The Battle of Neighborhoods - Open a Chinese restaurant in Phoenix

Linpeng Sun

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1 Introduction

1.1 Background

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.

1.2 Problem

One way to collect data of venus of a city is by using FourSquare API. The Foursquare Places API provides location based experiences with diverse information about venues, users, photos, and check-ins. The API supports real time access to places, Snap-to-Place that assigns users to specific locations, and Geo-tag. Additionally, Foursquare allows developers to build audience segments for analysis and measurement. JSON is the preferred response format. For this project, 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.

2 Data

2.1 Data sources

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assigns users to specific locations, and Geo-tag. Additionally, Foursquare allows developers to build audience segments for analysis and measurement. JSON is the preferred response format. For this project, 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.

2.2 Data selection

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 by apply folium for visualizing a particular neighbor in which that we will observe customer "traffic".

2.3 Data cleaning

After entered the location information of Phoenix, I got 20 venues information about Chinese restaurants near the center of Phoenix. Then I stored the information of those restaurants in items.

We start creating group including information which is recommended. And create items of objects Chinese restaurants and their attributes - id, address, name, etc. Testing the item[0]:


```
{'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'}
```


Figure 1: item[0]

From the output we can identify necessary factors of what we will use later to consider

the probability of launching our up-to-coming location. Based on that we start to organize what we have got.

```
df.head()
```


```
{'address': '401 E Jefferson St', 'lat': 33.44568053769315, 'lng': -112.0669919148652,
display', 'lat': 33.44568053769315, 'lng': -112.0669919148652}], 'postalCode': '85004',
', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['401 E Jefferson St'
States']}
{'address': '1139 E Buckeye Rd', 'crossStreet': 'at S 12th St', 'lat': 33.436630125934,
labeledLatLngs': [{'label': 'display', 'lat': 33.436630125934, 'lng': -112.056730112973
cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddr
S 12th St)', 'Phoenix, AZ 85034', 'United States']}
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abeledLatLngs': [{'label': 'display', 'lat': 33.48586836799868, 'lng': -112.06903472542
at': 33.485778, 'lng': -112.069076}], 'postalCode': '85012', 'cc': 'US', 'city': 'Phoen
'United States', 'formattedAddress': ['302 E Flower St (at N 3rd St)', 'Phoenix, AZ 850
{'address': '1502 W Thomas Rd', 'crossStreet': 'at N 15th Ave', 'lat': 33.4807100002017
'labeledLatLngs': [{'label': 'display', 'lat': 33.4807100002017, 'lng': -112.0917367736
lat': 33.480665, 'lng': -112.09169}], 'postalCode': '85015', 'cc': 'US', 'city': 'Phoen
'United States', 'formattedAddress': ['1502 W Thomas Rd (at N 15th Ave)', 'Phoenix, AZ
{'lat': 33.43923672861721, 'lng': -112.0735298712004, 'labeledLatLngs': [{'label': 'dis
1, 'lng': -112.0735298712004}], 'postalCode': '85041', 'cc': 'US', 'city': 'Phoenix', '
ed States', 'formattedAddress': ['Phoenix, AZ 85041', 'United States']}
{'address': '1714 E Broadway Rd', 'lat': 33.40704408256393, 'lng': -112.04421566726634,
