# 1. Introduction

## 1.1. Background

U.S. has long been viewed as the land of opportunity and has attracted lots of fresh talent into that country. As Asians from the far east (e.g. Hong Kong, Singapore) with exposure to both Western and Asian culture, migrates to the U.S., a transferable skill would be in the food hospitality industry. It is quite safe to say that Asian cuisine is almost everywhere in the U.S. of A from a small Chinese takeaway all the way to fine dining Chinese restaurant.

## 1.2 Problem Description

The fundamental law of Economics is that of demand and supply. Is there a demand for Asian cuisine and is there a supply, and what is the magnitude of the demand vs the supply. To start a restaurant, there has to be a market for that cuisine market segment share for the business to be successful. Hence, an analysis needs to be done for this purpose

This is further complicated by a few things, the first being the term Asian cuisine. It is used loosely here to cover the wide range of cuisines found in the greater Asia and can include fusion for variety and to increase the offering. The definition of Asian cuisine encompasses a wide range of cooking practises and traditions and there is no enforcement on how the term is being used. Just in the Asia region alone, there is Chinese cuisine which varies greatly in taste and flavor at different locations, to exotic Japanese, the spicy Koreans, the countries in South Asia, and to western parts including India. As such, the definition of Asian cuisine will depend strictly on how it is defined by the source of the data.

This project attempts to analyse the from various sources for a given location to derive the statistics for various cuisine for the purpose of understanding opportunities of starting up an Asian cuisine by understanding the current volume of the targeted cuisine, such as a Chinese restaurant, and its competition, is it in saturation or in growth mode or just penetrating the market.

For this project, we will analyse the greater Dallas area (or Dallas county) to derive the statistics for various cuisine for the purpose of understanding opportunities of starting up an Asian cuisine. Dallas was pick for the study for the following reasons:

1. It has a large white racial makeup, about 50% and while Asian constitutes about 6%.
2. It has mild weather with summer in the mid 30s and its dry, while winter is in the teens with at worse 1 inch of snow or so.
3. While it has issues with tornado, the inland where Dallas is, is less vulnerable.

4. The current unemployment rate is about 10% below the nationwide numbers and it is at its lowest since 2002.

In this exercise, we will attempt to understand the statistics around the frequency of various categories of venues and the ratio to the Asian venues for the cities that falls within the Dallas greater area.

## 1.3 Interest

For one interested in starting up a restaurant business, this project is a simple starting point on types of data that can be utilized and the various methods to gather them, and how to perform some data analysis to derive the statistics of the various categories of venues and the ratio to the Asian venues for the cities that falls within the Dallas greater area.

# 2. Data description & how it will be used to solve the problem

## 2.1 Data Terminology

Firstly, the term Asian cuisine is used loosely here to cover the wide range of cuisines found in the greater Asia and can include fusion for variety and to increase the offering. The definition of Asian cuisine encompasses a wide range of cooking practises and traditions and there is no enforcement on how the term is being used. Just in the Asia region alone, there is Chinese cuisine which varies greatly in taste and flavor at different locations, to exotic Japanese, the spicy Koreans, the countries in South Asia, and to western parts including India. As such, the definition of Asian cuisine will depend strictly on how it is defined by the source of the data.

Dallas county refers to the Dallas greater area or borough and it has within it 20 cities and towns, including one called Dallas. For the purpose of this article, Dallas county will be also referred to as Dallas city, and all the towns and cities will be referred to as neighborhoods.

The terminology zip code is used in the U.S. and it is synonymous with postal codes. Each zip code will have a corresponding latitude and longitude value assigned. Unfortunately, a city, by virtue of its size, can have multiple zip codes, and the results have to be grouped by city/town which will be referred to as neighborhoods.

## 2.2 Data sources and description of the data

There are 3 types of data has been identified:

1. It is logical to assume that neighborhoods/towns/cities are not homogeneous. An assumption is made that food preference can be influence by different population size demographics profile by neighborhood. Hence, data will need to be sourced from U.S. Census Bureau 2013-2017 American Community Survey 5-Year Estimates (ACS) and the Center for Public Policy Priorities.

2. The next data set will be the venue data. Details on the venues will be derived from Foursquare.com website via an API call to the application. Foursquares provides a count on the types of cuisine according to a predefined set of categories as documented on its website https://developer.foursquare.com/docs/resources.

