# Capstone Project - The Battle of Neighborhoods

March 25, 2021

# 1 Capstone Project - The Battle of Neighborhoods (Week 2)

## 1.1 1.Introduction

Phoenix is the capital and most populous city in Arizona. As of 2019, the city has a population of 1680992. It is also the fifth-most populous city in the United States, the largest state capital by population, and the only state capital with a population of more than one million residents. Phoenix is the anchor of the Phoenix metropolitan area, also known as the Valley of the Sun, which in turn is part of the Salt River Valley. The metropolitan area is the 11th largest by population in the United States, with approximately 4.73 million people as of 2017. Phoenix is the seat of Maricopa County and the largest city in the state at 517.9 square miles. Phoenix ranks as one of the fastest-growing cities in the United States. Because of that, it is also a city with cultural diversity. Therefore, for this project, I want to find out where is the best location in Phoenix to open a Chinese restaurant. And where is the best place to stay if one prefers to eat Chinese cuisine?

## 1.2 2.Data

To answer the questions in part(1), we need data of Chinese restaurants in Phoenix. The name, location, and custom reviews of the restaurants. And use those information to determine the "best" location for open a new Chinese restaurant. In order to asset data, we use FourSquare and apply folium for visualizing a particular neighbor in which that we will observe customer "traffic" and predict an appropriate location of our restaurant in Phoenix.

**Import tools we need.**

```
[100]: import numpy as np # library to handle data in a vectorized manner

       import pandas as pd # library for data analsysis
       pd.set_option('display.max_columns', None)
       pd.set_option('display.max_rows', None)

       import requests # library to handle requests

       #from bs4 import BeautifulSoup
       import os

       !conda install -c conda-forge folium=0.5.0 --yes
       import folium # map rendering library
       from folium import plugins
```

```python
#!conda install -c conda-forge geopy --yes
from geopy.geocoders import Nominatim # convert an address into latitude and
 ↪longitude values
import requests # library to handle requests

# Matplotlib and associated plotting modules
import matplotlib.pyplot as plt
import matplotlib.cm as cm
import matplotlib.colors as colors
%matplotlib inline

import seaborn as sns


print('Libraries imported.')
```

```
Collecting package metadata (current_repodata.json): …working… done
Solving environment: …working… done

# All requested packages already installed.

Libraries imported.
```

**Enter Foursquare Client Information**

```python
[28]: CLIENT_ID = '4V11HW4VE3OW5403FB0QNCP15DQJPGWIC5WEJYTSY33SOOJI' # your
 ↪Foursquare ID
CLIENT_SECRET = 'VUMKL05U5KTKHWGZDQUE3BUTYTRSN00S4JPRRO3CGYLBGYWU' # your
 ↪Foursquare Secret
VERSION = '20180604' # Foursquare API version
```

**Use requests to get the latitude and longitude values of Phoenix and venus of our choice.**

```python
[91]: import requests

request_parameters = {
    "client_id": CLIENT_ID,
    "client_secret": CLIENT_SECRET,
    "v": '20210101',
    "query": "Chinese restaurant",
    "near": "Phoenix, AZ",
    "radius": 2000,
    "limit": 100}

data = requests.get("https://api.foursquare.com/v2/venues/explore",
 ↪params=request_parameters)
```

**Transform data into json then request geocode.**

```
[92]: d = data.json()["response"]
      d.keys()
```

```
[92]: dict_keys(['suggestedFilters', 'geocode', 'headerLocation',
      'headerFullLocation', 'headerLocationGranularity', 'query', 'totalResults',
      'suggestedBounds', 'groups'])
```

```
[93]: d["headerLocationGranularity"], d["headerLocation"], d["headerFullLocation"]
```

```
[93]: ('city', 'Phoenix', 'Phoenix')
```

```
[94]: d["suggestedBounds"], d["totalResults"]
      d["geocode"]
```

```
[94]: {'what': '',
       'where': 'phoenix az',
       'center': {'lat': 33.44838, 'lng': -112.07404},
       'displayString': 'Phoenix, AZ, United States',
       'cc': 'US',
       'geometry': {'bounds': {'ne': {'lat': 33.918391, 'lng': -111.92541},
         'sw': {'lat': 33.290259999999996, 'lng': -112.324065}}},
       'slug': 'phoenix-arizona',
       'longId': '72057594043236591'}
```