'display', 'lat': 33.40704408256393, 'lng': -112.04421566726634}], 'postalCode': '8504(
x', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['1714 E Broadway Rd
d States']}
{'address': '998 E Indian School Rd', 'crossStreet': 'at N 10th St', 'lat': 33.4950412
1646, 'labeledLatLngs': [{'label': 'display', 'lat': 33.49504128170082, 'lng': -112.061
85014', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'form
School Rd (at N 10th St)', 'Phoenix, AZ 85014', 'United States']}
{'address': '2801 N Central Ave', 'lat': 33.47907, 'lng': -112.073306, 'labeledLatLngs'
': 33.479302, 'lng': -112.073394}, {'label': 'display', 'lat': 33.47907, 'lng': -112.07
'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAdd
'Phoenix, AZ 85004', 'United States']}
{'address': '545 W Thomas Rd', 'crossStreet': 'at 7th Ave', 'lat': 33.48020911555612, '
beledLatLngs': [{'label': 'display', 'lat': 33.48020911555612, 'lng': -112.082617776565
t': 33.480204, 'lng': -112.082479}], 'postalCode': '85013', 'cc': 'US', 'city': 'Phoeni
cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAddr
S 12th St)', 'Phoenix, AZ 85034', 'United States']}
{'address': '302 E Flower St', 'crossStreet': 'at N 3rd St', 'lat': 33.48586836799868,
abeledLatLngs': [{'label': 'display', 'lat': 33.48586836799868, 'lng': -112.06903472542
at': 33.485778, 'lng': -112.069076}], 'postalCode': '85012', 'cc': 'US', 'city': 'Phoen
'United States', 'formattedAddress': ['302 E Flower St (at N 3rd St)', 'Phoenix, AZ 850
{'address': '1502 W Thomas Rd', 'crossStreet': 'at N 15th Ave', 'lat': 33.4807100002017
'labeledLatLngs': [{'label': 'display', 'lat': 33.4807100002017, 'lng': -112.0917367736
lat': 33.480665, 'lng': -112.09169}], 'postalCode': '85015', 'cc': 'US', 'city': 'Phoen
'United States', 'formattedAddress': ['1502 W Thomas Rd (at N 15th Ave)', 'Phoenix, AZ
{'lat': 33.43923672861721, 'lng': -112.0735298712004, 'labeledLatLngs': [{'label': 'dis
1, 'lng': -112.0735298712004}], 'postalCode': '85041', 'cc': 'US', 'city': 'Phoenix', '
ed States', 'formattedAddress': ['Phoenix, AZ 85041', 'United States']}
{'address': '1714 E Broadway Rd', 'lat': 33.40704408256393, 'lng': -112.04421566726634,
'display', 'lat': 33.40704408256393, 'lng': -112.04421566726634}], 'postalCode': '8504(
x', 'state': 'AZ', 'country': 'United States', 'formattedAddress': ['1714 E Broadway Rd
d States']}
{'address': '998 E Indian School Rd', 'crossStreet': 'at N 10th St', 'lat': 33.4950412
1646, 'labeledLatLngs': [{'label': 'display', 'lat': 33.49504128170082, 'lng': -112.061
85014', 'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'form
School Rd (at N 10th St)', 'Phoenix, AZ 85014', 'United States']}
{'address': '2801 N Central Ave', 'lat': 33.47907, 'lng': -112.073306, 'labeledLatLngs'
': 33.479302, 'lng': -112.073394}, {'label': 'display', 'lat': 33.47907, 'lng': -112.07
'cc': 'US', 'city': 'Phoenix', 'state': 'AZ', 'country': 'United States', 'formattedAdd
'Phoenix, AZ 85004', 'United States']}
{'address': '545 W Thomas Rd', 'crossStreet': 'at 7th Ave', 'lat': 33.48020911555612, '
beledLatLngs': [{'label': 'display', 'lat': 33.48020911555612, 'lng': -112.082617776565
t': 33.480204, 'lng': -112.082479}], 'postalCode': '85013', 'cc': 'US', 'city': 'Phoeni
```


As we can see that there are many restaurants without address, so we need to execute hasattr() to determine if each object (restaurants) has a attribute (address). Then we will execute a very important part - get coordinates of Phoenix and create folium map which will help visualize what we have got from data.