   The latitude and longitude of all the neighbourhoods in Dallas county will be passed to Foursquare along with a search for the given category, and a radius the application is to search within. Hence, it has to be assumed that the latitude and longitude passed to Foursquare will be close to the center of that neighbourhood it represents and that the bulk of the cuisine in that neighbourhood does fall within a few kilometres from

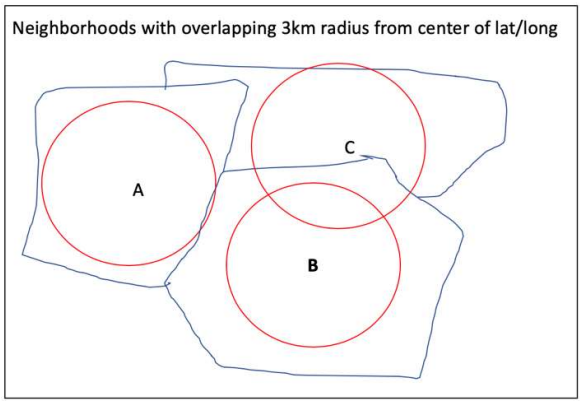
that latitude and longitude. Foursquare will then return all the venues it finds matching the category within the specified radius of the neighbourhood's latitude and longitude

3. The next set of data will be the Dallas Zip codes which will provide the list of neighborhoods in the Dallas county along with the postal codes or zip codes as they are called in the U.S. Each neighbourhood in the data will come with its corresponding longitude and latitude. This data of US Zip Codes database can be sourced from https://simplemaps.com/data/us-zips.

## 2.3 Data cleaning and processing

The first set of data to be processed will be the zip code. Dallas county has 20 neighborhoods, and 84 zip codes. The lat/long of all 84 zip codes will be passed to Foursquares and the venues returned will be grouped by neighborhoods. This is because when people talk about places, they normally refer to the neighbourhood name as opposed to zip codes.

Foursquare returns the venues' frequency by neighborhoods which is defined by their zip codes and their respective latitude and longitude. This information can only be used as a rough guide as Foursquare returns the findings based on a specified radius from that given latitude and longitude. This already assumes that all neighborhoods are circular and of a fixed size with its latitude and longitude in the centre of the circle. It is also not capable of limiting its search within the boundaries of a given city or town or neighbourhood. Hence, if a search radius is too large, Foursquare can return venues from another neighbourhood. That being said, if the neighboring neighbourhood is small, then there is a chance that it will return duplicates. And if the town center of the neighbourhood is big, then it will miss a few venues. Furthermore, it has to be assumed that if a neighbourhood has more than one zip code, such as Garland and Irving, then the lat/long of each zip code is in the town center of the zip code and it has a minimum radius of 3 km or that any overlapping will be insignificant. Hence, a radius of 3 km is picked, assuming that most eateries fall within that radius for any one given neighbourhood.




Based on the drawing, it can be seen that the circle B has an overlap with circle C. Any venue meeting the search category in the overlapped area will be retrieved twice

Furthermore, the venue data set that Foursquare provides is only a rough guide on the types of cuisine according to a predefined set of categories as Foursquare has documented. It can be seen from their website that bubble tea and dumpling, which is predominantly Asian, is not classified under the Asian category. Also, categories such as Chinese and Japanese are defined as subcategory under Asian by Foursquare, but they have food venues in the Asian category that has no subcategory.

A useful feature set will be demographics, mainly the distribution of White and Asians as it has been observed that Whites fascination with Asian food has resulted in the "Explosion of White-Owned Dallas Asian-Fusion Restaurants" in Dallas. However, census in the U.S. is done once every 10 years, and the next census will be in 2020, the data used can be up to 10 years old. There are census being done by ACS as recent as 2017, hence it will be used as is to provide guidance. This exercise can be repeated after the 2020 census results are released if deemed necessary.

## 2.4 Feature selection

The first set of data to be processed will be the zip code. Dallas county has 20 neighborhoods, and 84 zip codes. The zip code data will be sourced from this website https://simplemaps.com/data/us-zips

The first category to be queried via Foursquare will be Food, and the second will be Asian. This will return the frequencies of all venues and Asian venues from which we can determine its concentration. Also, depending on how the data behaves, such as the definition of Asian venues vs. Korean venues or Chinese venues or Szechuan or Curry house or ramen shop. As a free developers account is used for this project, ratings of the venues will not be a feature.

Next we will look at the demographics and the distribution. The U.S. census is about 10 years old, and the numbers have to be taken with a pinch of salt. The feature will be the populations size of Whites and Asians in Dallas county, and identification of neighborhoods where there is a higher concentration of Asians above the Dallas county average.

## 2.5 Analytical Methods

The basic "Demand and Supply of the market segment" economic model will be used. To achieve this we will decompose it into two approaches:

1. Understanding of how the Asian cuisine market segments itself such as a generic Chinese restaurant vs a Sushi or Peking Duck restaurant. As Chinese forms the greatest land mass in Asia, and the highest population count, understanding will have

to be derived from how Foursquare defines this. Certain assumptions will have to be made after the data has been retrieved

2. Statistical analysis has to be performed on the types of venues and its frequency by neighborhoods. The ratio of the cuisine and the ratio of the White and Asian demographics can be reviewed. There is insufficient data to draw that correlation but the frequency of venue and demographics can be observed as an initial guide before doing actual field exercises in exploring the various venues in the 20 different neighborhoods.

