
Find A Good Place to Open Hotpot Restaurant

Capstone Project - 16 April 2019



Introduction

In this project we will try to find an optimal location for a restaurant. Specifically, this report will be targeted to stakeholders interested in opening an Hotpot restaurant in Singapore.

Since there are lots of restaurants in Singapore we will try to detect locations that are not already crowded with restaurants. We are also particularly interested in areas with no Hotpot restaurants in vicinity. We would also prefer locations as close to city center as possible, assuming that first two conditions are met.

Data

Based on definition of our problem, factors that will influence our decision are:

1. number of existing restaurants in the neighborhood (any type of restaurant)
2. number of and distance to Hotpot restaurants in the neighborhood, if any
3. distance of neighborhood from city center.

To achieve these, the following data are needed:

1. Foursquare location data
2. coordinate data to calculate neighborhood

Approach

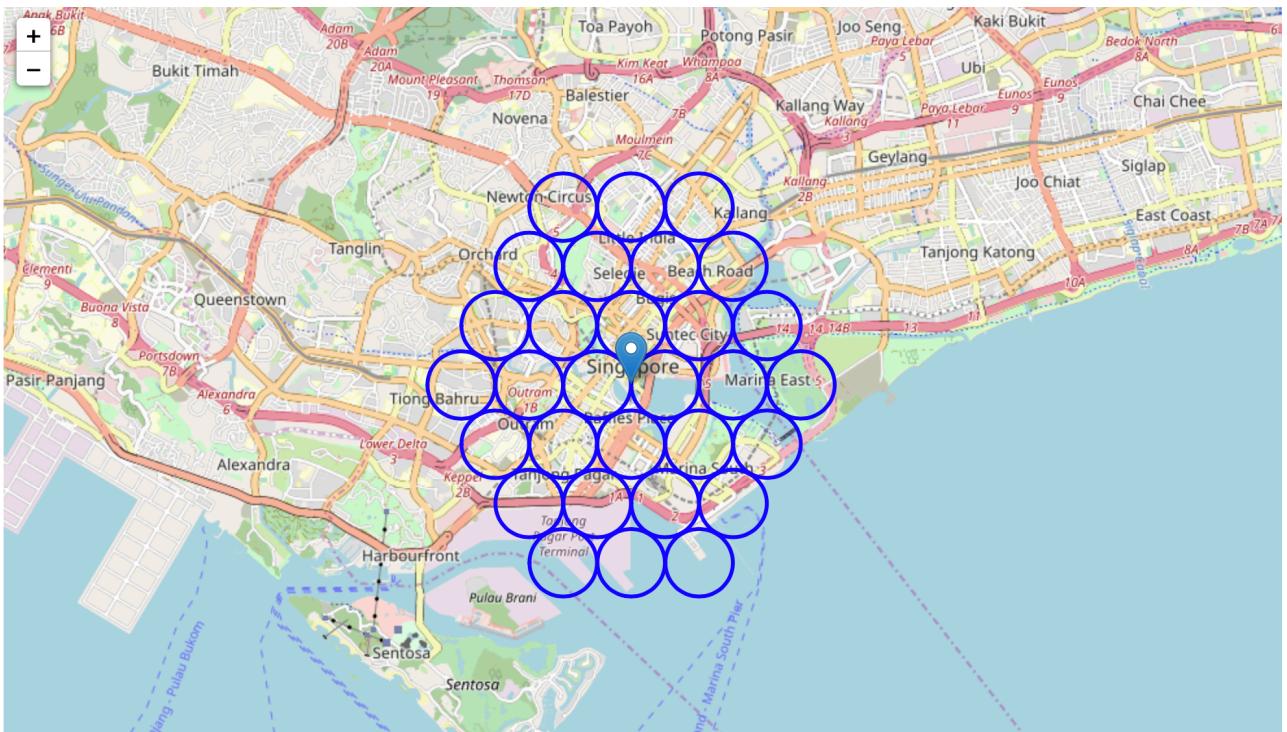
1. Get Neighborhood Candidates

We will create a grid of cells covering our area of interest which is approx. 12x12 kilometers centered around Singapore city center. Check Google the Singapore downtown core is [1.287953, 103.851784].

A grid of area candidates, equally spaced, centered around center and within ~3km from downtown. Our neighborhoods will be defined as circular areas with a radius of 500 meters, so our neighborhood centers will be 1000 meters apart.

To accurately calculate distances we need to create our grid of locations in Cartesian 2D coordinate system which allows us to calculate distances in meters (not in latitude/longitude degrees). Then we'll project those coordinates back to latitude/longitude degrees to be shown on Folium map. So let's create functions to convert between WGS84 spherical coordinate system (latitude/longitude degrees) and UTM Cartesian coordinate system (X/Y coordinates in meters).

