

Optimizing a New Food Truck Business in San Diego, CA



Introduction

- There are many opportunities for potential food truck businesses in San Diego, especially if the neighborhoods in San Diego are examined closely.
- Someone looking to break into the restaurant industry could see this as a less expensive option.
- The mobility of food trucks provides additional business opportunities since it can be moved around to different neighborhoods.
- Optimizing the type of cuisine offered and the location can help the business to reach maximum profitability.

Data Wrangling

Sources and Clean-up

- The source of the zip code, region, and neighborhood data was from the San Diego county court system at this website http://www.sdcourt.ca.gov/portal/page?_pageid=55,1524259&_dad=portal&_schema=PORTAL
- The latitudes and longitudes needed to query the Foursquare API was retrieved using the pandas geocoders library.
- The venue data was retrieved from the Foursquare API <https://foursquare.com/>
- The pieces of data retrieved from each of these sources was placed into a pandas dataframe for further analysis

Methodology

Data Analysis and Visualization

- Python libraries used: pandas, numpy, geocoders, folium, scikit learn
- The data was imported into a dataframe and further analyzed with one-hot encoding, KMeans Clustering, and folium maps
- The data obtained is illustrated on the next few slides

Optimizing the Dataframe

*Note: Only first few rows shown for each dataframe illustrated

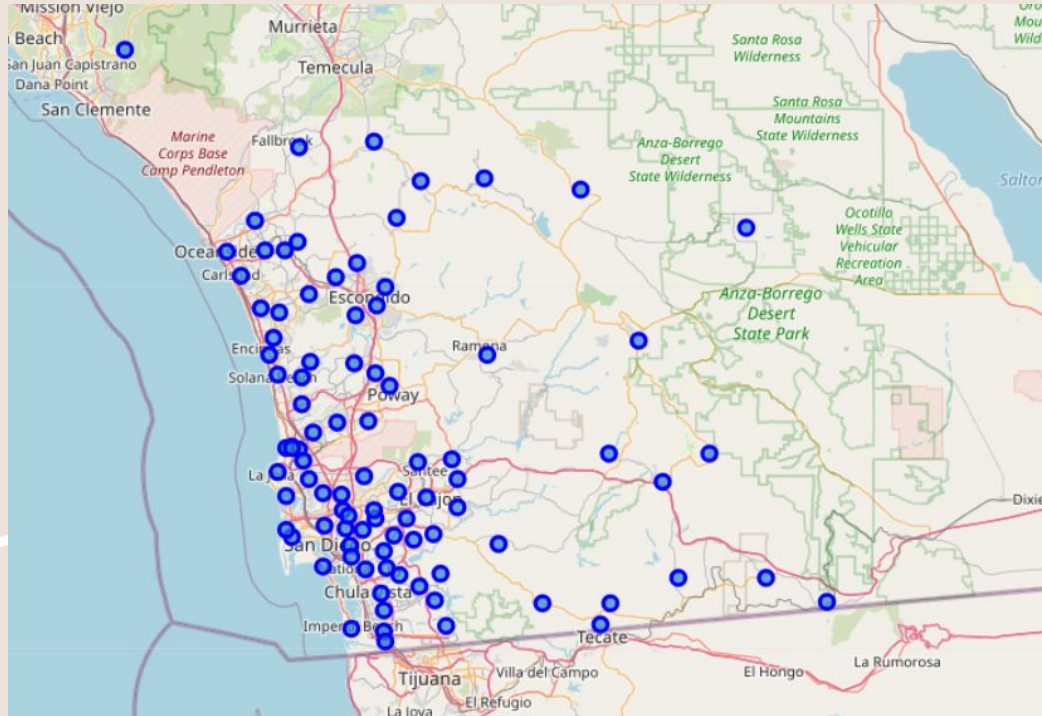
Initial data scraped from San Diego County Court System website

	Zip Code	City	Region
0	91901	Alpine	EAST
1	91902	Bonita	SOUTH
2	91903	Alpine	EAST
3	91905	Boulevard	EAST
4	91906	Campo	EAST