# 3. Exploratory Data Analysis

## 3.1 Demographics of Neighborhoods in Dallas county

The population of Dallas county is approximately 2.4M, with White being 1.56M which is 61% and Asians forming 153K which translates to 6%.

| # | Race | | Estimate |
|---|---|---|---|
| 1 | White | | 1,565,175 |
| 2 | Black | | 572,491 |
| 3 | Asian Total | | 153,214 |
| | Asian Indian | 54,697 | |
| | Chinese | 16,879 | |
| | Filipino | 10,306 | |
| | Japanese | 2,388 | |
| | Korean | 9,242 | |
| | Vietnamese | 32,610 | |
| | Asian Others | 27,092 | |
| 4 | American Indian | | 8,310 |

The table shows a snippet of the census data from ACS which shows the breakdown of what constitutes Asian where Vietnamese forms 21% of the Asian race. Chinese forms only 11%. Asian Indian form 36%

Hence, any neighbourhood with higher than 6% Asian population is worth noting.

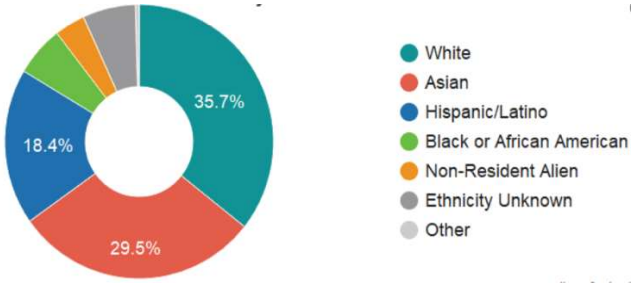
| No. | Neighborhood | Population | % of Asians |
|---|---|---|---|
| 1 | Addison | 12414 | 11.22 |
| 2 | Balch Springs | 23031 | |
| 3 | Carrollton | 46364 | 14.37 |
| 4 | Cedar Hill | 45373 | |
| 5 | Coppell | 38666 | 23.58 |
| 6 | Dallas | 1190205 | |
| 7 | Desoto | 48877 | |
| 8 | Duncanville | 38530 | |
| 9 | Garland | 226892 | 10.93 |
| 10 | Grand Prairie | 169322 | 7.29 |
| 11 | Hutchins | 5374 | |
| 12 | Irving | 217883 | 18.52 |
| 13 | Lancaster | 38269 | |
| 14 | Mesquite | 140703 | |
| 15 | Richardson | 78165 | 16.39 |
| 16 | Rowlett | 54963 | 7.7 |
| 17 | Sachse | 20328 | |
| 18 | Seagoville | 18339 | |
| 19 | Sunnyvale | 5118 | |
| 20 | Wilmer | 3956 | |

Also, most of the neighbourhood with higher percentage of Asian population such as, Addison, Coppell, Garland, Sachse, Richardson, and Rowlett are all to the North side (between North East to North West) of Dallas.

No Asian population numbers were found for Dallas which is a very large cosmopolitan city, but it is not uncommon that new migrants tend to gravitate towards the suburbs away from the inner city.