**Creating items of objects Chinese restaurants and their attributes, then testing it.**

```
[95]: items = d["groups"][0]["items"]
      print("number of items: %i" % len(items))
      items[0]
```

```
number of items: 20
```

```
[95]: {'reasons': {'count': 0,
         'items': [{'summary': 'This spot is popular',
           'type': 'general',
           'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '51a4187a498e776dbdf0a798',
        'name': 'Panda Express',
        'location': {'address': '401 E Jefferson St',
         'lat': 33.44568053769315,
         'lng': -112.0669919148652,
         'labeledLatLngs': [{'label': 'display',
           'lat': 33.44568053769315,
           'lng': -112.0669919148652}],
         'postalCode': '85004',
         'cc': 'US',
         'city': 'Phoenix',
```

```
          'state': 'AZ',
          'country': 'United States',
          'formattedAddress': ['401 E Jefferson St',
           'Phoenix, AZ 85004',
           'United States']},
        'categories': [{'id': '4bf58dd8d48988d145941735',
          'name': 'Chinese Restaurant',
          'pluralName': 'Chinese Restaurants',
          'shortName': 'Chinese',
          'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/asian_',
           'suffix': '.png'},
          'primary': True}],
        'photos': {'count': 0, 'groups': []}},
       'referralId': 'e-0-51a4187a498e776dbdf0a798-0'}
```

[96]: `items[1]`

```
[96]: {'reasons': {'count': 0,
        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '4bdb3ffb3904a593d077499e',
        'name': "Wong's Chinese Dining",
        'location': {'address': '1139 E Buckeye Rd',
         'crossStreet': 'at S 12th St',
         'lat': 33.436630125934,
         'lng': -112.05673011297367,
         'labeledLatLngs': [{'label': 'display',
           'lat': 33.436630125934,
           'lng': -112.05673011297367}],
         'postalCode': '85034',
         'cc': 'US',
         'city': 'Phoenix',
         'state': 'AZ',
         'country': 'United States',
         'formattedAddress': ['1139 E Buckeye Rd (at S 12th St)',
          'Phoenix, AZ 85034',
          'United States']},
        'categories': [{'id': '4bf58dd8d48988d145941735',
          'name': 'Chinese Restaurant',
          'pluralName': 'Chinese Restaurants',
          'shortName': 'Chinese',
          'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/asian_',
           'suffix': '.png'},
          'primary': True}],
        'delivery': {'id': '1763946',
         'url': 'https://www.grubhub.com/restaurant/wongs-chinese-dining-1139-east-
```

buckeye-road-phoenix/1763946?affiliate=1131&utm_source=foursquare-affiliate-
network&utm_medium=affiliate&utm_campaign=1131&utm_content=1763946',
    'provider': {'name': 'grubhub',
     'icon': {'prefix': 'https://fastly.4sqi.net/img/general/cap/',
      'sizes': [40, 50],
      'name': '/delivery_provider_grubhub_20180129.png'}}},
   'photos': {'count': 0, 'groups': []}},
  'referralId': 'e-0-4bdb3ffb3904a593d077499e-1'}

```python
df_raw = []
for item in items:
    venue = item["venue"]
    categories, uid, name, location = venue["categories"], venue["id"],
 ↪venue["name"], venue["location"]
    print(location)
    assert len(categories) == 1
    shortname = categories[0]["shortName"]
    address = ''
    if hasattr(location, 'address'):
      address = location['address']
    if not "postalCode" in location:
        continue
    postalcode = location["postalCode"]
    lat = location["lat"]
    lng = location["lng"]
    datarow = (uid, name, shortname, address, postalcode, lat, lng)
    df_raw.append(datarow)
df = pd.DataFrame(df_raw, columns=["uid", "name", "shortname", "address",
 ↪"postalcode", "lat", "lng"])
print("found %i cafes" % len(df))
df.head()
```

