# BOBA Drink exploration in Bay Area

In [54]:
```
import pandas as pd
import io
import requests
import lxml
import numpy as np
import folium
from sklearn.cluster import KMeans
from pandas.io.json import json_normalize # tranform JSON file into a panda
from geopy.geocoders import Nominatim # convert an address into latitude an

from IPython.display import Image
from IPython.core.display import HTML

import matplotlib.cm as cm
import matplotlib.colors as colors
```

In [1]:
```
# Hidden cell
CLIENT_ID = '' # your Foursquare ID
CLIENT_SECRET = '' # your Foursquare Secret
ACCESS_TOKEN = '' # your FourSquare Access Token
VERSION = '20180604'
LIMIT = 30
print('Your credentails:')
print('CLIENT_ID: ' + CLIENT_ID)
print('CLIENT_SECRET:' + CLIENT_SECRET)
```

```
Your credentails:
CLIENT_ID:
CLIENT_SECRET:
```

In [133]:
```
# Specify the location of our data point
address = 'Sunnyvale, CA'

geolocator = Nominatim(user_agent="foursquare_agent")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of Bay area, California {}, {}.'.format(l
```

```
The geograpical coordinate of Bay area, California 37.3688301, -122.03634
96.
```

In [134]:
```
# Generate a foursquare query for RESTAURANTS in the area
search_query = 'boba'
radius = 2000000
# url = 'https://api.foursquare.com/v2/venues/search?client_id={}&client_se
url = ''

# Get our result return from the foursqaure dbase
results = requests.get(url).json()
v=results['response']['venues']   # extract the result from json file
dframe = json_normalize(v)  # normalize our result with json normalize func
```

```
<ipython-input-134-9552f13398e9>:11: FutureWarning: pandas.io.json.json_n
ormalize is deprecated, use pandas.json_normalize instead
  dframe = json_normalize(v)  # normalize our result with json normalize
function
```

In [135]:
```
# keep only columns that include venue name, and anything that is associate
filtered_columns = ['name', 'categories'] + [col for col in dframe.columns
dataframe_filtered = dframe.loc[:, filtered_columns]

# function that extracts the category of the venue
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return categories_list[0]['name']

# filter the category for each row
dataframe_filtered['categories'] = dataframe_filtered.apply(get_category_ty

# clean column names by keeping only last term
dataframe_filtered.columns = [column.split('.')[-1] for column in dataframe

# dataframe_filtered
```

In [136]:
```
df = dataframe_filtered[['name', 'categories','address','lat','lng', 'posta
```