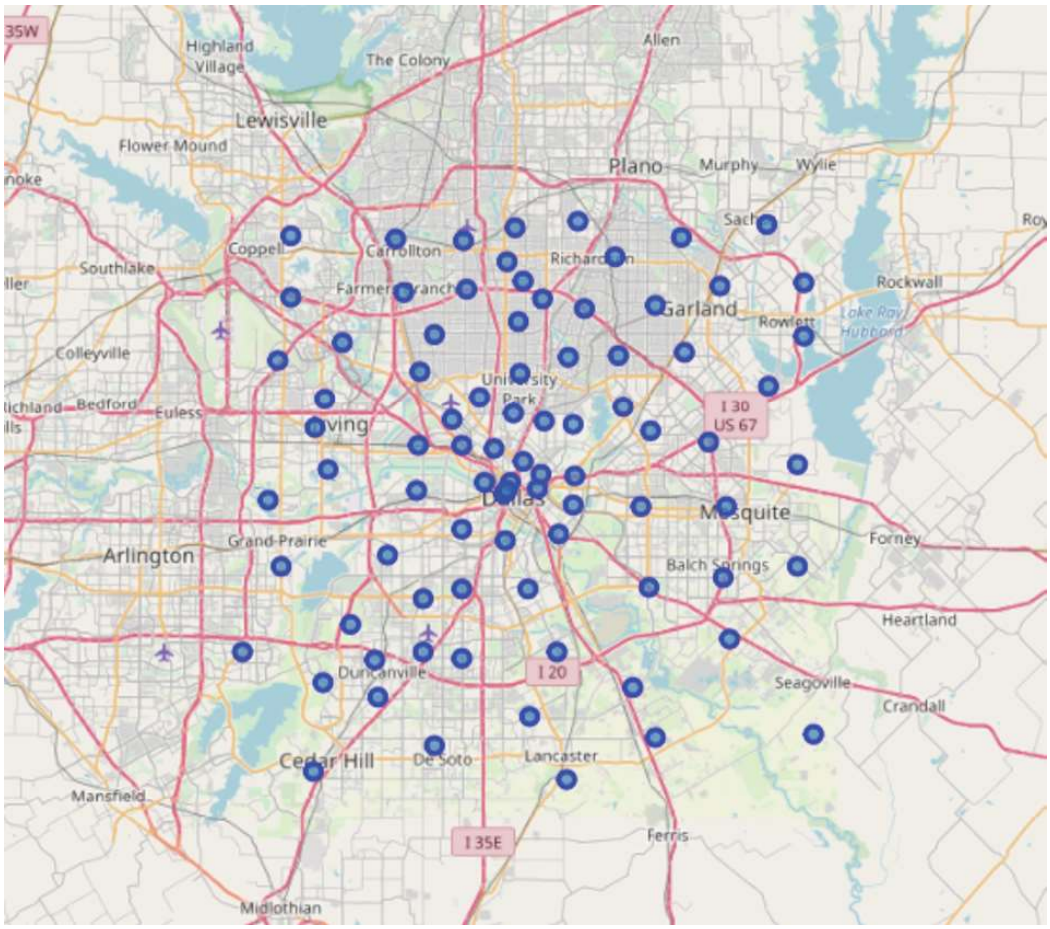
Another thing to call out will be that Richardson is the home to University of Texas, Dallas. The university has reported that 29.5% of its undergrads are Asians

University of Texas, Dallas, Undergraduate Ethnic Diversity



## 3.2 Zip Code distribution across Dallas county

From folium map, we can see that the zip codes around Dallas central is quite close together. This can be cause for concern with the radius of 3 km that we will be passing to Foursquare. However, those zip code zones might not actually have a 'town centre' if it is too small, so, it may not have venues of interest.




## 3.3 Foursquare all and Asian venue data

The Foursquare has two dimensions, one being the count of venues, and the other being the frequency. The venue count from Foursquare was tabulated below for all venues and Asian (collectively all venues in the subcategory of the Asian category) venues. The returned values were grouped by neighbourhood as there would otherwise be 84 zip codes as opposed to 20 neighborhoods.

It can be observed from the table of venue from Foursqare that there are no venues in Seagoville which has a population of 18k. From the folium map above, it can be seen that there are no lat/longs (blue dots) right on Seagoville, hence it could mean that the zip code lat/longs are not necessarily at the centre of the neighbourhood.

Likewise, Foursquare did not return any count for Asian venues at Wilmer, but this should not be a concern because that neighbourhood has the lowest population count.

| No. | Neighborhood | Population | % of Asians | Venues Frequency | |
|---|---|---|---|---|---|
| | | | | All | Asian |
| 1 | Addison | 12414 | 11.22 | 100 | 38 |
| 2 | Balch Springs | 23031 | | 40 | 5 |
| 3 | Carrollton | 46364 | 14.37 | 100 | 65 |
| 4 | Cedar Hill | 45373 | | 50 | 3 |
| 5 | Coppell | 38666 | 23.58 | 75 | 9 |
| 6 | Dallas | 1190205 | | 3506 | 1235 |
| 7 | Desoto | 48877 | | 40 | 3 |
| 8 | Duncanville | 38530 | | 117 | 20 |
| 9 | Garland | 226892 | 10.93 | 321 | 70 |
| 10 | Grand Prairie | 169322 | 7.29 | 136 | 15 |
| 11 | Hutchins | 5374 | | 10 | 2 |
| 12 | Irving | 217883 | 18.52 | 481 | 98 |
| 13 | Lancaster | 38269 | | 30 | 3 |
| 14 | Mesquite | 140703 | | 187 | 16 |
| 15 | Richardson | 78165 | 16.39 | 200 | 134 |
| 16 | Rowlett | 54963 | 7.7 | 79 | 15 |
| 17 | Sachse | 20328 | | 17 | 4 |
| 18 | Seagoville | 18339 | | | |
| 19 | Sunnyvale | 5118 | | 7 | 1 |
| 20 | Wilmer | 3956 | | 7 | |

Hence it can be seen from Foursquare venue data that places with percentage of Asian population above the 6% average also tend to have a higher ratio of Asian venues.

Interestingly, 35% of Dallas venues are Asian (including all its subcategory). Finally, Richardson which has 67% venues being Asian is the home of the University of Texas, Dallas as discussed earlier on.