{'address': '401 E Jefferson St', 'lat': 33.44568053769315, 'lng':
-112.0669919148652, 'labeledLatLngs': [{'label': 'display', 'lat':
33.44568053769315, 'lng': -112.0669919148652}], 'postalCode': '85004', 'cc':
'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States',
'formattedAddress': ['401 E Jefferson St', 'Phoenix, AZ 85004', 'United
States']}
{'address': '1139 E Buckeye Rd', 'crossStreet': 'at S 12th St', 'lat':
33.436630125934, 'lng': -112.05673011297367, 'labeledLatLngs': [{'label':
'display', 'lat': 33.436630125934, 'lng': -112.05673011297367}], 'postalCode':
'85034', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United
States', 'formattedAddress': ['1139 E Buckeye Rd (at S 12th St)', 'Phoenix, AZ
85034', 'United States']}
{'address': '302 E Flower St', 'crossStreet': 'at N 3rd St', 'lat':
33.48586836799868, 'lng': -112.06903472542763, 'labeledLatLngs': [{'label':
'display', 'lat': 33.48586836799868, 'lng': -112.06903472542763}, {'label':

'entrance', 'lat': 33.485778, 'lng': -112.069076}], 'postalCode': '85012', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['302 E Flower St (at N 3rd St)', 'Phoenix, AZ 85012', 'United States']]}
{'address': '1502 W Thomas Rd', 'crossStreet': 'at N 15th Ave', 'lat': 33.4807100002017, 'lng': -112.09173677364059, 'labeledLatLngs': [{'label': 'display', 'lat': 33.4807100002017, 'lng': -112.09173677364059}, {'label': 'entrance', 'lat': 33.480665, 'lng': -112.09169}], 'postalCode': '85015', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['1502 W Thomas Rd (at N 15th Ave)', 'Phoenix, AZ 85015', 'United States']]}
{'lat': 33.43923672861721, 'lng': -112.0735298712004, 'labeledLatLngs': [{'label': 'display', 'lat': 33.43923672861721, 'lng': -112.0735298712004}], 'postalCode': '85041', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['Phoenix, AZ 85041', 'United States']]}
{'address': '1714 E Broadway Rd', 'lat': 33.40704408256393, 'lng': -112.04421566726634, 'labeledLatLngs': [{'label': 'display', 'lat': 33.40704408256393, 'lng': -112.04421566726634}], 'postalCode': '85040', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['1714 E Broadway Rd', 'Phoenix, AZ 85040', 'United States']]}
{'address': '998 E Indian School Rd', 'crossStreet': 'at N 10th St', 'lat': 33.49504128170082, 'lng': -112.06132086071646, 'labeledLatLngs': [{'label': 'display', 'lat': 33.49504128170082, 'lng': -112.06132086071646}], 'postalCode': '85014', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['998 E Indian School Rd (at N 10th St)', 'Phoenix, AZ 85014', 'United States']]}
{'address': '2801 N Central Ave', 'lat': 33.47907, 'lng': -112.073306, 'labeledLatLngs': [{'label': 'entrance', 'lat': 33.479302, 'lng': -112.073394}, {'label': 'display', 'lat': 33.47907, 'lng': -112.073306}], 'postalCode': '85004', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['2801 N Central Ave', 'Phoenix, AZ 85004', 'United States']]}
{'address': '545 W Thomas Rd', 'crossStreet': 'at 7th Ave', 'lat': 33.48020911555612, 'lng': -112.08261777656587, 'labeledLatLngs': [{'label': 'display', 'lat': 33.48020911555612, 'lng': -112.08261777656587}, {'label': 'entrance', 'lat': 33.480204, 'lng': -112.082479}], 'postalCode': '85013', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['545 W Thomas Rd (at 7th Ave)', 'Phoenix, AZ 85013', 'United States']]}
{'address': '935 W Southern Ave', 'crossStreet': '7th Avenue and Southern', 'lat': 33.39174270629883, 'lng': -112.08470153808594, 'labeledLatLngs': [{'label': 'display', 'lat': 33.39174270629883, 'lng': -112.08470153808594}], 'postalCode': '85041', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['935 W Southern Ave (7th Avenue and Southern)', 'Phoenix, AZ 85041', 'United States']]}
{'address': '3302 W Thomas Rd', 'lat': 33.480916, 'lng': -112.130715, 'labeledLatLngs': [{'label': 'display', 'lat': 33.480916, 'lng': -112.130715},

