

ARTISANAL ICE CREAM SHOP

**Finding the best location to a Ice Cream Shop
in Osaka, Japan using Data Science**

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Introduction

- Osaka is one of the most famous cities in terms of food services. Known as the Food Capital in Japan. It has a GDP growth of 0.7% and a population of 2.6 million people, the third with the largest population.
- However, in spite of the good indexes and positive statistics of enterprise in the place, the city is full of diverse attractions and establishments. Making it difficult to open a microenterprise in such an attractive location. Without proper analysis of the environment, the entrepreneur may be harmed.
- Based on this favorable environment for the development of micro entrepreneurs. The objective of this project is to identify the best neighborhood in Osaka for the establishment of an artisanal ice cream shop



Ice Cream Data

- This project will analyze all the existing neighborhoods in Osaka and, based on that, send requests to the Foursquare API to get relevant data about the types of venues existing in each one;
- The logic used will be to value neighborhoods with fewer stores related to Coffee, Bakery and Ice Cream Shops and to prioritize neighborhoods with stores and restaurants with spicy and savory foods shops. In addition to looking at other relevant data such as the population quantity per neighborhood and also prioritizing neighborhoods with a larger population quantity.
- This project decided to utilize the density population statistics to look for neighborhood most populated. Based on studies made by United States Census Bureau, the density population stats is more effective for calculating small populated places.
- The data will be collected using three APIs. Wikipedia API, Bing and Foursquare





Methodology

- This study did not use any concept of machine learning because it is not necessary in this context. The methodology used was to locate locations with low number of stores related to ice cream, using the category attribute in the API Foursquare.
- With these data, a refinement was made in all neighborhoods to discover the ten most common store categories in these neighborhoods. With these results, choose the best neighborhoods in Osaka with the aforementioned logic.





Results

1) Osaka neighborhoods collection

The first step was to collect all neighborhoods in Osaka with the wikipedia API available for python. We obtain the total of 23 neighborhoods.

Being them:

	Rōmaji	Kanji	Population	Pop. density per km2
0	Abeno-ku	阿倍野区	107000	18440
1	Asahi-ku	旭区	90854	14376
2	Chūō-ku	中央区	100998	11386
3	Fukushima-ku	福島区	78348	16777
4	Higashinari-ku	東成区	83684	18433
5	Higashisumiyoshi-ku	東住吉区	126704	12995
6	Higashiyodogawa-ku	東淀川区	176943	13334
7	Hirano-ku	平野区	193282	12649
8	Ikuno-ku	生野区	129641	15489
9	Jōtō-ku	城東区	167925	20039
10	Kita-ku (administrative center)	北区	136602	13211
11	Konohana-ku	此花区	65086	3381
12	Minato-ku	港区	80759	10275
13	Miyakojima-ku	都島区	107555	17690
14	Naniwa-ku	浪速区	74992	17082
15	Nishi-ku	西区	103089	19787
16	Nishinari-ku	西成区	108654	14743
17	Nishiyodogawa-ku	西淀川区	95960	6748
18	Suminoe-ku	住之江区	120629	5853
19	Sumiyoshi-ku	住吉区	153425	16322
20	Taishō-ku	大正区	62872	6667
21	Tennōji-ku	天王寺区	80830	16700
22	Tsurumi-ku	鶴見区	111501	13648
23	Yodogawa-ku	淀川区	182254	14419



Results

1) Osaka neighborhoods collection

A problem was detected at the time of the Bing Maps API call regarding the neighborhood of index 10.
So it was abbreviated.

10	Kita-ku (administrative center)	北区	136602	13211
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10	Kita-ku ()	北区	136602	13211
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Results

1) Osaka neighborhoods Latitude and Longitude

The call to the Bing Maps API was made within a function that sent calls to all neighborhoods. The coordinates were stored in two vectors.