## 3.5 All Venues Frequencies in Dallas County from Foursquare

| | Neighborhood | 1st Most Common | 2nd Most Common | 3rd Most Common | 4th Most Common | 5th Most Common | 6th Most Common | 7th Most Common | 8th Most Common | 9th Most Common | 10th Most Common | 11th Most Common | 12th Most Common | 13th Most Common | 14th Most Common | 15th Most Common | 16th Most Common | 17th Most Common | 18th Most Common | 19th Most Common | 20th Most Common |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Addison | Mexican Restaurant | Italian Restaurant | American Restaurant | Burger Joint | Steakhouse | Pizza Place | Sandwich Place | Sushi Restaurant | Diner | Restaurant | Seafood Restaurant | Wings Joint | Chinese Restaurant | Asian Restaurant | Breakfast Spot | Deli / Bodega | Bakery | Fried Chicken Joint | BBQ Joint | Thai Restaurant |
| 1 | Balch Springs | Fast Food Restaurant | Fried Chicken Joint | Pizza Place | Chinese Restaurant | Food | Mexican Restaurant | Taco Place | Bakery | Bagel Shop | Burger Joint | Sandwich Place | Diner | CafV© | Asian Restaurant | Seafood Restaurant | Ethiopian Restaurant | Fondue Restaurant | Fish & Chips Shop | Dumpling Restaurant | Donut Shop |
| 2 | Carrollton | Mexican Restaurant | Fast Food Restaurant | Pizza Place | Korean Restaurant | Sandwich Place | Sushi Restaurant | Fried Chicken Joint | Indian Restaurant | Chinese Restaurant | Asian Restaurant | Vietnamese Restaurant | Burger Joint | Thai Restaurant | Diner | Donut Shop | CafV© | BBQ Joint | Breakfast Spot | Bakery | Caribbean Restaurant |
| 3 | Cedar Hill | Fast Food Restaurant | American Restaurant | Pizza Place | Mexican Restaurant | Fried Chicken Joint | Burger Joint | Donut Shop | Seafood Restaurant | Italian Restaurant | Breakfast Spot | Chinese Restaurant | Sandwich Place | Food | CafV© | Wings Joint | Southern / Soul Food Restaurant | Sushi Restaurant | Tex-Mex Restaurant | Bakery | BBQ Joint |
| 4 | Coppell | Pizza Place | Fast Food Restaurant | American Restaurant | Sandwich Place | Mexican Restaurant | Bakery | Tex-Mex Restaurant | Burger Joint | Donut Shop | Indian Restaurant | Food | CafV© | BBQ Joint | Italian Restaurant | Japanese Restaurant | Mediterranean Restaurant | Vietnamese Restaurant | Middle Eastern Restaurant | Diner | Greek Restaurant |
| 5 | Dallas | Mexican Restaurant | Fast Food Restaurant | American Restaurant | Pizza Place | Sandwich Place | Burger Joint | Fried Chicken Joint | Taco Place | Italian Restaurant | Seafood Restaurant | BBQ Joint | Restaurant | Chinese Restaurant | Bakery | Steakhouse | New American Restaurant | Donut Shop | Breakfast Spot | Thai Restaurant | Diner |
| 6 | Desoto | Pizza Place | Donut Shop | Fast Food Restaurant | American Restaurant | Sandwich Place | Seafood Restaurant | Fried Chicken Joint | Burger Joint | Fish & Chips Shop | Mexican Restaurant | Wings Joint | Chinese Restaurant | Tex-Mex Restaurant | Bakery | Restaurant | Ethiopian Restaurant | Diner | Dumpling Restaurant | Food | Fondue Restaurant |
| 7 | Duncanville | Fast Food Restaurant | Pizza Place | American Restaurant | Fried Chicken Joint | Mexican Restaurant | Chinese Restaurant | Wings Joint | Seafood Restaurant | BBQ Joint | Italian Restaurant | Sandwich Place | Food | Donut Shop | Diner | Restaurant | Bagel Shop | Taco Place | Sushi Restaurant | Bakery | Burger Joint |
| 8 | Garland | Fast Food Restaurant | Mexican Restaurant | Pizza Place | Burger Joint | Chinese Restaurant | American Restaurant | Sandwich Place | Donut Shop | Fried Chicken Joint | Taco Place | Seafood Restaurant | Wings Joint | BBQ Joint | Restaurant | Vietnamese Restaurant | Italian Restaurant | Breakfast Spot | Food | Bakery | Sushi Restaurant |
