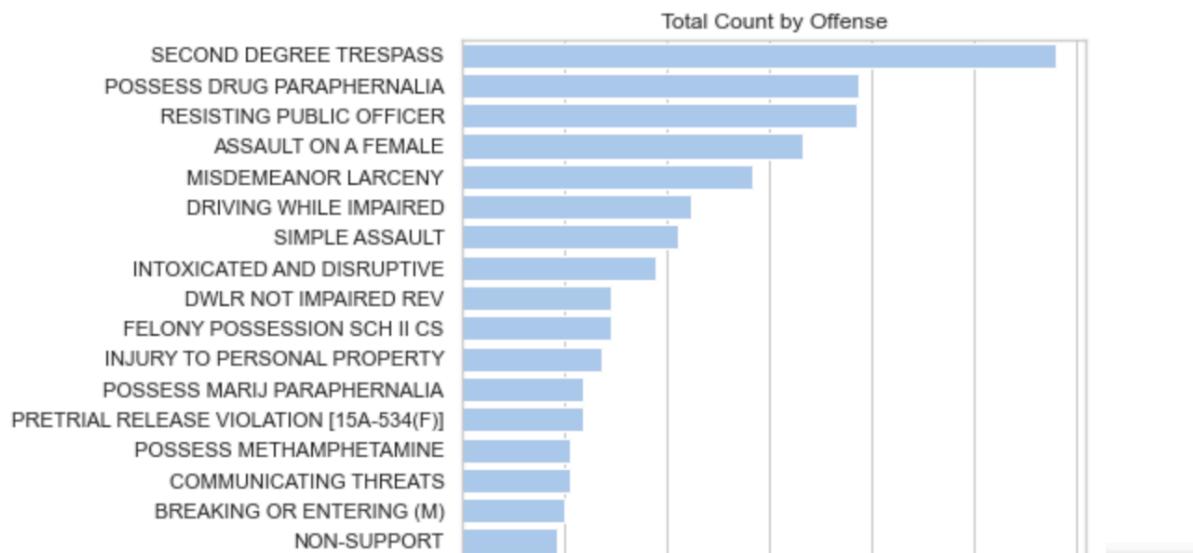
Three sets of data are collected: neighborhood, arrest, and venues. The arrest and venue data will be populated with the neighborhood information. There are 58 neighborhoods in Asheville, NC. See map below.



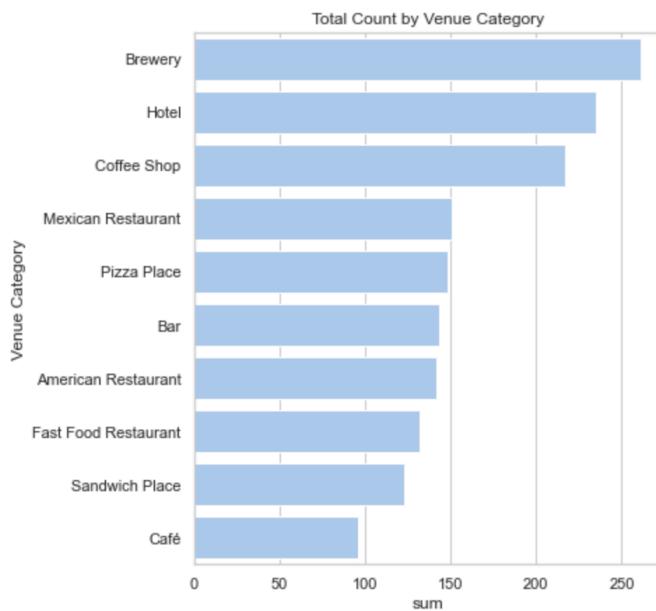
The location for each arrest was assigned to the nearest neighborhood. There were almost 100,000 total arrests in the database. The data was reduced to include only arrests since 2020. There are 9209 arrests for this analysis. Below is a map of the arrest from 2020. They are evenly spread throughout the neighborhoods except for a concentration in the downtown area.



The arrest data was grouped by arrest type and counted. The following bar chart displays the high frequency arrests. Second degree trespass is the highest offense, followed by possession of drug paraphernalia, and resisting a public officer. Trespassing is of special interest as this offense could be affected by added security. Drugs and resisting arrest are also of interest as they indicate there are dangerous people in the area.