{'label': 'entrance', 'lat': 33.480822, 'lng': -112.130728}], 'postalCode': '85017', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['3302 W Thomas Rd', 'Phoenix, AZ 85017', 'United States']]}
{'address': '914 E Camelback Rd', 'crossStreet': 'at 10th Pl.', 'lat': 33.509861584349466, 'lng': -112.06114123201033, 'labeledLatLngs': [{'label': 'display', 'lat': 33.509861584349466, 'lng': -112.06114123201033}, {'label': 'entrance', 'lat': 33.509733, 'lng': -112.060978}], 'postalCode': '85014', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['914 E Camelback Rd (at 10th Pl.)', 'Phoenix, AZ 85014', 'United States']]}
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{'address': '1520 W Indian School Rd Ste 1', 'crossStreet': '15th Ave', 'lat': 33.495492, 'lng': -112.092242, 'labeledLatLngs': [{'label': 'display', 'lat': 33.495492, 'lng': -112.092242}], 'postalCode': '85015', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['1520 W Indian School Rd Ste 1 (15th Ave)', 'Phoenix, AZ 85015', 'United States']]}
{'address': '3400 W Van Buren St', 'lat': 33.451025, 'lng': -112.133544, 'labeledLatLngs': [{'label': 'display', 'lat': 33.451025, 'lng': -112.133544}, {'label': 'entrance', 'lat': 33.451128, 'lng': -112.133483}], 'postalCode': '85009', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['3400 W Van Buren St', 'Phoenix, AZ 85009', 'United States']]}
{'address': '2939 N 24th St', 'lat': 33.481879, 'lng': -112.02988400000001, 'labeledLatLngs': [{'label': 'display', 'lat': 33.481879, 'lng': -112.02988400000001}], 'postalCode': '85016', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['2939 N 24th St', 'Phoenix, AZ 85016', 'United States']]}
{'address': '5219 S 7th St', 'lat': 33.398832, 'lng': -112.064353, 'labeledLatLngs': [{'label': 'display', 'lat': 33.398832, 'lng': -112.064353}, {'label': 'entrance', 'lat': 33.39883, 'lng': -112.06442}], 'postalCode': '85040', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['5219 S 7th St', 'Phoenix, AZ 85040', 'United States']]}
{'address': '4515 N 7th Ave', 'lat': 33.50276513136434, 'lng': -112.08219860422271, 'labeledLatLngs': [{'label': 'display', 'lat': 33.50276513136434, 'lng': -112.08219860422271}, {'label': 'entrance', 'lat': 33.502684, 'lng': -112.082223}], 'postalCode': '85013', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['4515 N 7th Ave', 'Phoenix, AZ 85013', 'United States']]}
{'address': '220 E Southern Ave', 'lat': 33.39250946044922, 'lng': -112.0709457397461, 'labeledLatLngs': [{'label': 'display', 'lat': 33.39250946044922, 'lng': -112.0709457397461}], 'postalCode': '85040', 'cc':

'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States',
'formattedAddress': ['220 E Southern Ave', 'Phoenix, AZ 85040', 'United
States']}
{'address': '6044 S 16th St', 'lat': 33.391441345214844, 'lng':
-112.04911804199219, 'labeledLatLngs': [{'label': 'display', 'lat':
33.391441345214844, 'lng': -112.04911804199219}], 'postalCode': '85042', 'cc':
'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States',
'formattedAddress': ['6044 S 16th St', 'Phoenix, AZ 85042', 'United States']}
found 20 cafes

```
[97]:                      uid                                    name shortname  \
      0  51a4187a498e776dbdf0a798                        Panda Express   Chinese
      1  4bdb3ffb3904a593d077499e                  Wong's Chinese Dining   Chinese
      2  413ba880f964a520311b1fe3                          China Chili   Chinese
      3  4b58bbdaf964a520206828e3                               Mu Shu   Chinese
      4  5101ca8de4b02714c07746df  New Garden Chinese Central & Hadley   Chinese

        address postalcode        lat         lng
      0             85004  33.445681  -112.066992
      1             85034  33.436630  -112.056730
      2             85012  33.485868  -112.069035
      3             85015  33.480710  -112.091737
      4             85041  33.439237  -112.073530
```

```
[98]: Phoenix_center = d["geocode"]["center"]
      Phoenix_center
```

```
[98]: {'lat': 33.44838, 'lng': -112.07404}
```