| 9 | Grand Prairie | Fast Food Restaurant | Mexican Restaurant | Pizza Place | Fried Chicken Joint | Sandwich Place | Bakery | American Restaurant | Taco Place | BBQ Joint | Donut Shop | Wings Joint | Chinese Restaurant | Burger Joint | Restaurant | Italian Restaurant | Seafood Restaurant | Diner | Steakhouse | Food Stand | Food Court |
| 10 | Hutchins | Fast Food Restaurant | Food | American Restaurant | Sandwich Place | Truck Stop | Fried Chicken Joint | Wings Joint | Diner | Donut Shop | Dumpling Restaurant | Ethiopian Restaurant | Fish & Chips Shop | Fondue Restaurant | Food Stand | Food Court | Deli / Bodega | Food Truck | French Restaurant | Gastropub | German Restaurant |
| 11 | Irving | Mexican Restaurant | Fast Food Restaurant | Sandwich Place | Indian Restaurant | Pizza Place | American Restaurant | Fried Chicken Joint | Burger Joint | Asian Restaurant | Bakery | Restaurant | Chinese Restaurant | Breakfast Spot | Italian Restaurant | Deli / Bodega | Donut Shop | Japanese Restaurant | Brazilian Restaurant | Latin American Restaurant | Food |
| 12 | Lancaster | Fast Food Restaurant | Pizza Place | Wings Joint | Chinese Restaurant | CafV© | Fried Chicken Joint | Food | Mexican Restaurant | Food Truck | Burger Joint | Donut Shop | Taco Place | Italian Restaurant | Bakery | BBQ Joint | Asian Restaurant | American Restaurant | Gastropub | German Restaurant | Greek Restaurant |
| 13 | Mesquite | Fast Food Restaurant | Mexican Restaurant | American Restaurant | Pizza Place | Burger Joint | Sandwich Place | Fried Chicken Joint | Chinese Restaurant | BBQ Joint | Taco Place | Breakfast Spot | Donut Shop | Greek Restaurant | Italian Restaurant | Steakhouse | Diner | Restaurant | Deli / Bodega | Wings Joint | Seafood Restaurant |
| 14 | Richardson | Mexican Restaurant | Sandwich Place | Chinese Restaurant | Bakery | Burger Joint | American Restaurant | Mediterranean Restaurant | Fast Food Restaurant | Vietnamese Restaurant | Indian Restaurant | BBQ Joint | Pizza Place | Taco Place | CafV© | Italian Restaurant | Asian Restaurant | Donut Shop | Fried Chicken Joint | Breakfast Spot | Wings Joint |
| 15 | Rowlett | Fast Food Restaurant | Mexican Restaurant | Pizza Place | Sandwich Place | Chinese Restaurant | Fried Chicken Joint | Deli / Bodega | Restaurant | Burger Joint | Italian Restaurant | Greek Restaurant | Seafood Restaurant | Wings Joint | Asian Restaurant | BBQ Joint | American Restaurant | Thai Restaurant | Breakfast Spot | Vietnamese Restaurant | Donut Shop |
| 16 | Sachse | Burger Joint | Sandwich Place | Fast Food Restaurant | Fried Chicken Joint | Mexican Restaurant | Wings Joint | Breakfast Spot | Pizza Place | CafV© | Donut Shop | Food Truck | French Restaurant | Diner | Food Court | Gastropub | Food | Fondue Restaurant | Fish & Chips Shop | German Restaurant | Ethiopian Restaurant |
| 17 | Sunnyvale | American Restaurant | Sandwich Place | Italian Restaurant | Donut Shop | Food Truck | Mexican Restaurant | Sushi Restaurant | Wings Joint | Fondue Restaurant | Diner | Dumpling Restaurant | Ethiopian Restaurant | Fast Food Restaurant | Fish & Chips Shop | Food Stand | Food | Food Court | Deli / Bodega | French Restaurant | Fried Chicken Joint |
| 18 | Wilmer | Fast Food Restaurant | American Restaurant | Diner | Truck Stop | Sandwich Place | Pizza Place | Wings Joint | Food | Donut Shop | Dumpling Restaurant | Ethiopian Restaurant | Fish & Chips Shop | Fondue Restaurant | Food Court | Deli / Bodega | Food Stand | Food Truck | French Restaurant | Fried Chicken Joint | Gastropub |

