Explore Ramen Restaurants near Japan Railway Station

1. Introduction

"Ramen" with the meaning of "pulled noodles" is a very popular food in Japan. If you travel to Japan, you can find ramen restaurants anywhere. There are more than 30000 ramen restaurants around Japan. A survey said that more than 94% Japanese like eating ramen, men eat 22.7 cups every year and women eat 12.4 cups every year at ramen restaurants. The purpose of this report is to help select potential location for new ramen restaurant. A ramen chef who wants to open a restaurant may be interested in this project.

Ramen is fast food. People always like eats ramen near train station. The most important thing for choosing a restaurant location is the number of traffic people, so this topic chooses to analyze the relationship between the number of passengers at Japan railway (JR) station and the number of exiting ramen restaurants near those stations.

2. Data Source

I found the statistical data of daily passengers of JR stations from JR official website. I used geopy library to get the latitude and longitude of JR station, and I used Foursquare API to get information of ramen restaurants near JR stations.

3. Methodology

I scraped JR official website (https://www.jreast.co.jp/passenger/), got the data of average daily passengers of JR in 2018, cleaned it, and then read it into a panda dataframe. The following table shows the rank of JR station, station name, No_Teiki (the number of passengers use normal ticket), Teiki (the number of passengers use commute pass), Total (total number of passengers), Ratio(the number of passengers compared to last year).

	Rank	JR_station	NO_Teiki	Teiki	Total	Ratio
0	1	新宿	372,401	416,965	789,366	1.4
1	2	池袋	240,260	326,734	566,994	0.1
2	3	東京	224,973	242,191	467,165	3.2
3	4	横浜	164,975	258,675	423,651	0.8
4	5	品川	163,942	219,499	383,442	1.3
5	6	渋谷	178,045	192,810	370,856	0.1
6	7	新橋	106,621	175,350	281,971	1.6
7	8	大宮	100,395	157,713	258,108	1.2

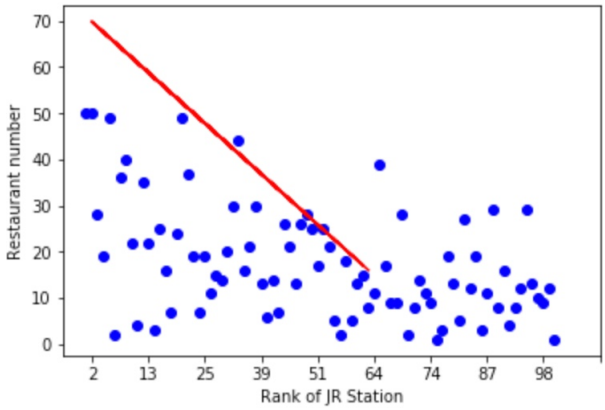
I used geopy library to get the latitude and longitude values of top 100 JR stations, and then I used Foursquare API to get the ramen restaurants information (included restaurant name, latitude, longitude of each restaurant) around target JR stations.

	JR_station	Rank	Total Traffic	Restaurant	Latitude	Longitude
0	新宿	1	789,366	Mansei Menten (万世麺店)	35.692111	139.699587
1	新宿	1	789,366	Umemoto (梅もと)	35.691830	139.699002
2	新宿	1	789,366	老麺処 圓	35.691152	139.698293
3	新宿	1	789,366	Kitakata Ramen Ban Nai (喜多方ラーメン 坂内)	35.692691	139.699560
4	新宿	1	789,366	1/2PPUDO	35.691365	139.701080