The geographical coordinate of Abeno-ku are 34.627501, 135.514095.
The geographical coordinate of Asahi-ku are 34.726483, 135.546952.
The geographical coordinate of Chūō-ku are 35.666255, 139.775565.
The geographical coordinate of Fukushima-ku are 34.692104, 135.474812.
The geographical coordinate of Higashinari-ku are 34.672912, 135.550567.
The geographical coordinate of Higashiyodogawa-ku are 34.740212, 135.517432.
The geographical coordinate of Hirano-ku are 34.603715, 135.559027.
The geographical coordinate of Ikuno-ku are 34.653003, 135.547722.
The geographical coordinate of Jōtō-ku are 34.693887, 135.547769.
The geographical coordinate of Kita-ku () are 35.755838, 139.736687.
The geographical coordinate of Konohana-ku are 34.676245, 135.43555.
The geographical coordinate of Minato-ku are 35.6432274, 139.7400553.
The geographical coordinate of Miyakojima-ku are 34.712703, 135.529697.
The geographical coordinate of Naniwa-ku are 34.66283, 135.490485.
The geographical coordinate of Nishi-ku are 34.674598, 135.476774.
The geographical coordinate of Nishinari-ku are 34.639074, 135.490813.
The geographical coordinate of Nishiyodogawa-ku are 34.705938, 135.442936.
The geographical coordinate of Suminoe-ku are 34.614132, 135.466545.
The geographical coordinate of Sumiyoshi-ku are 34.599765, 135.506426.
The geographical coordinate of Taishō-ku are 34.65064, 135.46957.
The geographical coordinate of Tennōji-ku are 34.655043, 135.51837.
The geographical coordinate of Tsurumi-ku are 35.480132, 139.69366289438247.
The geographical coordinate of Yodogawa-ku are 34.726613, 135.483397.



Results

1) Osaka neighborhoods Latitude and Longitude

We updated the dataframe and placed the respective coordinates in the neighborhoods

	Rōmaji	Kanji	Population	Pop. density per km2	Latitude	Longitude
0	Abeno-ku	阿倍野区	107000	18440	34.627501	135.514095
1	Asahi-ku	旭区	90854	14376	34.726483	135.546952
2	Chūō-ku	中央区	100998	11386	35.666255	139.775565
3	Fukushima-ku	福島区	78348	16777	34.692104	135.474812
4	Higashinari-ku	東成区	83684	18433	34.672912	135.550567
5	Higashisumiyoshi-ku	東住吉区	126704	12995	34.615662	135.531096
6	Higashiyodogawa-ku	東淀川区	176943	13334	34.740212	135.517432
7	Hirano-ku	平野区	193282	12649	34.603715	135.559027
8	Ikuno-ku	生野区	129641	15489	34.653003	135.547722
9	Jōtō-ku	城東区	167925	20039	34.693887	135.547769
10	Kita-ku ()	北区	136602	13211	35.755838	139.736687
11	Konohana-ku	此花区	65086	3381	34.676245	135.435550
12	Minato-ku	港区	80759	10275	35.643227	139.740055
13	Miyakojima-ku	都島区	107555	17690	34.712703	135.529697
14	Naniwa-ku	浪速区	74992	17082	34.662830	135.490485
15	Nishi-ku	西区	103089	19787	34.674598	135.476774
16	Nishinari-ku	西成区	108654	14743	34.639074	135.490813
17	Nishiyodogawa-ku	西淀川区	95960	6748	34.705938	135.442936
18	Suminoe-ku	住之江区	120629	5853	34.614132	135.466545
19	Sumiyoshi-ku	住吉区	153425	16322	34.599765	135.506426
20	Taishō-ku	大正区	62872	6667	34.650640	135.469570
21	Tennōji-ku	天王寺区	80830	16700	34.655043	135.518370
22	Tsurumi-ku	鶴見区	111501	13648	35.480132	139.693663
23	Yodogawa-ku	淀川区	182254	14419	34.726613	135.483397



Results

1) Osaka neighborhoods with the most density population

In this project, we used neighborhoods with the highest population density as a key parameter to discover busy neighborhoods.

Top 5

	Rōmaji	Kanji	Population	Pop. density per km2	Latitude	Longitude
0	Jōtō-ku	城東区	167925	20039	34.693887	135.547769
1	Nishi-ku	西区	103089	19787	34.674598	135.476774
2	Abeno-ku	阿倍野区	107000	18440	34.627501	135.514095
3	Higashinari-ku	東成区	83684	18433	34.672912	135.550567
4	Miyakojima-ku	都島区	107555	17690	34.712703	135.529697



Results

1) Osaka venues call

We started by taking the most populated neighborhood and making a request to the Foursquare API to pick up the nearest venues within 500 meters.