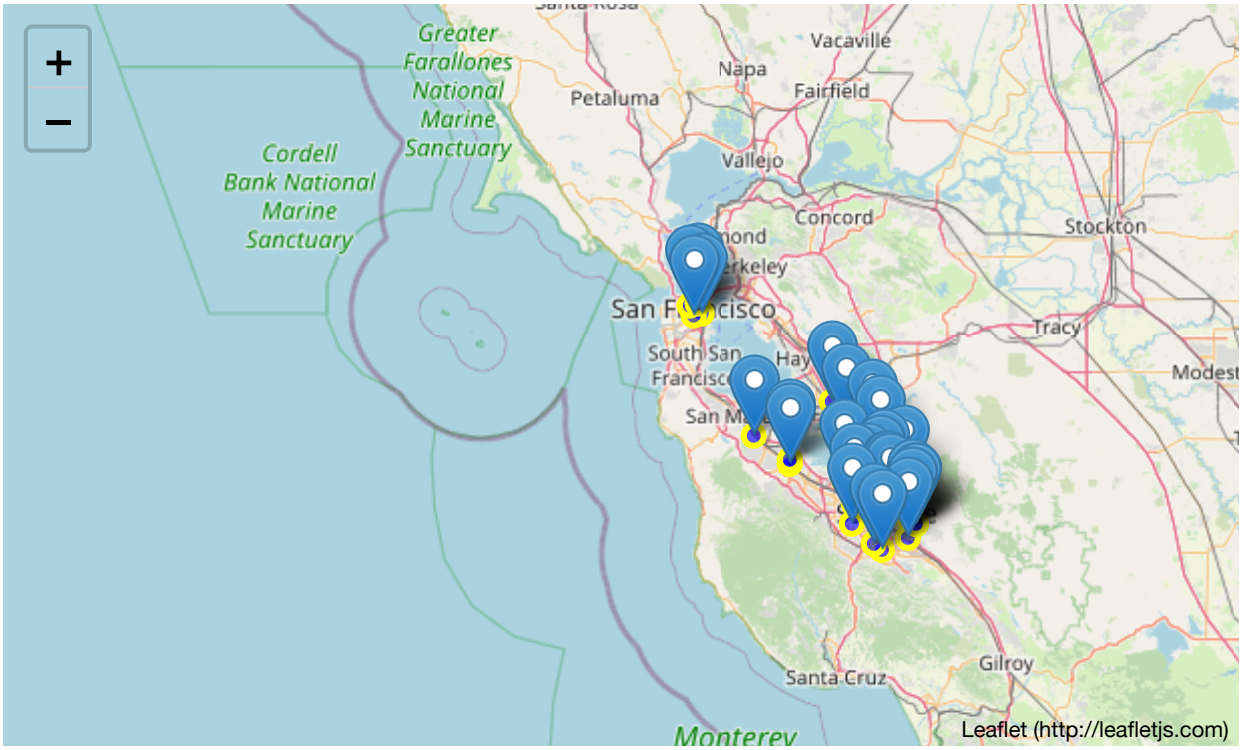
In [137]:
```
df.head()
```

Out[137]:

| | name | categories | address | lat | lng | postalCode | formattedAddress | |
|---|---|---|---|---|---|---|---|---|
| **0** | Boba Bar Teahouse & Eatery | Bubble Tea Shop | 310 S 3rd St | 37.332368 | -121.884731 | 95112 | [310 S 3rd St (at E San Carlos St), San Jose, ... | 53cf2ef34 |
| **1** | Boba Guys | Bubble Tea Shop | 855 El Camino Real #120 | 37.438476 | -122.159122 | 94301 | [855 El Camino Real #120, Palo Alto, CA 94301] | 5c3518fd2 |
| **2** | Boba Drive | Bubble Tea Shop | NaN | 37.403202 | -122.008931 | 94089 | [Sunnyvale, CA 94089] | 5c561c556 |
| **3** | Boba Guys | Bubble Tea Shop | 1002 16th St | 37.766448 | -122.397042 | 94107 | [1002 16th St (at Missouri St), San Francisco,... | 58d451f49 |
| **4** | Boba | Coffee Shop | 1710 N Milpitas Blvd | 37.455524 | -121.910233 | 95035 | [1710 N Milpitas Blvd, Milpitas, CA 95035] | 4f32367a1 |

In [138]:
```
sanjose_map = folium.Map(location=[latitude, longitude], zoom_start=12)


incidents = folium.map.FeatureGroup()

for lat, lng, in zip(df.lat, df.lng):
    incidents.add_child(
        folium.features.CircleMarker(
            [lat, lng],
            radius=5,
            color='yellow',
            fill=True,
            fill_color='blue',
            fill_opacity=0.6
        )
    )

# add pop-up text to each marker on the map
latitudes = df.lat
longitudes = df.lng
label = df.categories

for lat, lng, label in zip(latitudes, longitudes, label):
    folium.Marker([lat, lng], popup=label).add_to(sanjose_map)

# add incidents to map
sanjose_map.add_child(incidents)
```

Out[138]:




In [139]:
```
df.columns
```

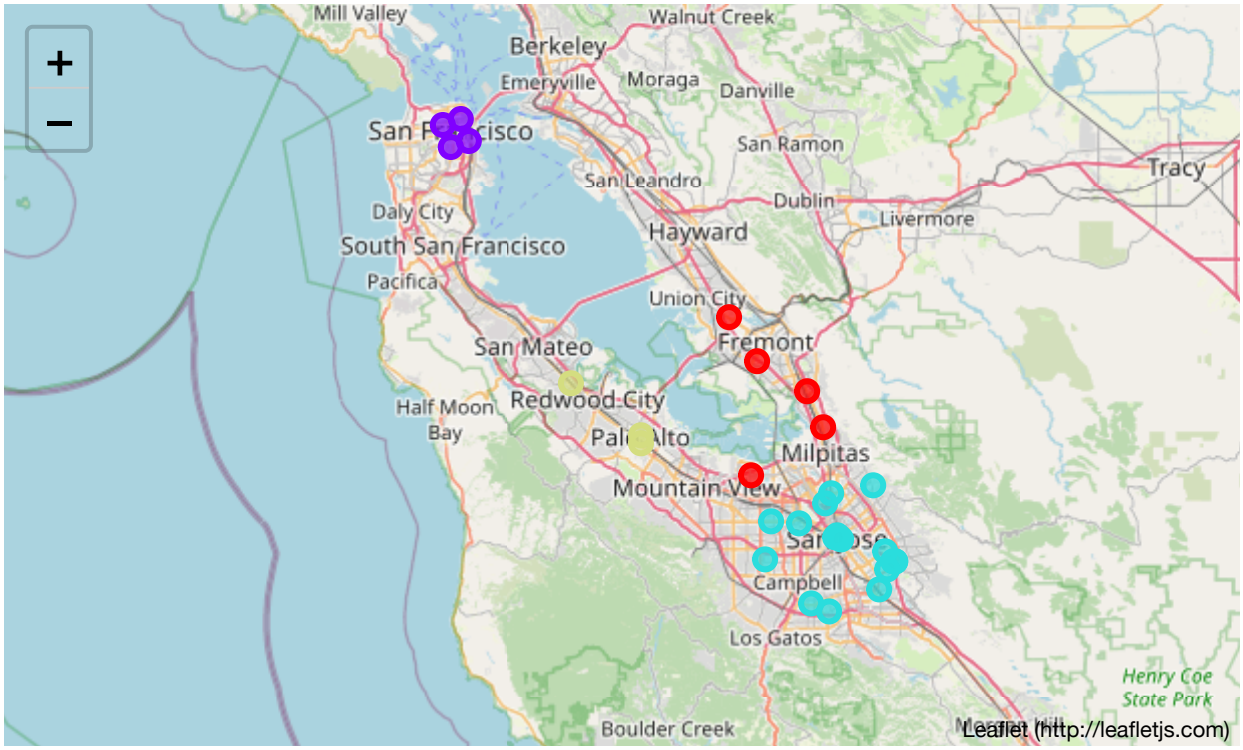
Out[139]:
```
Index(['name', 'categories', 'address', 'lat', 'lng', 'postalCode',
       'formattedAddress', 'id', 'distance', 'city'],
      dtype='object')
```

In [140]:
```
# set number of clusters
kclusters = 4

group_cluster = df.drop(['name', 'categories','address', 'postalCode','form

# run k-means clustering
kmeans = KMeans(n_clusters=kclusters, random_state=0).fit(group_cluster)

# check cluster labels generated for each row in the dataframe
kmeans.labels_

# Insert k cluster as column into df

df.insert(0, 'cluster label', kmeans.labels_)
```

In [141]:
```
map_clusters = folium.Map(location=[latitude, longitude], zoom_start=11)

# set color scheme for the clusters
x = np.arange(kclusters)
ys = [i + x + (i*x)**2 for i in range(kclusters)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

# add markers to the map
markers_colors = []
for lat, lon, poi, cluster in zip(df['lat'], df['lng'],df['city'],df['clust
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=
    folium.CircleMarker(
        [lat, lon],
        radius=5,
        popup=label,
        color=rainbow[cluster-1],
        fill=True,
        fill_color=rainbow[cluster-1],
        fill_opacity=0.7).add_to(map_clusters)
```

In [142]:
```
map_clusters
```

Out[142]:



In [150]:
```
cluster_2 = df.loc[df['cluster label'] == 2]
cluster_2
```

Out[150]:

| | cluster label | name | categories | address | lat | lng | postalCode | formattedAddres |
|---|---|---|---|---|---|---|---|---|
| **0** | 2 | Boba Bar Teahouse & Eatery | Bubble Tea Shop | 310 S 3rd St | 37.332368 | -121.884731 | 95112 | [310 S 3rd St (at San Carlos S San Jose, |
| **6** | 2 | Oh Boba | Bubble Tea Shop | NaN | 37.350555 | -121.944010 | NaN | [Santa Clara, C |
| **7** | 2 | Boba Pub | Coffee Shop | NaN | 37.253480 | -121.901566 | NaN | [San Jose, C |
| **9** | 2 | Bobaholics | Bubble Tea Shop | 1055 E Brokaw Rd #40 | 37.384296 | -121.897496 | 95131 | [1055 E Brokaw F #40, San Jose, C 9513 |
| **10** | 2 | Tiger Milk Boba | Bubble Tea Shop | 72 N Almaden Ave | 37.336055 | -121.894399 | 95110 | [72 N Almade Ave, San Jose, C 9511 |
| **11** | 2 | Bob & Karen's | None | NaN | 37.310632 | -121.988374 | NaN | [Californi |
| **12** | 2 | WeBoba | Bubble Tea Shop | 3030 El Camino Real | 37.351721 | -121.981472 | 95051 | [3030 El Camir Real, Santa Clar CA 9505 |
| **13** | 2 | Cafe Boba | Coffee Shop | 110 E San Fernando St | 37.335346 | -121.886551 | 95112 | [110 E Sa Fernando St, Sa Jose, CA 9511 |
| **14** | 2 | Boba Fitt | Bubble Tea Shop | 1051 E Capitol Expy | 37.301310 | -121.822820 | 95121 | [1051 E Capit Expy, San Jos CA 9512 |
| **16** | 2 | Boba Tea Express | Café | 4100 Monterey Hwy | 37.279468 | -121.834097 | 95111 | [4100 Montere Hwy (Marina), Sa Jose, CA 9511 |
| **18** | 2 | Bob & Steve's Auto & Truck Repair | Automotive Shop | NaN | 37.372134 | -121.908033 | NaN | [San Jose, C |
| **19** | 2 | Oh My Boba | Bubble Tea Shop | NaN | 37.392014 | -121.842310 | 95132 | [San Jose, C 9513 |
| **21** | 2 | BOBATEANI | Bubble Tea Shop | 75 E Santa Clara St | 37.337212 | -121.889275 | 95113 | [75 E Santa Cla St, San Jose, C 9511 |
| **24** | 2 | Simply Boba | Bubble Tea Shop | 3005 Silver Creek Rd Ste 192 | 37.309512 | -121.813647 | 95121 | [3005 Silver Cree Rd Ste 192, Sa Jose, CA 95 |
| **25** | 2 | Bob and Sue's | None | NaN | 37.264193 | -121.927576 | NaN | [San Jose, C |
| **26** | 2 | Pho 21 & Boba 21 | Vietnamese Restaurant | NaN | 37.319470 | -121.823760 | 95122 | [San Jose, C 9512 |

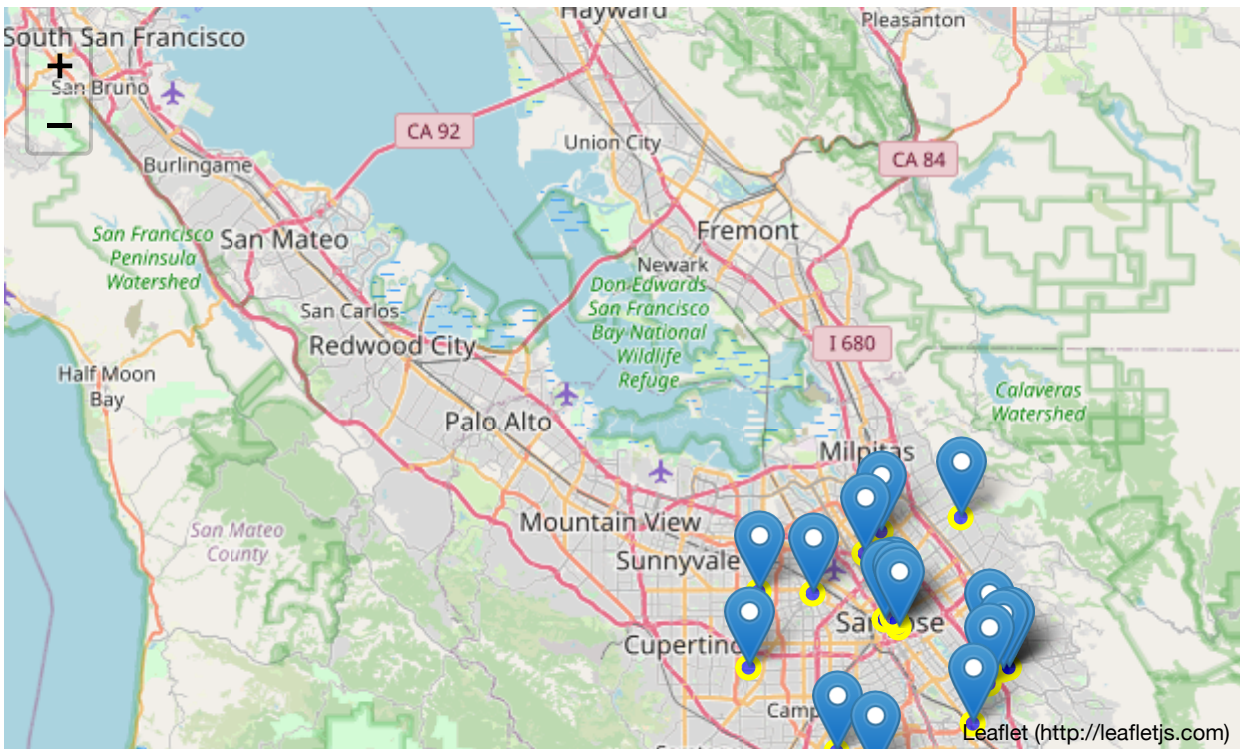
| | cluster label | name | categories | address | lat | lng | postalCode | formattedAddres |
|---|---|---|---|---|---|---|---|---|
| **27** | 2 | OooH Boba Tea and Desserts | Dessert Shop | 1783 E Capitol Expy | 37.309635 | -121.810071 | 95121 | [1783 E Capit Expy, San Jos CA 9512 |
| **28** | 2 | Joy Boba Tea | Bubble Tea Shop | 1783 E Capitol Expy | 37.309663 | -121.810100 | 95121 | [1783 E Capit Expy, San Jos CA 9512 |