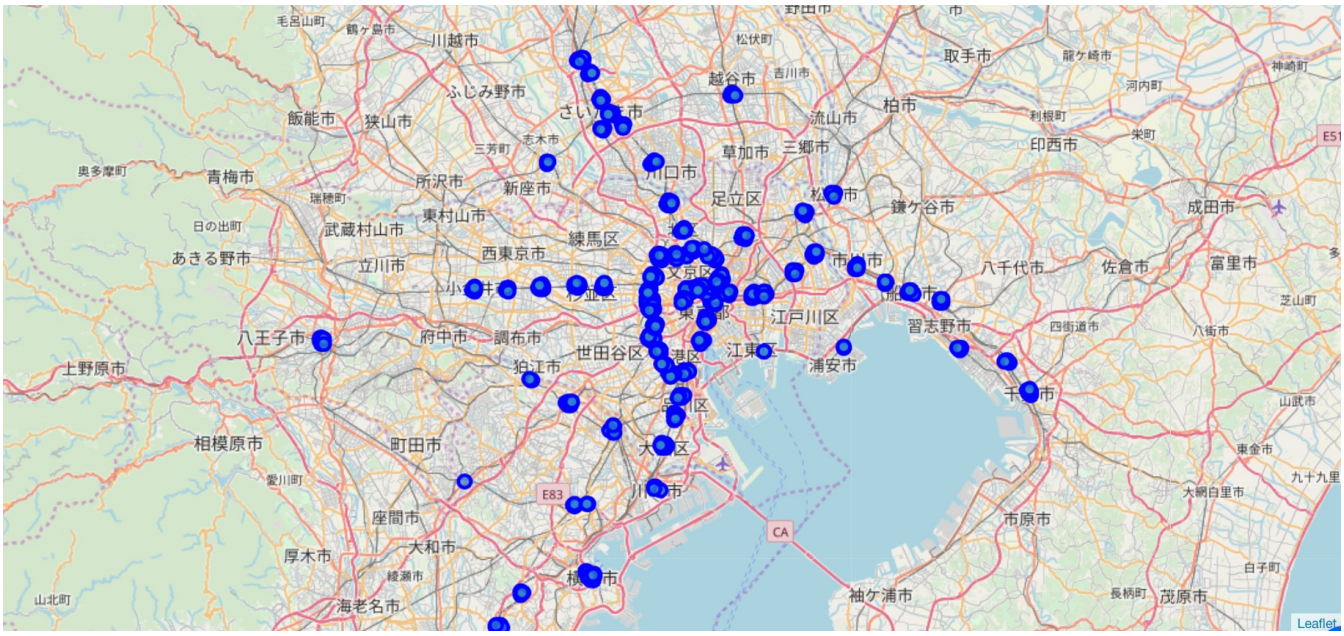
I grouped the restaurants with the same station, and count the number of ramen restaurants in each station.

		Restaurant
Rank	**JR_station**	
1	**新宿**	50
2	**池袋**	50
4	**横浜**	28
5	**品川**	19
6	**渋谷**	49
7	**新橋**	2
8	**大宮**	36
9	**秋葉原**	40
10	**北千住**	22

Then I explored the relationship between the number of daily passengers and the number of ramen restaurants using linear regression analysis.



Finally, I used Folium map to visualize the distribution of ramen restaurants in top100 JR stations.



4. Results and Discussion

- Most of the busiest JR stations are located in central Tokyo. In some JR stations, you can even find more than 50 ramen restaurants within 300 meters from station.
- The large the number of passengers the larger number of ramen restaurants. But because of the limitation of Foursquare Regular call, I could only get the largest of 50 restaurants per call. If the linear regression model could be fit for more data, the model may be better.
- Tokyo station, the biggest train station in Japan (rank in top 3) but have no ramen restaurants within 300 meter from station, and only have 7 ramen restaurants within 500 meter. It dose not mean there is a potential business chance to open a new ramen restaurant in Tokyo station because of the large traffic passengers and less competitors. Tokyo station is located in the center of Tokyo city, which also has the highest rent in Japan. Because the price and profits of ramen is not as high as other foods like sushi, restaurant owner could not afford such high rent, so there are less ramen restaurants there. Other places like Shinjuku, also has huge passengers every day, but the rent is much cheaper than Tokyo station. It is easily to find more than 50 ramen restaurants near Shinjuku Station in a radius of 300 meters area.
- I would like to recommend the location for new ramen restaurants if it is

satisfied the following conditions. (1) The top 50 JR stations which means enough passengers who may become your customers; (2) The number of existing ramen restaurants in this location is more than 20 and less than 40, which suggests the cost of run a ramen restaurant in this location is affordable and there still rooms for competition. (3) Choose the location where the passengers' number is growing every year. The ratio (2018/2017) the larger the better. About all, the JR station Yurakucho（有楽町）may be a good choice, which rank in 15, has 25 ramen restaurants right now, and the passengers number is 1.8 time than last year.

	Rank	JR_station	Passengers(Ticket)	Passengers(Commute Pass)	Total Passengers	Ratio (2018/2017)	Number of Restaurants
2	4	横浜	164,975	258,675	423,651	0.8	28
6	8	大宮	100,395	157,713	258,108	1.2	36
8	10	北千住	59,277	161,626	220,903	1.4	22
10	12	高田馬場	81,732	129,954	211,687	0.2	35
11	13	上野	101,428	86,741	188,170	0.3	22
13	15	有楽町	77,800	95,202	173,003	1.8	25
16	20	恵比寿	69,979	77,719	147,699	1.6	24
18	22	吉祥寺	61,068	82,616	143,685	0.3	37