Latitude and Longitude added via geocoders

	Zip Code	City	Region	Latitude	Longitude
0	91901	Alpine	EAST	48.409197	17.493948
1	91902	Bonita	SOUTH	32.666379	-117.022725
2	91903	Alpine	EAST	48.905857	24.713281
3	91905	Boulevard	EAST	32.662786	-116.312998
4	91906	Campo	EAST	32.662691	-116.481502

Initial Visualization of City & Region Data with Folium



Counting the Unique Categories of Venues

*Note: Only a few rows shown for each dataframe illustrated

Venues with latitudes and longitudes

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Alpine	48.409197	17.493948	Restaurant & Pizza ŠRÁMEK	48.409530	17.495751	Gastropub
1	Alpine	48.409197	17.493948	Piváreň Zákruť	48.408316	17.492037	Bar
2	Bonita	32.666379	-117.022725	Starbucks	32.669177	-117.022423	Coffee Shop
3	Bonita	32.666379	-117.022725	Hans & Harry Bakery	32.670406	-117.021200	Bakery
4	Bonita	32.666379	-117.022725	Club Caribe	32.670370	-117.021281	Nightclub

Count of Unique Categories, Grouped by Neighborhood

	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighborhood						
Alpine	18	18	18	18	18	18
Bonita	12	12	12	12	12	12
Borrego Springs/Ocotillo Wells	1	1	1	1	1	1
Camp Pendleton	46	46	46	46	46	46
Cardiff By The Sea	4	4	4	4	4	4
...
Santee	49	49	49	49	49	49
Solana Beach	32	32	32	32	32	32
Spring Valley	10	10	10	10	10	10
Tecate	4	4	4	4	4	4
Vista	77	77	77	77	77	77

There are 258 unique categories.

One-Hot Encoding

*Note: Only a few rows shown for each dataframe illustrated

Grouped by Neighborhood and Averaged

	Neighborhood	ATM	Accessories Store	American Restaurant	Antique Shop	Apres Ski Bar	Arcade	Art Gallery	Arts & Crafts Store	Arts & Entertainment	Arts & Entertainment	...	Video Store	Vietnamese Restaurant	Warehouse Store	Water Park	Wine Bar	Wine Shop	Winery	Wings Joint	Women's Store	Yoga Studio
0	Alpine	0.000000	0.000000	0.0	0.0	0.0	0.0	0.000000	0.000000	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.000000
1	Bonita	0.000000	0.000000	0.0	0.0	0.0	0.0	0.000000	0.000000	0.083333	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.083333
2	Borrego Springs/Ocotillo Wells	0.000000	0.000000	0.0	0.0	0.0	0.0	0.000000	0.000000	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.000000
3	Camp Pendleton	0.000000	0.021739	0.0	0.0	0.0	0.0	0.000000	0.000000	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.000000
4	Cardiff By The Sea	0.000000	0.000000	0.0	0.0	0.0	0.0	0.000000	0.000000	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.000000
...
62	Santee	0.000000	0.000000	0.0	0.0	0.0	0.0	0.020408	0.020408	0.000000	...	0.020408		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.020408
63	Solana Beach	0.000000	0.000000	0.0	0.0	0.0	0.0	0.000000	0.031250	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.000000
64	Spring Valley	0.000000	0.000000	0.0	0.0	0.0	0.0	0.000000	0.000000	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.000000
65	Tecate	0.000000	0.000000	0.0	0.0	0.0	0.0	0.000000	0.000000	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.0	0.000000
66	Vista	0.012967	0.000000	0.0	0.0	0.0	0.0	0.000000	0.000000	0.000000	...	0.000000		0.0	0.0	0.0	0.0	0.012967	0.0	0.012967	0.0	0.000000