Then we make a dataframe of the response.

First 5 venues

	name	categories	lat	lng
0	FamilyMart (ファミリーマート 新喜多東店)	Convenience Store	34.693190	135.549745
1	Tonkizoku (鳥貴族 鴻野店)	Sake Bar	34.692083	135.545437
2	JR Shigino Station (JR 鴻野駅)	Train Station	34.692329	135.545587
3	餃子の王将 鴻野店	Chinese Restaurant	34.690924	135.546136
4	FamilyMart (ファミリーマート 鴻野駅南店)	Convenience Store	34.691751	135.545328



Results

1) Osaka neighborhoods Venues list

With this example, we replicate for all neighborhoods with a limit of 100 venus per neighborhood. The result was 582 venues.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Jōtō-ku	34.693887	135.547769	FamilyMart (ファミリーマート 新喜多東店)	34.693190	135.549745	Convenience Store
1	Jōtō-ku	34.693887	135.547769	Torikizoku (鳥貴族 鳴野店)	34.692083	135.545437	Sake Bar
2	Jōtō-ku	34.693887	135.547769	JR Shigino Station (JR 鳴野駅)	34.692329	135.545587	Train Station
3	Jōtō-ku	34.693887	135.547769	餃子の王将 鳴野店	34.690924	135.546136	Chinese Restaurant
4	Jōtō-ku	34.693887	135.547769	FamilyMart (ファミリーマート 鳴野駅南店)	34.691751	135.545328	Convenience Store
...
577	Suminoe-ku	34.614132	135.466545	マグスミノエ バッティングセンター	34.610062	135.468525	Athletics & Sports
578	Suminoe-ku	34.614132	135.466545	泉1交差点	34.610171	135.464018	Intersection
579	Konohana-ku	34.676245	135.435550	FamilyMart (ファミリーマート 此花島屋店)	34.676346	135.440089	Convenience Store
580	Konohana-ku	34.676245	135.435550	FamilyMart (ファミリーマート 堀田此花店)	34.676232	135.441014	Convenience Store
581	Konohana-ku	34.676245	135.435550	SAGAWA EXPRESS CO.,LTD. (佐川急便 大阪営業所)	34.673893	135.439380	Distribution Center

582 rows × 7 columns



Results

1) Osaka neighborhoods with all venues

We turn all venues into columns on the dataframe and analyze them with the highest frequency of appearance in each neighborhood.

	Neighborhood	ATM	Arcade	Art Gallery	Athletics & Sports	BBQ Joint	Bakery	Bar	Baseball Stadium	Bath House	... Tunnel	Udon Restaurant	Unagi Restaurant	Used Bookstor
0	Abeno-ku	0.000000	0.000000	0.066667	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
1	Asahi-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.045455	...	0.000000	0.045455	0.000000
2	Chūō-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.032609	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.021739
3	Fukushima-ku	0.018182	0.000000	0.000000	0.000000	0.000000	0.018182	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
4	Higashinari-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
5	Higashiyamashiro-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
6	Higashiyodogawa-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.028571	0.000000	0.000000	...	0.000000	0.000000	0.000000
7	Hirano-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
8	Ikuno-ku	0.000000	0.000000	0.000000	0.000000	0.076923	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.076923	0.000000
9	Jōtō-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
10	Kita-ku ()	0.000000	0.019231	0.000000	0.000000	0.019231	0.019231	0.000000	0.000000	0.000000	...	0.019231	0.000000	0.000000
11	Konohana-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
12	Minato-ku	0.000000	0.000000	0.000000	0.000000	0.032258	0.032258	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
13	Miyakojima-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.045455	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.02272
14	Naniwa-ku	0.000000	0.000000	0.032258	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
15	Nishi-ku	0.026316	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.026316	0.000000	...	0.000000	0.000000	0.000000
16	Nishinari-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
17	Nishiyodogawa-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
18	Suminoe-ku	0.000000	0.000000	0.000000	0.090909	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
19	Sumiyoshi-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
20	Taishō-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
21	Tennōji-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.100000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
22	Tsurumi-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000
23	Yodogawa-ku	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.076923	0.000000

24 rows × 117 columns



Results

1) Osaka neighborhoods Most common venues

Then we selected the 10 most common venues in each neighborhoods and make a dataframe.