The center location and candidate neighborhood centers are visualised based on folium shown as follows:



2. Get restaurants information based on Foursquare data

The statistics are as follows:

Total number of restaurants: 727

Total number of Hotpot restaurants: 7

Percentage of Hotpot restaurants: 0.96%

Average number of restaurants in neighborhood:

20.33333333333332

The list of hotpot restaurants are as follows:

List of Hotpot restaurants

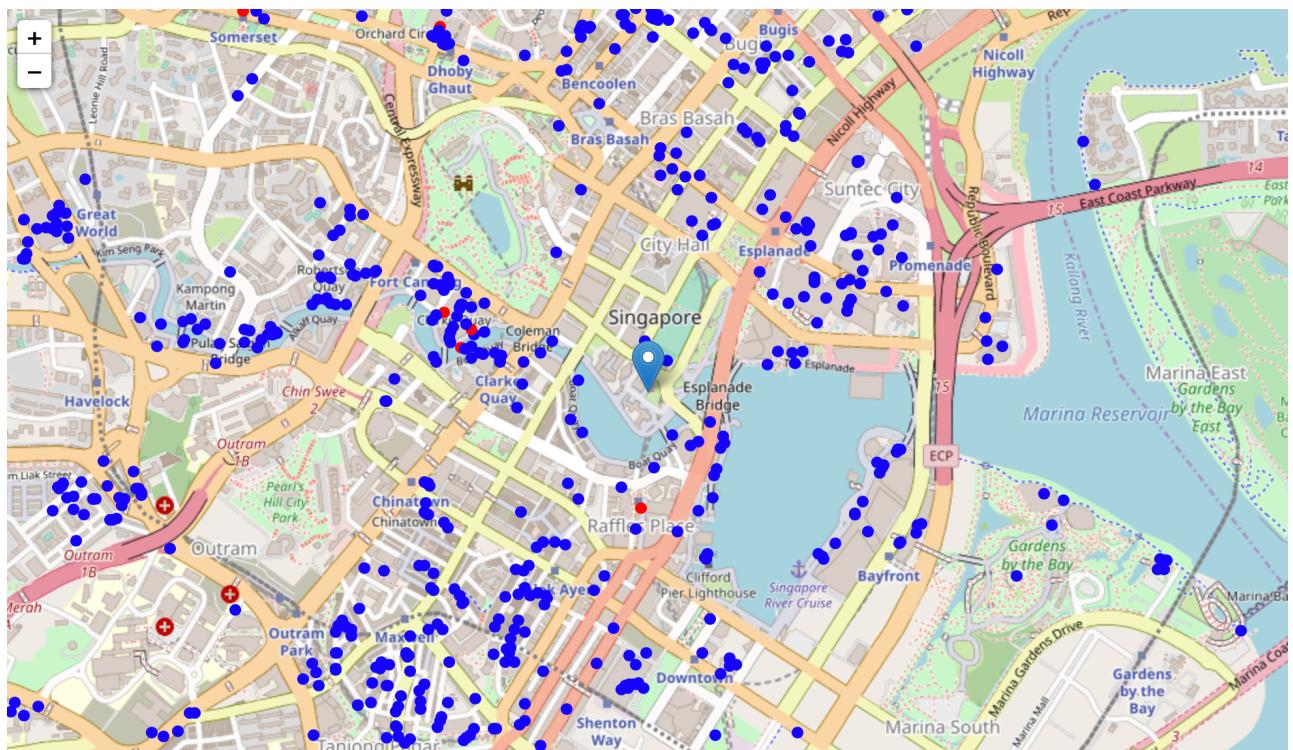
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( '53ae48b4498ec970f3cc0455', 'CITY Hot Pot Shabu shabu',  
1.284172851493935, 103.85158494974766, 'One Raffles Place  
#04-28, 048616, Singapore', 451, True, 372233.4346508933,  
141968.62249332076)  
( '50ae28fde4b0062752d48b38', 'Hai Di Lao Hot Pot',  
1.2894538145879413, 103.84565413368888, '#02-04 Blk 3D  
River Valley Rd, Clarke Quay, 179023, Singapore', 247,  
True, 371573.7781421836, 142552.74695106354)  
( '5ab9b9acd7627e775da498b0', 'Spice World Hot Pot 香天下火  
锅', 1.290611289561904, 103.84507235886304, 'Block B, 3  
River Valley Road(Clarke Quay) #01-06/07, 179021,
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Singapore', 385, True, 371509.1023130056,
142680.73886923498)
('5889fcf13e88350e4e2a266a', 'Da Miao Hotpot',
1.2900504965819144, 103.84598717740977, '3C River Valley
Road, #01-11 The Cannery, 179022, Singapore', 275, True,
371610.8657191406, 142618.69523009294)
('5a268cf98173cb7b40543d4c', 'Hai Di Lao Hot Pot',
1.3000075971167873, 103.84496501271408, 'Plaza Singapura
#04-01 (68 Orchard Road), 238839, Singapore', 477, True,
371497.63139458734, 143719.53620637098)
('5392bffc498e2f39904dc785', 'Hai Di Lao 海底捞火锅 (Hai
Di Lao)', 1.3005120126841698, 103.83849148498787, 'Level
4, 313@somerset (313 Orchard Road), 238895, Singapore',
345, True, 370777.35164374457, 143775.63150233758)
('4b753a81f964a520dd012ee3', 'Nan Hwa Chong Fish-Head
Steamboat Corner', 1.3040554909651518,
103.86072529598684, '814/816 North Bridge Rd (Jalan
Sultan), 198779, Singapore', 498, True,
373251.46365890646, 144166.24471026086)

...