The table above from Foursquare was built using "Food" as venue category. Foursquare breakdowns the Asian venue into its subclassifications such as Chinese, Asian, Thai, Indian, Japanese, and Korean. Hence, this tables cannot be reconciled with the count table that Foursquare produced earlier on. Furthermore, Coppell which has a 23.58 % Asian population, does not have an Asian or Chinese top 20 most common. However, it does have a Japanese and Vietnames restaurant in the top 20 most common. Likewise, Carrollton which has a 14.37% Asian population has more Korean, Japanese (Sushi) and Indian restaurants than Chinese and Asian.

Sachse has a large population of 20K and have a lower than average Asian population. Also, it is in the NE of Dallas.

## 3.6 Asian Venues Frequencies in Dallas County from Foursquare

| Neighborhood | 1st Most Common | 2nd Most Common | 3rd Most Common | 4th Most Common | 5th Most Common | 6th Most Common | 7th Most Common | 8th Most Common | 9th Most Common | 10th Most Common | 11th Most Common | 12th Most Common | 13th Most Common | 14th Most Common | 15th Most Common | 16th Most Common | 17th Most Common | 18th Most Common | 19th Most Common | 20th Most Common |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Addison | Asian Restaurant | Chinese Restaurant | Thai Restaurant | Sushi Restaurant | Japanese Restaurant | Vietnamese Restaurant | Korean Restaurant | Noodle House | Food Truck | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Wings Joint | Filipino Restaurant | Fast Food Restaurant | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Diner |
| Balch Springs | Chinese Restaurant | Asian Restaurant | Wings Joint | Filipino Restaurant | Karaoke Bar | Japanese Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Fast Food Restaurant | Vietnamese Restaurant | Diner | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Korean Restaurant | Mongolian Restaurant | New American Restaurant |
| Carrollton | Korean Restaurant | Asian Restaurant | Chinese Restaurant | Vietnamese Restaurant | Sushi Restaurant | Thai Restaurant | Ramen Restaurant | Japanese Restaurant | Karaoke Bar | Soup Place | Noodle House | Filipino Restaurant | Fried Chicken Joint | Food Truck | Wings Joint | Fast Food Restaurant | Himalayan Restaurant | Dim Sum Restaurant | Burmese Restaurant | Buffet |
| Cedar Hill | Asian Restaurant | Chinese Restaurant | Sushi Restaurant | Wings Joint | Filipino Restaurant | Japanese Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Diner | Fast Food Restaurant | Korean Restaurant | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Karaoke Bar | Mongolian Restaurant | Vietnamese Restaurant |
| Coppell | Vietnamese Restaurant | Chinese Restaurant | Japanese Restaurant | Asian Restaurant | Thai Restaurant | Sushi Restaurant | Peking Duck Restaurant | Filipino Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Wings Joint | Fast Food Restaurant | Karaoke Bar | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Diner |
| Dallas | Asian Restaurant | Chinese Restaurant | Sushi Restaurant | Thai Restaurant | Japanese Restaurant | Vietnamese Restaurant | Korean Restaurant | Ramen Restaurant | Noodle House | Food Truck | Fast Food Restaurant | Seafood Restaurant | Taiwanese Restaurant | Fried Chicken Joint | Sandwich Place | New American Restaurant | American Restaurant | Vegetarian / Vegan Restaurant | Poke Place | Szechuan Restaurant |
| Desoto | Chinese Restaurant | Thai Restaurant | Wings Joint | Fast Food Restaurant | Japanese Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Filipino Restaurant | Diner | Korean Restaurant | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Asian Restaurant | Karaoke Bar | Mongolian Restaurant | Vietnamese Restaurant |
| Duncanville | Chinese Restaurant | Asian Restaurant | Vietnamese Restaurant | Sushi Restaurant | Mongolian Restaurant | Burmese Restaurant | Buffet | Bakery | Dim Sum Restaurant | Korean Restaurant | Fast Food Restaurant | Filipino Restaurant | Food Truck | Fried Chicken Joint | Himalayan Restaurant | Indian Restaurant | Japanese Restaurant | Karaoke Bar | Diner | Wings Joint |
| Garland | Chinese Restaurant | Vietnamese Restaurant | Asian Restaurant | Sushi Restaurant | Thai Restaurant | Korean Restaurant | Tianjin Restaurant | Filipino Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Wings Joint | Fast Food Restaurant | Diner | Japanese Restaurant | Burmese Restaurant | Buffet | Bakery | Dim Sum Restaurant |
| Grand Prairie | Chinese Restaurant | Asian Restaurant | Japanese Restaurant | Filipino Restaurant | Sushi Restaurant | Wings Joint | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Diner | Fast Food Restaurant | Korean Restaurant | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Karaoke Bar | Mongolian Restaurant | Vietnamese Restaurant |
| Hutchins | Asian Restaurant | Sushi Restaurant | Wings Joint | Fast Food Restaurant | Japanese Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Filipino Restaurant | Diner | Korean Restaurant | Dim Sum Restaurant | Chinese Restaurant | Burmese Restaurant | Buffet | Bakery | Karaoke Bar | Mongolian Restaurant | Vietnamese Restaurant |
| Irving | Asian Restaurant | Chinese Restaurant | Thai Restaurant | Japanese Restaurant | Sushi Restaurant | Korean Restaurant | Vietnamese Restaurant | Indian Restaurant | Himalayan Restaurant | Sandwich Place | Bakery | Wings Joint | Dim Sum Restaurant | Diner | Fast Food Restaurant | Filipino Restaurant | Food Truck | Fried Chicken Joint | Burmese Restaurant | Buffet |
| Lancaster | Chinese Restaurant | Asian Restaurant | Wings Joint | Filipino Restaurant | Karaoke Bar | Japanese Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Fast Food Restaurant | Vietnamese Restaurant | Diner | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Korean Restaurant | Mongolian Restaurant | New American Restaurant |
| Mesquite | Chinese Restaurant | Japanese Restaurant | Asian Restaurant | Thai Restaurant | Sushi Restaurant | Wings Joint | Filipino Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Dim Sum Restaurant | Fast Food Restaurant | Diner | Korean Restaurant | Burmese Restaurant | Buffet | Bakery | Karaoke Bar | Mongolian Restaurant |
| Richardson | Asian Restaurant | Chinese Restaurant | Vietnamese Restaurant | Thai Restaurant | Japanese Restaurant | Sushi Restaurant | Korean Restaurant | Noodle House | Ramen Restaurant | Dim Sum Restaurant | Vegetarian / Vegan Restaurant | Buffet | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Wings Joint | Food Truck | Filipino Restaurant | Fast Food Restaurant | Burmese Restaurant |
| Rowlett | Chinese Restaurant | Asian Restaurant | Vietnamese Restaurant | Thai Restaurant | Filipino Restaurant | Karaoke Bar | Japanese Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Wings Joint | Fast Food Restaurant | Korean Restaurant | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Diner | Mongolian Restaurant |
| Sachse | Japanese Restaurant | Chinese Restaurant | Sushi Restaurant | Korean Restaurant | Wings Joint | Filipino Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Diner | Fast Food Restaurant | Dim Sum Restaurant | Burmese Restaurant | Buffet | Bakery | Asian Restaurant | Karaoke Bar | Mongolian Restaurant | Vietnamese Restaurant |
| Sunnyvale | Sushi Restaurant | Wings Joint | Fast Food Restaurant | Japanese Restaurant | Indian Restaurant | Himalayan Restaurant | Fried Chicken Joint | Food Truck | Filipino Restaurant | Diner | Korean Restaurant | Dim Sum Restaurant | Chinese Restaurant | Burmese Restaurant | Buffet | Bakery | Asian Restaurant | Karaoke Bar | Mongolian Restaurant | Vietnamese Restaurant |