The venue data was collected and counted for each neighborhood. There were 5465 venues in 251 different categories. The bar graph below illustrates the top 10 Venue Categories in Asheville.



The venue and arrest data were one hot encoded then adjusted for frequency for k clustering analysis. K-means clustering is a method of vector quantization that aims to partition n observations into k clusters. Each observation belongs to the cluster with the nearest mean. K-means clustering is an unsupervised algorithm that will help to find neighborhoods that are alike based on venue, arrests, or both combined. Five clusters were used for this analysis. Tables were made with the top 10 venue and arrests for each neighborhood. A combined table of the top 3 arrest and venue were created for each neighborhood. The individual clusters for venue, arrest, and the combined cluster of venue/arrest can be interrogated.

Results

Five clusters were created for each of the venue and arrest data. Venue data clustered according to the type of venue. Neighborhoods with businesses grouped together as did neighborhoods with bars or restaurants. Hotel rich neighborhoods also formed a cluster. For example the bar cluster is shown below.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
29	Lee Walker Heights	Brewery	Bar	American Restaurant	Beer Store	BBQ Joint	Breakfast Spot	Donut Shop	Chocolate Shop	Restaurant	Field
36	Oakhurst	Brewery	Bar	American Restaurant	Cocktail Bar	Liquor Store	Dessert Shop	Grocery Store	Chocolate Shop	Pharmacy	Mexican Restaurant
41	South French Broad	Brewery	Bar	Gym	Food Truck	Coffee Shop	Art Gallery	Music Venue	Arts & Crafts Store	Pet Store	Donut Shop
42	South Slope	Brewery	Bar	Mexican Restaurant	Donut Shop	Cocktail Bar	Dessert Shop	Beer Store	Japanese Restaurant	Rock Club	Grocery Store

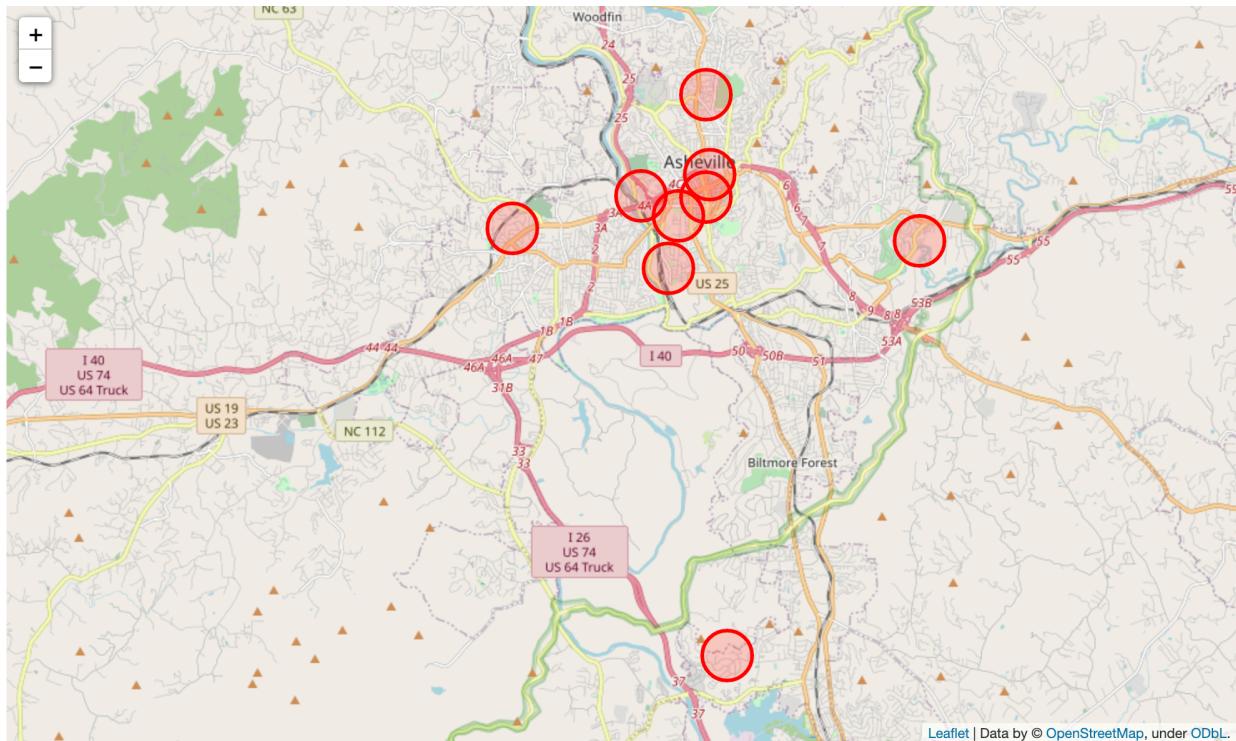
The arrest data also clustered around the type of arrest. The most common arrests dominated the clustering. Second degree trespass being the most important. Below is an example of an arrest cluster.