67 rows × 258 columns

Sorted by Top 20 Most Frequent Venues

	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	...	11th Most Common Venue	12th Most Common Venue	13th Most Common Venue	14th Most Common Venue	15th Most Common Venue	16th Most Common Venue	17th Most Common Venue	18th Most Common Venue	19th Most Common Venue	20th Most Common Venue
0	Alpine	Gastropub	Bar	Gym	Bus Stop	Shopping Mall	Fried Chicken Joint	Farmers Market	Supermarket	Furniture / Home Store	...	Bus Station	Restaurant	Grocery Store	Food & Drink Shop	Discount Store	Athletics & Sports	Pharmacy	Dessert Shop	Dance Studio	Flower Shop
1	Bonita	Yoga Studio	Discount Store	Fried Chicken Joint	Shopping Plaza	Taco Place	Nightclub	Gastropub	Bakery	Coffee Shop	...	Arts & Entertainment	Pizza Place	Diner	Farm	Food Court	Food & Drink Shop	Flower Shop	Flea Market	Dance Studio	Fishing Store
2	Borrego Springs/Ocotillo Wells	Furniture / Home Store	Yoga Studio	Football Stadium	Food Service	Food Court	Food & Drink Shop	Flower Shop	Flea Market	Fishing Store	...	Fast Food Restaurant	Farmers Market	Farm	Factory	Fabric Shop	Electronics Store	Donut Shop	Doner Restaurant	Dog Run	Dive Bar
3	Camp Pendleton	Supermarket	Coffee Shop	Sandwich Place	Clothing Store	Furniture / Home Store	Cosmetics Shop	Bakery	Plaza	Sporting Goods Shop	...	Frozen Yogurt Shop	Bookstore	Electronics Store	Fountain	Roof Deck	Food Court	Salad Place	Salon / Barbershop	Mexican Restaurant	Shopping Plaza
4	Cardiff By The Sea	Hotel	Peruvian Restaurant	Mexican Restaurant	Intersection	Financial or Legal Service	Factory	Farm	Farmers Market	Fast Food Restaurant	...	Fishing Store	Electronics Store	Flower Shop	Food & Drink Shop	Food Court	Food Service	Fabric Shop	Doner Restaurant	Donut Shop	Football Stadium