The Asian venues frequency is built using the “Asian Restaurant” as venue category. Notice that all the neighborhoods that have Chinese and Asian restaurants below top 5, which is Desoto, Hutchins, Grand Prairie, Sachse, and Sunnyvale, all have a below average % of Asian populations.
Noticed that Foursquare returns Asian restaurant as a category and also Chinese restaurant which is a subcategory and also Dim Sum Restaurant which is a sub-subcategory.

A logical conclusion would be the way the individual venues classify themselves, and Foursquare stores that self-classification as a category in its database which does not align to its venue category hierarchy.

# 4. Interpreting the results

## 4.1 Classifications and definitions affects interpretation of results

Firstly, the term Asian cuisine is used loosely here to cover the wide range of cuisines found in the greater Asia and can include fusion for variety and to increase the offering. The definition of Asian cuisine encompasses a wide range of cooking practises and traditions and there is no enforcement on how the term is being used. Just in the Asia region alone, there is Chinese cuisine which varies greatly in taste and flavor at different locations, to exotic Japanese, the spicy Koreans, the countries in South Asia, and to western parts including India. As such, the definition of Asian cuisine will depend strictly on how it is defined by the source of the data.

However, if classification of the venue is dependent on interpretation of the venue owners or reviewers, then Asian venues could mean a venue that prepares and servers Asian food which could include curry, some sushi rolls, dim sum, spicy noodles and bbq beef. Then this would mean that there is a high amount of venues that falls under this category serving a wide range of Asian cuisine resulting in a higher frequency for Asian and Chinese venues.

## 4.2 Demographics

1. Most of the areas with an above average Asian population are located N, NE and NW of Dallas, and has a higher volume of Asian venues with respect to the overall venues count. The neighbourhood that has the highest ratio of Asian venues of 67%, Richardson, is also the home of the University of Texas Dallas which has reported that 30% of its 18,000 undergraduate students are Asian. These areas are worth exploring.

2. If an area has a very low population count, it will have a low count of venues and naturally a lower count of Asian venues, too. These areas can be considered low opportunity a high risk.

3. Specialty restaurants, especially Japanese, Korean and Vietnamese are generally lower in frequency except in certain areas which could potentially have more of such Asian population.

## 4.3 Conclusion

It appears that the Asian and Chinese venues do follow a demographics pattern. Neighbourhood with higher percentage of Asians population such as Addison, Coppell, Garland, Sachse, Richardson, and Rowlett are worth exploring.

The trend is for a restaurant to serve a wide range of Asian cuisines and classify itself Asian or Chinese restaurant.

Again, the data cannot be interpreted strictly and it should only be used as guide