# Cluster result

In comparison with other county and city within the area, We can observe San Jose attracted majority of the boba locations

In [151]:
```
sanjose_map = folium.Map(location=[latitude, longitude], zoom_start=12)


map_feature = folium.map.FeatureGroup()

for lat, lng, in zip(cluster_2.lat, cluster_2.lng):
    map_feature.add_child(
        folium.features.CircleMarker(
            [lat, lng],
            radius=5,
            color='yellow',
            fill=True,
            fill_color='blue',
            fill_opacity=0.6
        )
    )

# add pop-up text to each marker on the map
latitudes = list(df.lat)
longitudes = list(df.lng)
labels = list(df.name)

for lat, lng, label in zip(cluster_2.lat,cluster_2.lng, df.categories):
    folium.Marker([lat, lng], popup=label).add_to(sanjose_map)

# add incidents to map
sanjose_map.add_child(map_feature)
```

Out[151]:




# CLuster with most Boba shop and what are those shop

**Tiger Milk Tea**

In [152]:
```
venue_id = '53cf2ef3498e1e5b6248251d'
radius = 200
# url = 'https://api.foursquare.com/v2/venues/search?client_id={}&client_se
url = ''
# Get our result return from the foursqaure dbase
results = requests.get(url).json()
print('total like: ', results['response']['venue']['likes']['count'])
print('price: ', results['response']['venue']['price'])
```

```
total like:  51
price:  {'tier': 1, 'message': 'Cheap', 'currency': '$'}
```

In [153]:
```
venue_id = '5ec8592ba823280008d502fb'
radius = 200
# url = 'https://api.foursquare.com/v2/venues/search?client_id={}&client_se
url = ''
# Get our result return from the foursqaure dbase
results = requests.get(url).json()
print('total like: ', results['response']['venue']['likes']['count'])
```

```
total like:  0
```

**#### The last one doesnt look too promising because it have 0 like**

In [154]:
```
boba_shop_in_SJ = cluster_2[cluster_2['city'] == 'San Jose'].city.count()
boba_shop_in_SJ
```

Out[154]: 15

In [155]:
```
boba_shop_in_Bay = df.city.count()
boba_shop_in_Bay
```

Out[155]: 29

In [156]:
```
percentage_boba_sj = (boba_shop_in_SJ/boba_shop_in_Bay) * 100
percentage_boba_sj
```

Out[156]: 51.724137931034484

# Conclusion

By using folium and K-mean cluster analysis, we was able to figure out which region within the Bay area contain the most boba shop. We also check out two of those boba shop within the San Jose city which is a variable of cluster 0. We can see that Tiger Milk Tea have higher rating and also have more information about price.
There is a total of 29 boba shops in the Bay area, and 15 of these boba shops located in San Jose City. That is 52% if the boba shop locate in San Jose. SO, for those boba lover
considering moving to the Bay Area, I would highly recommend for you to stay near San Jose.