Total: 7

The distribution of restaurants and hotspot restaurants are shown as follows:



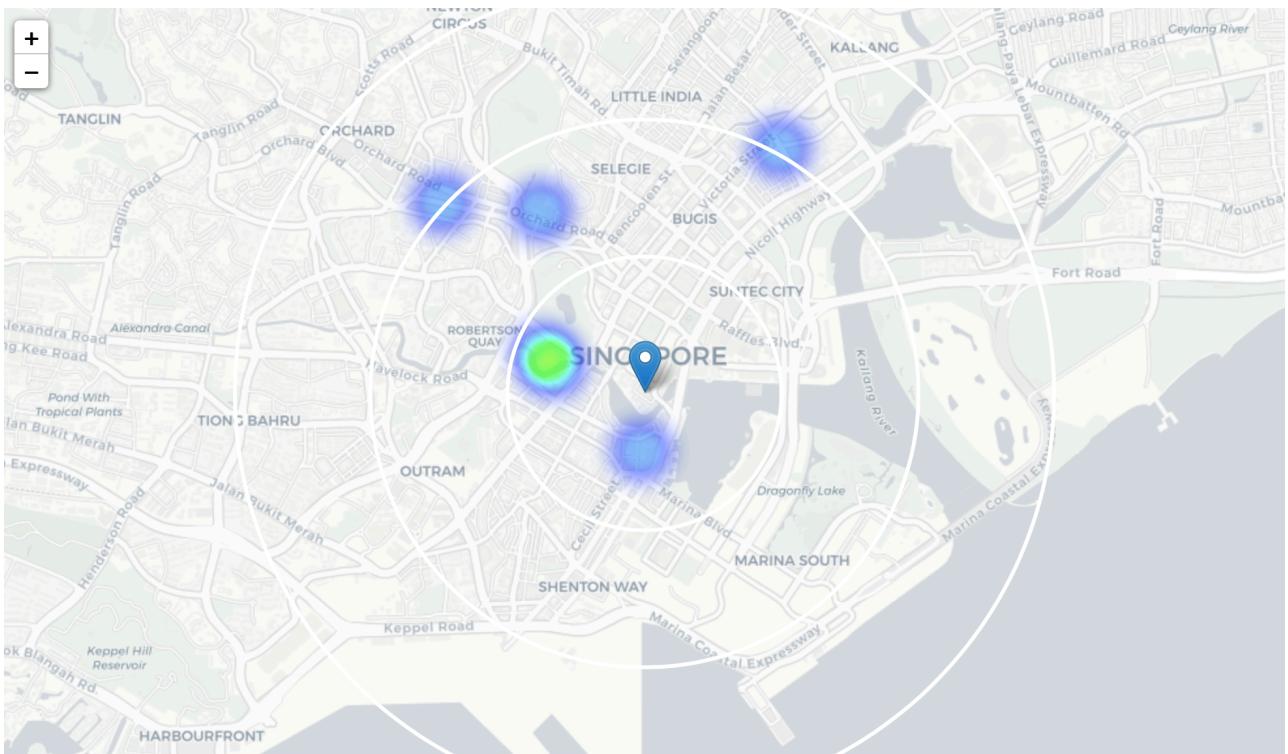
As shown in the figure, there are many restaurant in blue, but only 7 hotspot restaurants in red which make the selection of location easier.

3. Get the heat map of restaurants and hotspot restaurants.

The heat map of restaurants is shown as follows:



The heat map of hotspot restaurants is shown as follows:



As we can see in the figures, there are only 7 hotpot restaurants and most of them are in west part of Downtown core, near Clarke Quay. There are no Hotpot restaurants in North-east of Downtown Core (SUNTEC CITY area). That means suntec city (3 Temasek Blvd, Singapore 038983) is a good place for open a new Hotpot restaurant.

Conclusion

Our analysis shows that although there is a great number of restaurants in Singapore near the Downtown Core area, but there are only 7 Hotpot restaurants in this area. And as shown in the figure, most of them are in west and south part of Downtown core. In the north-east, the suntec city which is a famous place and near downtown but there is no hotpot restaurant there. Therefore, we recommend suntec city (3 Temasek Blvd, Singapore 038983) as a good place to open a new Hotpot restaurant.

Future Direction

Further work can be done by analyzing suntec city area more detailly. Clustering model can be used to generate more reasonable candidate locations for stakeholders to select.