	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	10th Most Common Venue
0	Abeno-ku	Convenience Store	Café	Park	Supermarket	Steakhouse	Coffee Shop	Optical Shop	Indian Restaurant	Art Gallery	Fast Food Restaurant
1	Asahi-ku	Convenience Store	Donburi Restaurant	Grocery Store	Ramen Restaurant	Japanese Restaurant	Platform	Dessert Shop	Chinese Restaurant	Supermarket	Café
2	Chūō-ku	Sushi Restaurant	Japanese Restaurant	Soba Restaurant	Convenience Store	Coffee Shop	Italian Restaurant	Bakery	Park	Ramen Restaurant	Donburi Restaurant
3	Fukushima-ku	Convenience Store	Chinese Restaurant	Fast Food Restaurant	Ramen Restaurant	Train Station	Donburi Restaurant	Japanese Curry Restaurant	Japanese Restaurant	Supermarket	Café
4	Higashinari-ku	Café	Convenience Store	Beer Bar	Yoshoku Restaurant	Halal Restaurant	Fast Food Restaurant	Food	Food Court	French Restaurant	Fried Chicken Joint



Results

1) Osaka neighborhoods Final Results

Finally, we join the dataframe of the venues and combine it with the preliminary dataframe and sorted the result based on population density. The chosen neighborhood is the first in the table.

	Neighborhood	Kanji	Population	Pop. density per km2	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue
0	Naniwa-ku	浪速区	74992	17082	34.662830	135.490485	2.0	Convenience Store	Japanese Curry Restaurant
1	Fukushima-ku	福島区	78348	16777	34.692104	135.474812	2.0	Convenience Store	Chinese Restaurant
2	Ikuno-ku	生野区	129641	15489	34.653003	135.547722	2.0	Convenience Store	Gym
3	Nishinari-ku	西成区	108654	14743	34.639074	135.490813	1.0	Convenience Store	Donburi Restaurant
4	Yodogawa-ku	淀川区	182254	14419	34.726613	135.483397	2.0	Convenience Store	Supermarket
5	Higashiyodogawa-ku	東淀川区	176943	13334	34.740212	135.517432	2.0	Convenience Store	Ramen Restaurant
6	Higashisumiyoshi-ku	東住吉区	126704	12995	34.615662	135.531096	2.0	Convenience Store	Supermarket
7	Chūō-ku	中央区	100998	11386	35.666255	139.775565	0.0	Sushi Restaurant	Japanese Restaurant
8	Minato-ku	港区	80759	10275	35.643227	139.740055	2.0	Convenience Store	Park
9	Taishō-ku	大正区	62872	6667	34.650640	135.469570	2.0	Convenience Store	Donburi Restaurant
10	Suminoe-ku	住之江区	120629	5853	34.614132	135.466545	0.0	Sporting Goods Shop	Japanese Restaurant

Results

The Best
Neighborhood
is: Naniwa-ku!





Discussion

- Based on this study and analysis, we can see several interesting points regarding the type of places that exist in Osaka, by neighborhoods.
- We found that convenience stores are the most frequent locations in all neighborhoods. A unique feature that happens in Japan
- We are also able to observe neighborhoods that have a higher frequency of sports aritgos where there are gyms. Also neighborhoods with supermarkets and parks have a higher frequency of coffee shops.
- We also found that Restaurante de Lamen is frequent in almost every neighborhood in Osaka.





Conclusion

- After analyzing data from venues in each neighborhood and taking into account the neighborhood with the highest population density that had the least ice cream-related stores, the best neighborhood to place an artisanal ice cream shop is the Naniwa-ku neighborhood



THANK YOU!

FOR READING UNTIL HERE.

