Predicting an optimal location for a Hot Pot restaurant

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1. Introduction: Business Problem

1.1. Background

Chengdu is a UNESCO world food capital.Sichuan hot pot is the most popular and famous food in chengdu.Hotpot in sichuan is famous for its hemp, spicy, fresh and fragrant flavor. It comes from the people and is promoted to the temple. Whether it is menial servants, officials , literati , workers, or young men and women, the range of consumer groups and Consumption per capita are all higher than that of any other place.As a delicacy, hot pot has become the representative cuisine of sichuan and chongqing.

1.2. Problem

Datalization of the location of a hot pot restaurant can help analyze the location of a newly opened hot pot restaurant.Factors such as the number of hotpot restaurants in each block, the distance to the city center, and the data
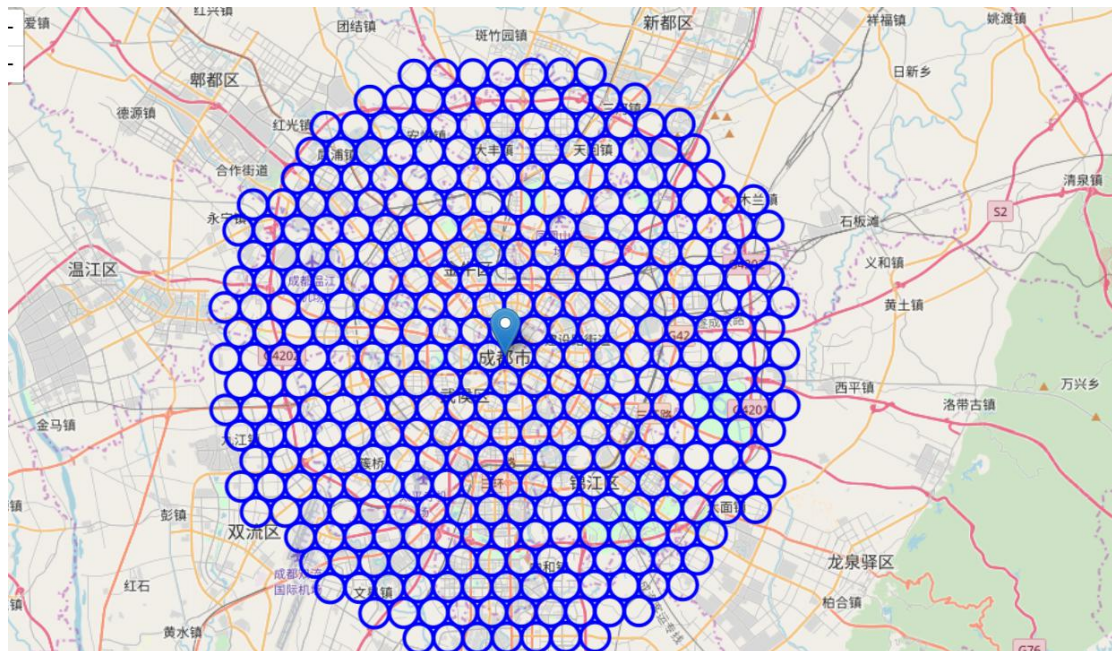
of nearby shopping malls are available

1.3. Interest

Machine-learning algorithms can help investors choose a suitable address in chengdu to open a new hotpot restaurant

2. Data

Now let's create a grid of area candidates, equaly spaced, centered around city center and within ~16km from TianFu Square. Our neighborhoods will be defined as circular areas with a radius of 400 meters, so our neighborhood centers will be 800 meters apart.

Let's now use BaiDu Maps API to get approximate addresses of those locations and place all this into a Pandas dataframe.

	Address	formatted_address	Latitude	Longitude	X	Y	Distance from center
0		四川省成都市双流区	30.524351	104.014528	405454.853184	3.377303e+06	15979.987484
1		四川省成都市双流区锦江路四段	30.524476	104.031203	407054.853184	3.377303e+06	15574.337867
2		四川省成都市双流区滨河路2段	30.524599	104.047878	408654.853184	3.377303e+06	15325.795249
3		四川省成都市双流区伏龙路1段	30.524720	104.064554	410254.853184	3.377303e+06	15242.047107
4		四川省成都市双流区新通大道	30.524838	104.081229	411854.853184	3.377303e+06	15325.795249
5		四川省成都市双流区新通大道	30.524955	104.097905	413454.853184	3.377303e+06	15574.337867
6		四川省成都市双流区双简路	30.525069	104.114581	415054.853184	3.377303e+06	15979.987484
7		四川省成都市双流区长城路2段-59号	30.536661	103.989386	403054.853184	3.378689e+06	15615.377037
8		四川省成都市双流区	30.536789	104.006063	404654.853184	3.378689e+06	14945.233354
9		四川省成都市双流区荣店路	30.536916	104.022740	406254.853184	3.378689e+06	14422.205102
10		四川省成都市武侯区	30.537040	104.039418	407854.853184	3.378689e+06	14062.716665

Now that we have our location candidates, let's use BaiDu API to get info on restaurants in each neighborhood and these data at local file system (restaurants, hot_pot_restaurants, location_restaurants).