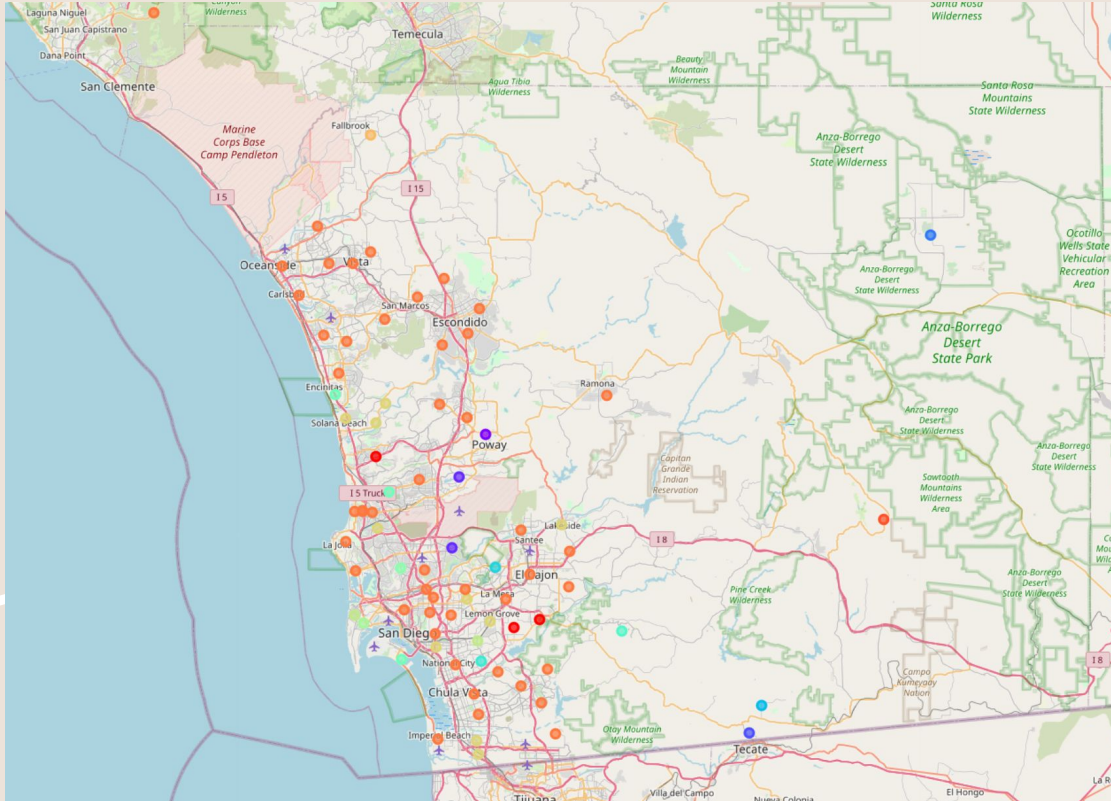
K-Means Cluster Analysis with K = 20

*Note: Only a few rows shown for the dataframe illustrated

Column for Cluster Label Added

	City	Region	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	...	11th Most Common Venue	12th Most Common Venue	13th Most Common Venue	14th Most Common Venue	15th Most Common Venue	16th Most Common Venue	17th Most Common Venue	18th Most Common Venue	19th Most Common Venue	20th Most Common Venue
0	Alpine	EAST	48.409197	17.493948	17	Gastropub	Bar	Gym	Bus Stop	Shopping Mall	...	Bus Station	Restaurant	Grocery Store	Food & Drink Shop	Discount Store	Athletics & Sports	Pharmacy	Dessert Shop	Dance Studio	Flower Shop
1	Bonita	SOUTH	32.666379	-117.022725	17	Yoga Studio	Discount Store	Fried Chicken Joint	Shopping Plaza	Taco Place	...	Arts & Entertainment	Pizza Place	Diner	Farm	Food Court	Food & Drink Shop	Flower Shop	Flea Market	Dance Studio	Fishing Store
2	Alpine	EAST	48.905857	24.713281	17	Gastropub	Bar	Gym	Bus Stop	Shopping Mall	...	Bus Station	Restaurant	Grocery Store	Food & Drink Shop	Discount Store	Athletics & Sports	Pharmacy	Dessert Shop	Dance Studio	Flower Shop
5	Bonita	SOUTH	48.461970	17.495524	17	Yoga Studio	Discount Store	Fried Chicken Joint	Shopping Plaza	Taco Place	...	Arts & Entertainment	Pizza Place	Diner	Farm	Food Court	Food & Drink Shop	Flower Shop	Flea Market	Dance Studio	Fishing Store
6	Chula Vista	SOUTH	48.929178	24.709396	17	Shopping Mall	Park	Cosmetics Shop	Pizza Place	Café	...	Pub	Cupcake Shop	Perfume Shop	Sporting Goods Shop	Bistro	Football Stadium	Soccer Field	Bowling Alley	Food & Drink Shop	Mobile Phone Shop

Visualization of Clusters with Folium



Clusters to Note from the Results

- **Clusters 1-3**: low restaurant density
- **Clusters 4-10**: outskirts of the county, low restaurant density but inconveniently located
- **Cluster 11**: most common venue is a hotel, high potential for restaurant business
- **Clusters 12-17 and 19-20**: many restaurants already available in these areas, a specific type of cuisine would have to be considered
- **Cluster 18**: by far the largest with the highest restaurant density, specific neighborhoods have potential if the most frequent venue is not a restaurant

Conclusions

- Many opportunities for food trucks exist
- The neighborhood and the type of cuisine should be carefully considered
- Outlying neighborhoods can likely be eliminated due to inconvenience
- Any area that didn't have a restaurant listed as the most frequent venue has strong potential
- Of particular note are areas that have hotels listed as the most frequent venue
- Other areas to note are neighborhoods that have shopping malls or parks/playgrounds as the most frequent venues

References

- <https://roaminghunger.com/food-trucks/san-diego-ca/>
- <https://sandiego.eater.com/>
- http://www.sdcourt.ca.gov/portal/page?_pageid=55.1524259&_dad=portal&_schema=PORTAL
- <https://foursquare.com/>