Neighborhood	1st Most Common Arrest	2nd Most Common Arrest	3rd Most Common Arrest	4th Most Common Arrest	5th Most Common Arrest	6th Most Common Arrest	7th Most Common Arrest	8th Most
0 Albemarle Park	DRIVING WHILE IMPAIRED	SIMPLE ASSAULT	INJURY TO PERSONAL PROPERTY	INTOXICATED AND DISRUPTIVE	BREAKING AND OR ENTERING (F)	BREAKING OR ENTERING (M)	RECKLESS DRVG-WANTON DISREGARD	LARCENY BRE
1 Altamont Apts	SECOND DEGREE TRESPASS	RESISTING PUBLIC OFFICER	POSSESS DRUG PARAPHERNALIA	INTOXICATED AND DISRUPTIVE	ASSAULT ON A FEMALE	FELONY POSSESSION SCH II CS	INJURY TO PERSONAL PROPERTY	DRIVIN
2 Aston Park Tower	SECOND DEGREE TRESPASS	RESISTING PUBLIC OFFICER	POSSESS DRUG PARAPHERNALIA	MISDEMEANOR LARCENY	ASSAULT GOVT OFFICIAL/EMPLOY	BREAKING OR ENTERING (M)	ASSAULT ON A FEMALE	FIRST DE ENTE
3 Bartlett Arms Apts	ASSAULT ON A FEMALE	SECOND DEGREE TRESPASS	RESISTING PUBLIC OFFICER	POSSESS DRUG PARAPHERNALIA	DISORDERLY CONDUCT	SIMPLE ASSAULT	INTOXICATED AND DISRUPTIVE	MISDE PROBAT
4 Beverly Hills	24 HOUR HOLD	DV PROTECTIVE ORDER VIOL (M)	BREAKING OR ENTERING (M)	RESISTING PUBLIC OFFICER	SECOND DEGREE TRESPASS	LARCENY BY EMPLOYEE	MISDEMEANOR LARCENY	INJURY PI

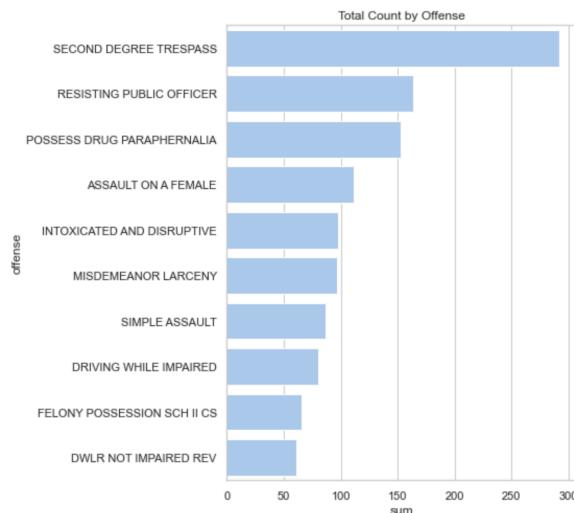
The most useful information comes from the combined analysis. The cluster count was increased to 10 to provide a more focused approach. A single cluster contained the majority of the neighborhoods. To better filter for a targeted marketing campaign the list was reduced to include only neighborhoods with the top offense of second-degree trespass. The table is show below.