Total number of restaurants: 7919

Total number of hot_pot_restaurants: 492

Percentage of Hot Pot restaurants: 6.21%

Average number of restaurants in neighborhood: 21.755494505494507

Let's perform some basic explanatory data analysis and derive some additional info from our raw data. First let's count the number of restaurants in every area candidate.

Average number of restaurants in every area with radius=300m: 21.755494505494507

	Address	formatted_address	Latitude	Longitude	X	Y	Distance from center	Restaurants in area	Distance to Hot Pot restaurant
0		四川省成都市双流区	30.524351	104.014528	405454.853184	3.377303e+06	15979.987484	8	3388.639029
1		四川省成都市双流区锦江路四段	30.524476	104.031203	407054.853184	3.377303e+06	15574.337867	0	1815.296410
2		四川省成都市双流区滨河路2段	30.524599	104.047878	408654.853184	3.377303e+06	15325.795249	17	477.208179
3		四川省成都市双流区伏龙路1段	30.524720	104.064554	410254.853184	3.377303e+06	15242.047107	91	373.190451
4		四川省成都市双流区新通大道	30.524838	104.081229	411854.853184	3.377303e+06	15325.795249	2	1080.333151
5		四川省成都市双流区新通大道	30.524955	104.097905	413454.853184	3.377303e+06	15574.337867	0	2671.231484
6		四川省成都市双流区双简路	30.525069	104.114581	415054.853184	3.377303e+06	15979.987484	0	3429.724512
7		四川省成都市双流区长城路2段-59号	30.536661	103.989386	403054.853184	3.378689e+06	15615.377037	0	1937.303086
8		四川省成都市双流区	30.536789	104.006063	404654.853184	3.378689e+06	14945.233354	0	2169.230737
9		四川省成都市双流区荣店路	30.536916	104.022740	406254.853184	3.378689e+06	14422.205102	0	2431.864122

so on average Hot Pot restaurant can be found within ~1500m from every area center candidate. That's fairly close, so we need to filter our areas carefully!
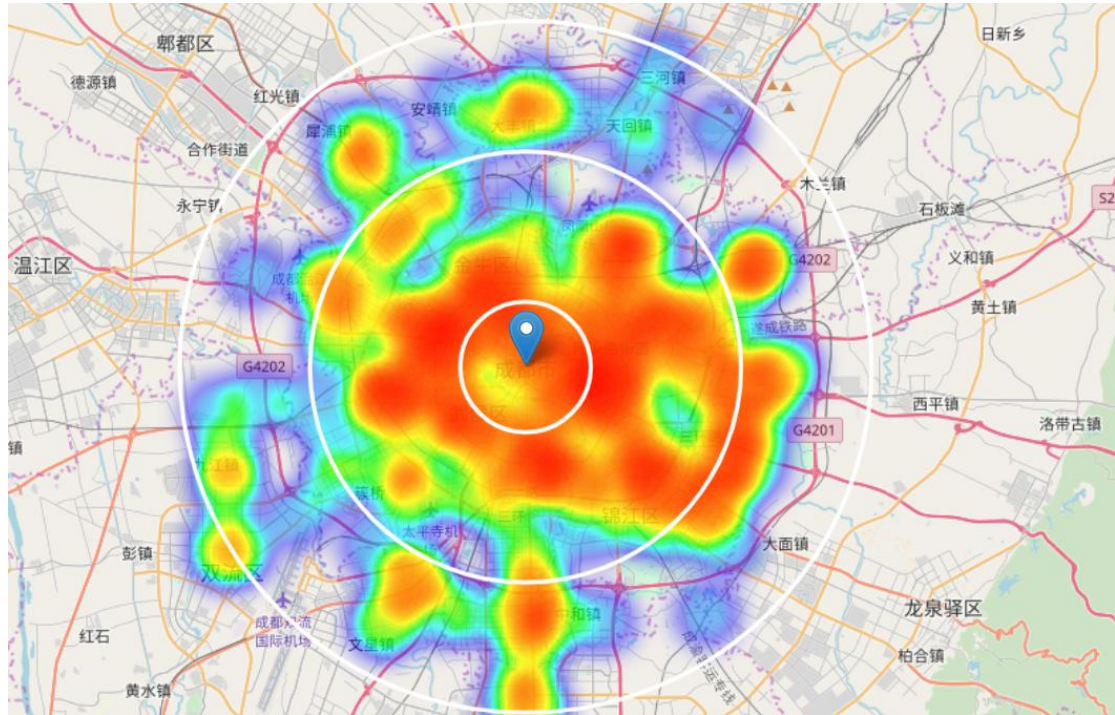

Fig:heat map of restaurant

Fig:heat map of hot pot restaurant