### 1.2.1 Print a heat map of Chinese restaurants in the center of Phoenix.

Get coordinates of Phoenix and create folium map to help us visualize the customer flow distribution.

```
[142]: map_Phoenix = folium.Map(location=[33.44838, -112.07404], zoom_start=12)


       def add_markers(df):
           for (j, row) in df.iterrows():
               label = folium.Popup(row["name"], parse_html=True)
               folium.CircleMarker(
                   [row["lat"], row["lng"]],
                   radius=5,
                   popup=label,
                   color='red',
                   fill=True,
                   fill_color='#3186cc',
                   fill_opacity=0.7,
                   parse_html=False).add_to(map_Phoenix)
```
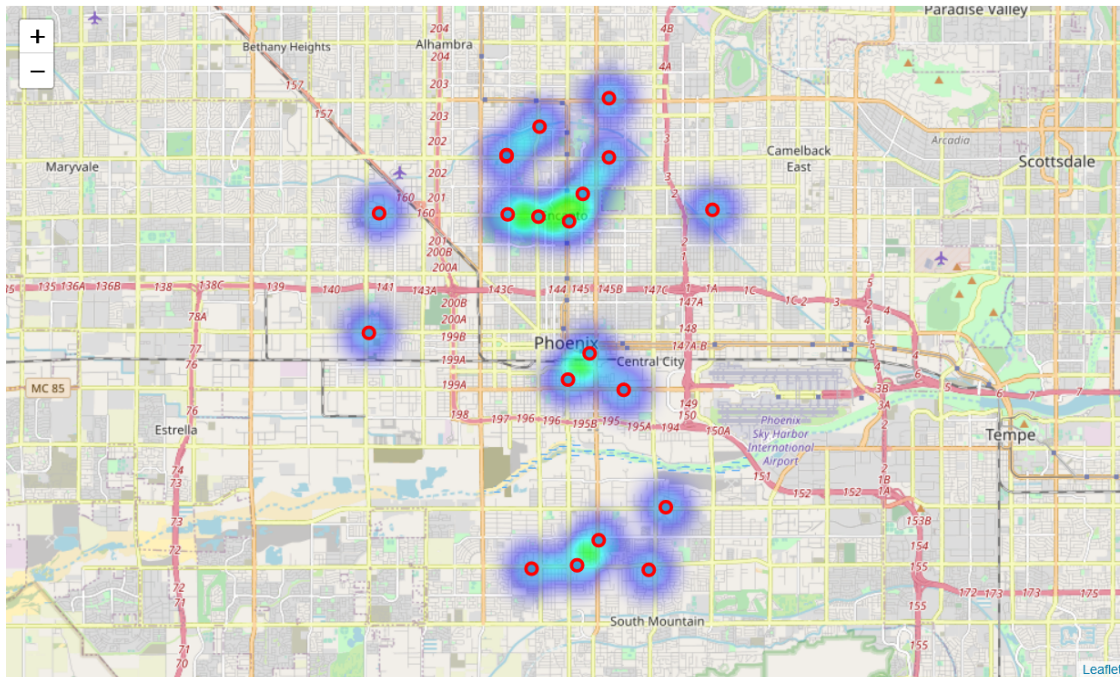
```
add_markers(df)
hm_data = df[["lat", "lng"]].to_numpy().tolist()
map_Phoenix.add_child(plugins.HeatMap(hm_data))

map_Phoenix
```

[142]: <folium.folium.Map at 0x26531a88d00>



####

Phoenix_map_1 From the map above, we can see there are three main Chinese restaurants clusters in Phoenix. The one at the top of the map has the most customer distribution and the highest density of restaurants. Therefore, I think it is the best area for us to open a new restaurant.