Cluster Labels	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	1st Most Common Arrest	2nd Most Common Arrest	3rd Most Common Arrest
1	0 Altamont Apts	Hotel	Coffee Shop	Café	SECOND DEGREE TRESPASS	RESISTING PUBLIC OFFICER	POSSESS DRUG PARAPHERNALIA
2	0 Aston Park Tower	Brewery	Music Venue	Bar	SECOND DEGREE TRESPASS	RESISTING PUBLIC OFFICER	POSSESS DRUG PARAPHERNALIA
5	0 Biltmore Park	Rental Car Location	American Restaurant	Fast Food Restaurant	SECOND DEGREE TRESPASS	DRIVING WHILE IMPAIRED	DWLR NOT IMPAIRED REV
11	0 Downtown	Hotel	Coffee Shop	Brewery	SECOND DEGREE TRESPASS	RESISTING PUBLIC OFFICER	SIMPLE ASSAULT
15	0 Erskine-Walton	Coffee Shop	Dance Studio	Hawaiian Restaurant	SECOND DEGREE TRESPASS	RESISTING PUBLIC OFFICER	DWLR NOT IMPAIRED REV
21	0 Hillcrest	Shipping Store	Frozen Yogurt Shop	Hotel	SECOND DEGREE TRESPASS	POSSESS DRUG PARAPHERNALIA	RESISTING PUBLIC OFFICER
34	0 Norwood Park	Ice Cream Shop	Fast Food Restaurant	Breakfast Spot	SECOND DEGREE TRESPASS	INTOXICATED AND DISRUPTIVE	ASSAULT ON A FEMALE
44	0 View Point	Fast Food Restaurant	Thrift / Vintage Store	Diner	SECOND DEGREE TRESPASS	ASSAULT ON A FEMALE	POSSESS DRUG PARAPHERNALIA
46	0 Wilshire Park	Sandwich Place	Mexican Restaurant	Fast Food Restaurant	SECOND DEGREE TRESPASS	POSSESS DRUG PARAPHERNALIA	RESISTING PUBLIC OFFICER

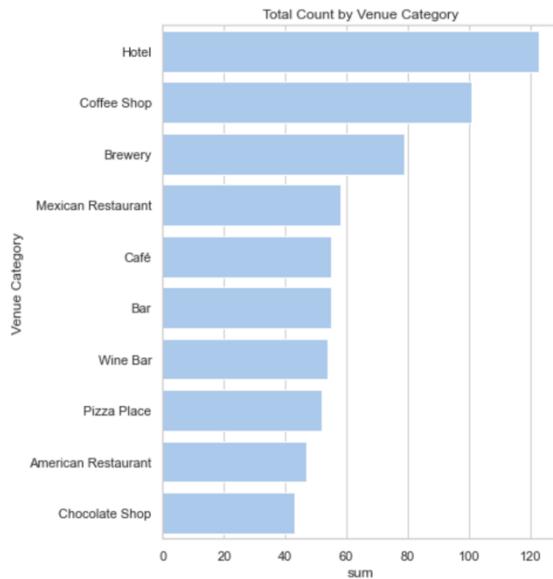
This is a focused list of 9 neighborhoods that have all the same types of offenses. The map below shows that many of these neighborhoods are in close proximity.



The total offense in this cluster is shown below.



The total type of venue is shown below.



Discussion

The goal is to find neighborhoods in Asheville that have business that could be clients for the security firm. We've located a cluster of neighborhoods in downtown Asheville that have a similar arrest and venue profile. These businesses can be targeted with a marketing campaign. Altamont Aps, Downtown, Ashton Park Tower, Erskine Walton and Hilcrest are very close together. There are hotels and restaurants in the area that could need increased security. Focusing the marketing campaign in a target approach will be more cost effective.

Conclusion

The data analysis of arrests and venues in the Asheville area will help the provide the security firm with a target marketing campaign. The firm knows exactly where the crimes are being committed. Fliers and sales calls can be designed for each type of venue with a targeted approach. This should increase the value of this campaign as the small security company needs to effectively spend their capital.