3 Data Analysis

3.1 Folium visualization

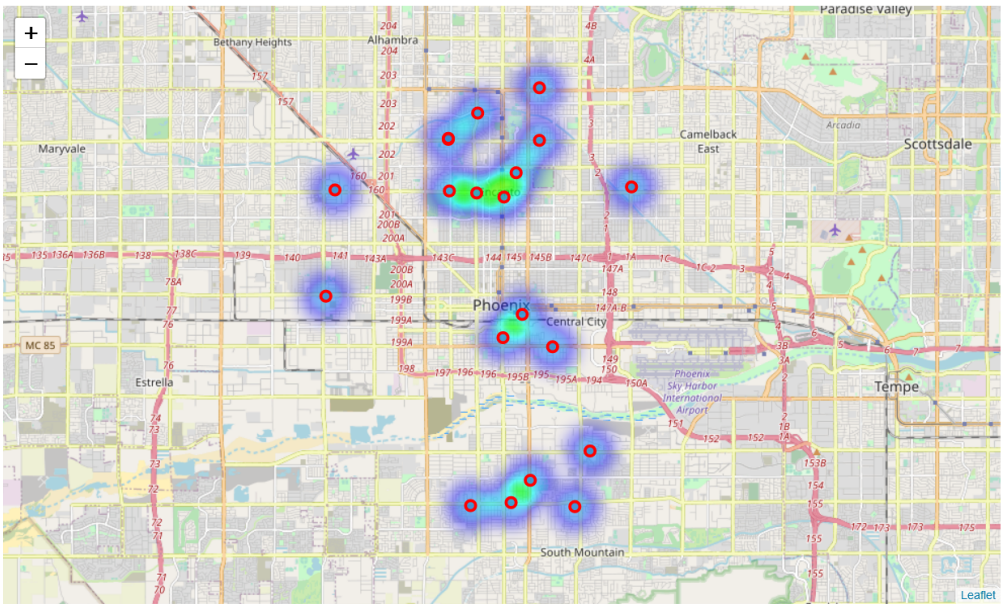

Figure 2: "Traffic" map of Chinese restaurants in Phoenix.

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.

3.2 Determining 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.

4 Results

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

The blue bubble on the map indicates the final result.

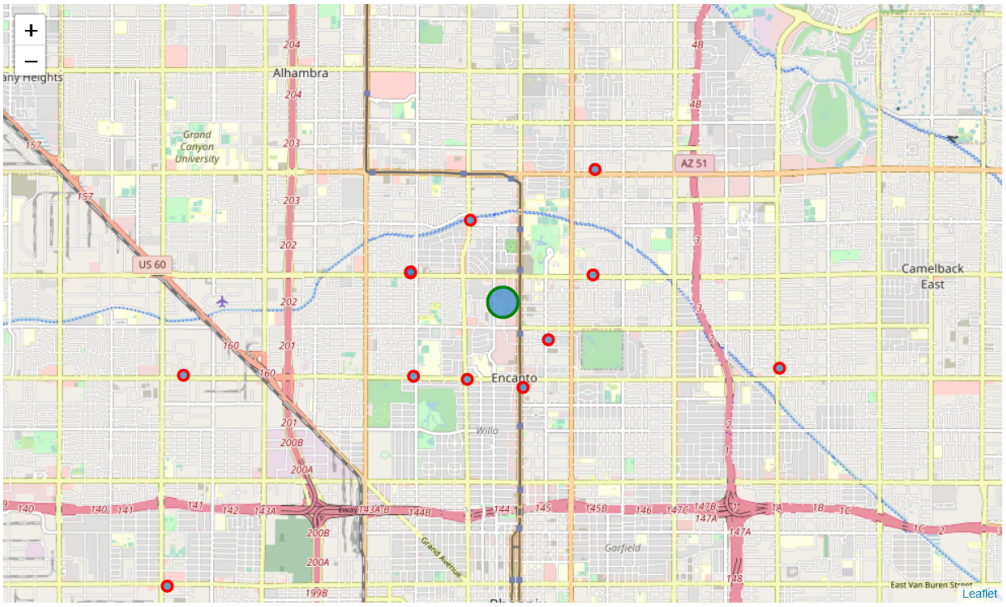

Figure 3: First 6 rows of the stock yield of Alphabet Inc. The first row is missing because the profit is calculated by the difference of stock data between each day.

5 Discussion

Use Google Map to check the location: www.google.com/maps. 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.

6 Conclusions

In this study, I used FourSquare to collect data of existing Chinese restaurants and apply folium for visualizing a particular neighbour 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 opening a new Chinese restaurant in Phoenix.