[139]: ```
df
```

[139]:

| | uid | name |
|---|---|---|
| 0 | 51a4187a498e776dbdf0a798 | Panda Express |
| 1 | 4bdb3ffb3904a593d077499e | Wong's Chinese Dining |
| 2 | 413ba880f964a520311b1fe3 | China Chili |
| 3 | 4b58bbdaf964a520206828e3 | Mu Shu |
| 4 | 5101ca8de4b02714c07746df | New Garden Chinese Central & Hadley |
| 5 | 4dc1ab68b0fb1c18ee68f129 | Tams Chinese And Mexican Food |
| 6 | 4e89be544901b86fc2a4ecd8 | Panda Express |
| 7 | 59094803898bdc1a41d0bfe9 | Siu Wok |
| 8 | 4b634324f964a5204f6e2ae3 | Long Wong's |
| 9 | 5cda25a465211f002c28dccb | Panda Express |
| 10 | 4c16b1e074fb20a115845012 | Shanghai Express |
| 11 | 4b33c0fcf964a520841e25e3 | Tokyo Express |

9

```
12  4f32763c19836c91c7da20da                        China City Restaurant
13  4e68157d14952e0a132c2202                             Lucky Kitchen
14  4c3676c92c8020a168718700                                China Star
15  4c2128983389c9b605594ffb                     New China Super Buffet
16  4e02c1396284217c7f10bb01                        Wongs Chinese Food
17  4da6687cf7b192b4866cd6bf                   South China BBQ HK Style
18  4e7ba90ca809dd77188623ef                                  King Wah
19  4ce6c802e1eeb60c70f498ae  New China Restaurant (16th St/Southern)


    shortname address postalcode       lat         lng
0     Chinese                 85004  33.445681  -112.066992
1     Chinese                 85034  33.436630  -112.056730
2     Chinese                 85012  33.485868  -112.069035
3     Chinese                 85015  33.480710  -112.091737
4     Chinese                 85041  33.439237  -112.073530
5     Chinese                 85040  33.407044  -112.044216
6     Chinese                 85014  33.495041  -112.061321
7     Chinese                 85004  33.479070  -112.073306
8     Chinese                 85013  33.480209  -112.082618
9     Chinese                 85041  33.391743  -112.084702
10    Chinese                 85017  33.480916  -112.130715
11    Chinese                 85014  33.509862  -112.061141
12    Chinese                 85015  33.495277  -112.092285
13    Chinese                 85015  33.495492  -112.092242
14    Chinese                 85009  33.451025  -112.133544
15    Chinese                 85016  33.481879  -112.029884
16    Chinese                 85040  33.398832  -112.064353
17    Chinese                 85013  33.502765  -112.082199
18    Chinese                 85040  33.392509  -112.070946
19    Chinese                 85042  33.391441  -112.049118
```

### 1.2.2  Finding the Location of Our Restaurant

With coordinates that close to each other, we can treat the Earth as being locally flat and simply find the centroid as though they were planar coordinates. Then could simply take the average of the latitudes and the average of the longitudes to find the latitude and longitude of the centroid. Since there are only eight restaurants in the first cluster, I manually generated two lists contain the latitude and longtitude of those restaurants. And calculated the latitude and longtitude of their midpoint.

```
[140]: lat = []
       long = []
       lat.append(float(df[df["name"] == "South China BBQ HK Style"]["lat"]))
       lat.append(float(df[df["name"] == "Lucky Kitchen"]["lat"]))
       lat.append(float(df[df["name"] == "Mu Shu"]["lat"]))
       lat.append(float(df[df["name"] == "Siu Wok"]["lat"]))
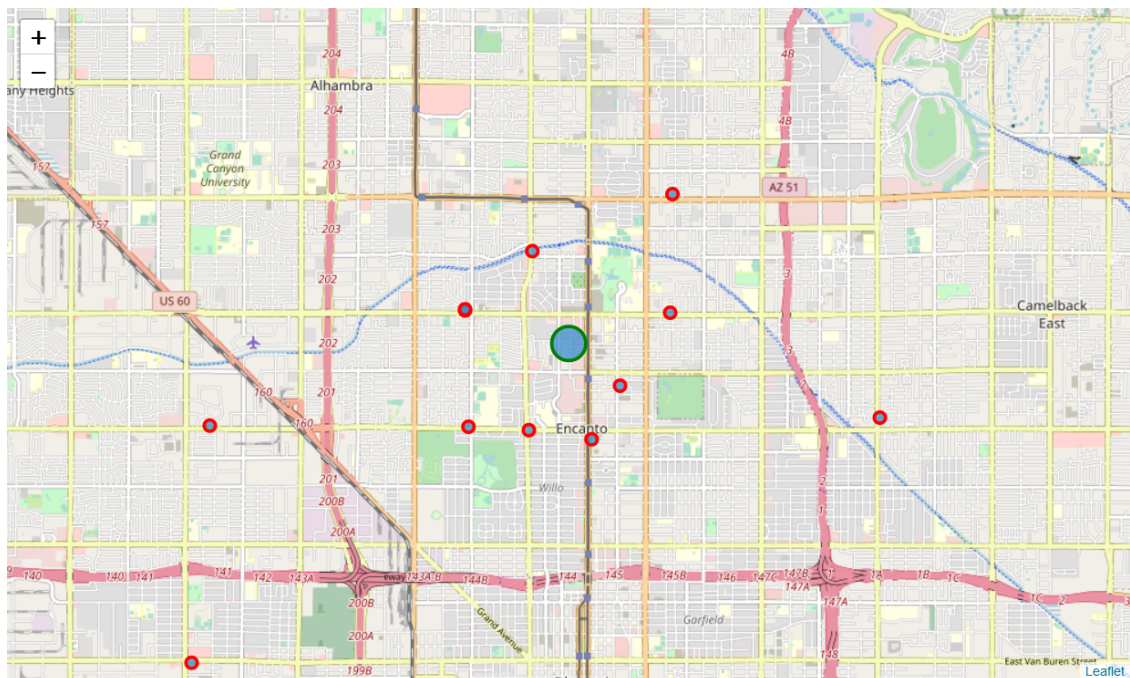       lat.append(float(df[df["name"] == "China Chili"]["lat"]))
```

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```
lat.append(float(df[df["name"] == "Tokyo Express"]["lat"]))
lat.append(float(df[df["name"] == "Long Wong's"]["lat"]))
lat.append(float(df[df["uid"] == "4e89be544901b86fc2a4ecd8"]["lat"]))
long.append(float(df[df["name"] == "South China BBQ HK Style"]["lng"]))
long.append(float(df[df["name"] == "Lucky Kitchen"]["lng"]))
long.append(float(df[df["name"] == "Mu Shu"]["lng"]))
long.append(float(df[df["name"] == "Siu Wok"]["lng"]))
long.append(float(df[df["name"] == "China Chili"]["lng"]))
long.append(float(df[df["name"] == "Tokyo Express"]["lng"]))
long.append(float(df[df["name"] == "Long Wong's"]["lng"]))
long.append(float(df[df["uid"] == "4e89be544901b86fc2a4ecd8"]["lng"]))

print("The location of the midpoint of the heat map is:", sum(lat)/len(lat),␣
 ↪sum(long)/len(long))
```

```
The location of the midpoint of the heat map is: 33.49112718514639
-112.07669974657294
```

## 1.3 Result



The blue bubble on the map indicates the final result.

**Plot the location of our restaruant on map**

```
[141]: lat = 33.49112718514639
       lng = -112.07669974657294
       map_Phoenix = folium.Map(location=[lat, lng], zoom_start=13)
       add_markers(df)
       folium.CircleMarker(
```

```
        [lat, lng],
        radius=15,
        popup="Our New Restaruant",
        color='green',
        fill=True,
        fill_color='#3186cc',
        fill_opacity=0.7,
        parse_html=False).add_to(map_Phoenix)

map_Phoenix
```

[141]: `<folium.folium.Map at 0x26531a13760>`

**Phoenix_map_2**

## 1.4 Discussion

Use Google Map to check the location: https://www.google.com/maps/place/33%C2%B029'28.1%22N+112%C2%..
112.0780428,17.25z/. I found it is surrounded by three hotels. So the location could have a large
number of potential users. And it is safe as well since it is also next to a bank.

## 1.5 Conclusion

In this study, I used FourSquare to collect data of existing Chinese restaurants and apply
folium for visualizing a particular neighbor in Phoenix. By using visualization method, I found
[33.49112718514639, -112.07669974657294] as my final location. And combining the information
I found on Google map, I could conclude that it is a great location for openning a new Chinese
restaurant in Phoenix.

[ ]: