

The Battle of Neighborhoods

Opening a shopping mall in Shanghai



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Agenda

1. Introduction

- I. Background
- II. Problem Description

2. Data

- I. List of Districts in Shanghai
- II. Geographical coordinates in Shanghai
- III. Population Density
- IV. Venue Data from Foursquare API

3. Methodology and Result

4. Discussion

5. Conclusion

6. Future Improvement

1



Introduction

Where should a shopping mall be opened
in Shanghai?

Background

■ Shanghai—the global financial center

One of the four municipalities in China, and the second most populous urban area in the world

■ Stakeholders seeking opportunity

Attracted expanding business in Shanghai, but the choices are broad

■ Choosing Optimal Location

Make sure the location of a commercial site won't have negative impact on growth of revenue

Problem Description

A shopping mall is essential in a city where people spend their leisure time purchasing needs, having meals, and enjoying entertainment facilities with friends. Especially in Shanghai, a populous city and a prominent financial center, it becomes a culture for young people to spend time in shopping malls during weekends to relax. This project aims to help stakeholders find the optimal location to open a shopping mall in Shanghai by analyzing data and making suggestions.



2



Data

What are the datasets that need to be analyzed?

List of Districts in Shanghai

Neighborhood	
0	Huangpu District
1	Xuhui District
2	Changning District
3	Jing'an District
4	Putuo District
5	Hongkou District
6	Yangpu District
7	Pudong
8	Baoshan District
9	Minhang District
10	Jiading District
11	Jinshan District
12	Songjiang District
13	Qingpu District
14	Fengxian District
15	Chongming District

Sixteen Districts in total—Obtained from Wikipedia—Scrapped via BeautifulSoup library

Geographical Coordinates

	Neighborhood	Latitude	Longitude			
0	Huangpu District	31.23780	121.47810	9	Minhang District	31.10880 121.37472
1	Xuhui District	31.19594	121.44709	10	Jiading District	31.36637 121.22153
2	Changning District	31.21739	121.42105	11	Jinshan District	30.92025 121.25199
3	Jing'an District	31.22000	121.41583	12	Songjiang District	31.03595 121.21460
4	Putuo District	31.25100	121.38970	13	Qingpu District	31.15394 121.11408
5	Hongkou District	31.25000	121.48917	14	Fengxian District	30.83381 121.52128
6	Yangpu District	31.26193	121.51904	15	Chongming District	31.21739 121.42105
7	Pudong	31.23513	121.52759			
8	Baoshan District	31.41639	121.48000			

Latitude and longitude for each district in Shanghai—applied geopy library—implement geocoder

Population Density

	Neighborhood	Area(km^2)	Population	Density(/km^2)					
0	Huangpu District	20.46	658,600	32,190	8	Baoshan District	270.99	2,022,900	7,465
1	Xuhui District	54.76	1,089,100	19,889	9	Jiading District	464.2	1,568,231	3,378
2	Changning District	38.3	691,100	18,044	10	Pudong New Area	1,210.41	5,474,900	4,523
3	Jing'an District	37.37	1,000,000	27,000	11	Jinshan District	586.05	798,000	1,362
4	Putuo District	54.83	1,288,000	23,491	12	Songjiang District	605.64	1,760,200	2,906
5	Hongkou District	23.46	809,400	34,501	13	Qingpu District	670.14	1,209,100	1,804
6	Yangpu District	60.73	1,315,200	21,657	14	Fengxian District	687.39	1,159,900	1,687
7	Minhang District	370.75	2,537,900	6,845	15	Chongming District	1,185.49	696,400	587

Same Data from Wikipedia

Shopping mall venue data

	Neighborhood	DistrictLatitude	DistrictLongitude	VenueName	VenueLatitude	VenueLongitude	VenueCategory
19	Huangpu District	31.2378	121.4781	Three on the Bund	31.236266	121.486486	Shopping Mall
38	Huangpu District	31.2378	121.4781	Bund18 (外滩18号)	31.240480	121.485575	Shopping Mall
39	Huangpu District	31.2378	121.4781	K11 Art Mall (上海K11购物艺术中心)	31.225486	121.469001	Shopping Mall
54	Huangpu District	31.2378	121.4781	Joy City (大悦城)	31.244856	121.467333	Shopping Mall
68	Huangpu District	31.2378	121.4781	IFC Mall (国际金融中心商场)	31.238492	121.497902	Shopping Mall

Obtained from Foursquare API—Shopping mall category

3



Methodology and Results

What are the main factors should taken into account?

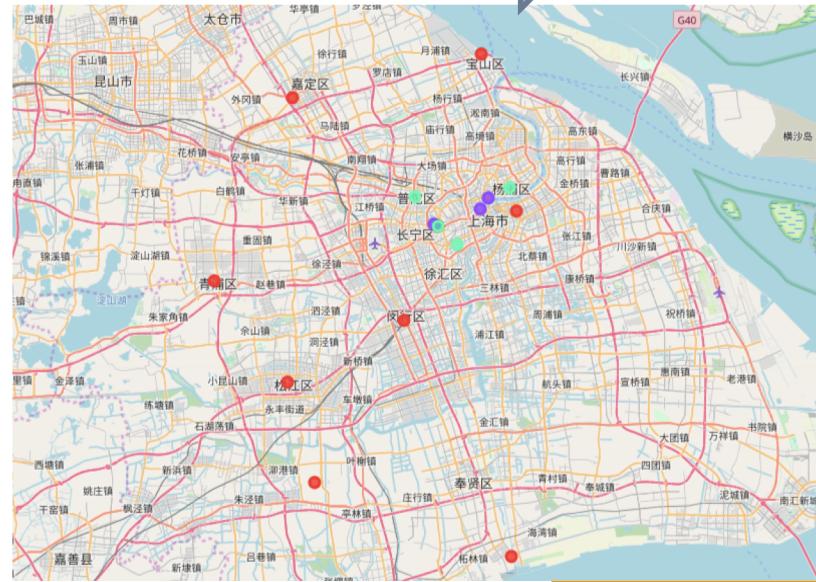
Population Density Analysis

Important to have a larger customer base—high population density

K-means algorithm

Neighborhood	Latitude	Longitude	Density/(km^2)	Cluster Labels	
7	Pudong	31.23513	121.52759	6845	0
8	Baoshan District	31.41639	121.48000	7465	0
9	Minhang District	31.10880	121.37472	3378	0
10	Jiading District	31.36637	121.22153	4523	0
11	Jinshan District	30.92025	121.25199	1362	0
12	Songjiang District	31.03595	121.21460	2906	0
13	Qingpu District	31.15394	121.11408	1804	0
14	Fengxian District	30.83381	121.52128	1687	0
15	Chongming District	31.21739	121.42105	587	0
0	Huangpu District	31.23780	121.47810	32190	1
3	Jing'an District	31.22000	121.41583	27000	1
5	Hongkou District	31.25000	121.48917	34501	1
1	Xuhui District	31.19594	121.44709	19889	2
2	Changning District	31.21739	121.42105	18044	2
4	Putuo District	31.25100	121.38970	23491	2
6	Yangpu District	31.26193	121.51904	21657	2

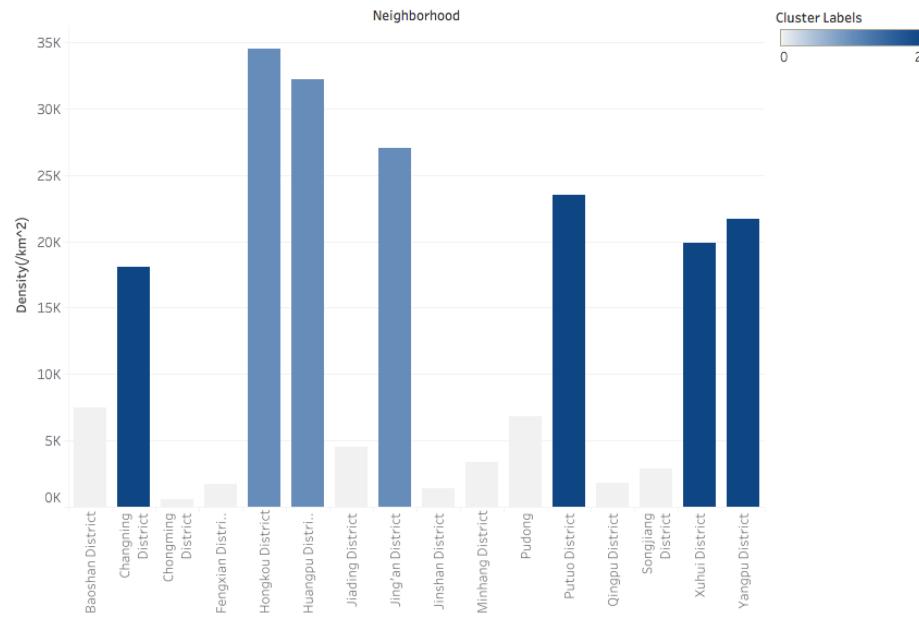
Three Clusters
Map Visualization



(Red: Cluster 0, Purple: Cluster 1, Green: Cluster 2)

Result

Population Density



Sum of Density(/km²) for each Neighborhood. Color shows sum of Cluster Labels.

Cluster 1 and 2 have relatively larger population density

Candidate List
Changning
Putuo
Yangpu
Huangpu
Jing'an
Hongkou
Xuhui

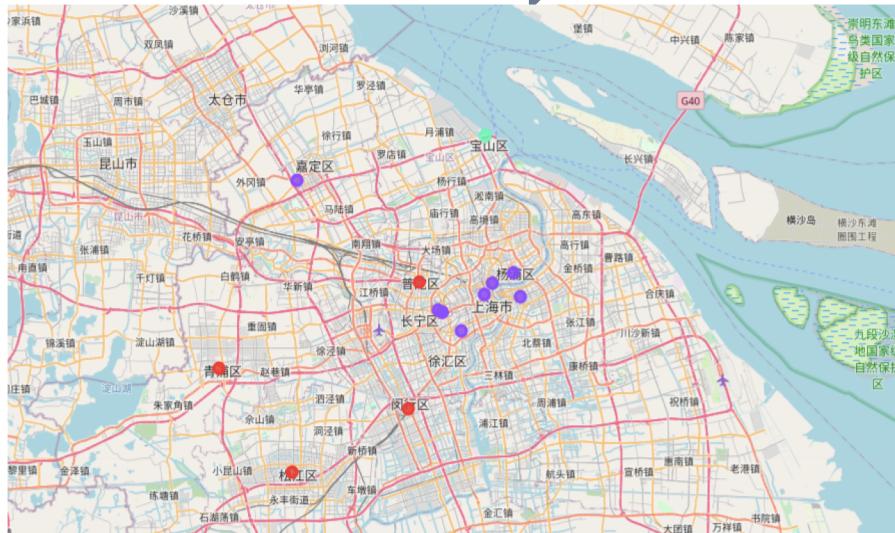
Competition Analysis

competitive advantage in location – low shopping mall density

K-means algorithm

	Neighborhood	Shopping Mall	Cluster Labels	Latitude	Longitude	Density(/km^2)
8	Minhang District	0.076923	0	31.10880	121.37472	3378
10	Putuo District	0.077922	0	31.25100	121.38970	23491
11	Qingpu District	0.111111	0	31.15394	121.11408	1804
12	Songjiang District	0.095238	0	31.03595	121.21460	2906
1	Changning District	0.020000	1	31.21739	121.42105	18044
2	Chongming District	0.020000	1	31.21739	121.42105	587
3	Fengxian District	0.000000	1	30.83381	121.52128	1687
4	Hongkou District	0.030000	1	31.25000	121.48917	34501
5	Huangpu District	0.050000	1	31.23780	121.47810	32190
6	Jiading District	0.000000	1	31.36637	121.22153	4523
7	Jing'an District	0.020000	1	31.22000	121.41583	27000
9	Pudong	0.050000	1	31.23513	121.52759	6845
13	Xuhui District	0.010000	1	31.19594	121.44709	19889
14	Yangpu District	0.020833	1	31.26193	121.51904	21657
0	Baoshan District	0.166667	2	31.41639	121.48000	7465

Three Clusters
Map Visualization



(Red: Cluster 0, Purple: Cluster 1, Green: Cluster 2)

Result

Cluster 1 have lower shopping mall concentrated districts

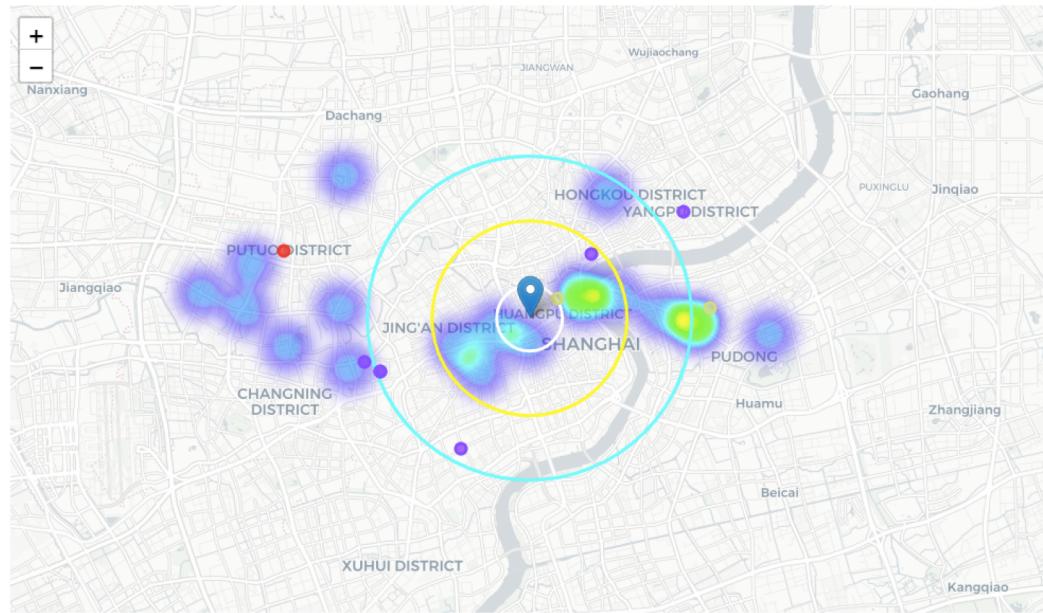
Candidate List
Changning
Chongming
Fengxian
Huangpu
Hongkou
Jiading
Pudong
Xuhui
Yangpu
Jing'an

Visibility Analysis

Close to the city center—attract not only local residents but also tourists

Heat Map
Map Visualization

Within radius of 1000,
3000, 5000 km from the
city center



Result

Districts that are within the range

Candidate List
Chongming
Huangpu
Hongkou
Xuhui
Jing'an

4



Discussion

How to combine the results?

Rank in Top 5 for each result

Result/ Rank	Population	Competition	Visibility
1	Hongkou	Jiading & Fengxian	Huangpu
2	Huangpu	Xuhui	Hongkou
3	Jing'an	Changning, Chongming & Jing'an	Xuhui
4	Putuo	Yangpu	Chongming
5	Yangpu	Hongkou	Jing'an

According to this list, Hongkou District and Jing'an District appear in each three result, and Hongkou has a relatively better performance.

5. Conclusion

The purpose of this project is to find an optimal location/district to open a shopping mall in Shanghai. Data including population density, geographical coordinates, shopping mall data are obtained from both Wikipedia and Foursquare API. In the methodology part, three analysis are performed: population density analysis, competition analysis, and visibility analysis. K-means algorithm is mainly used to cluster the districts, and folium map is used for visualization. Tableau is also used for a visualization tool. The final result after analysis is that Hongkou District and Jing'an District are the optimal locations to open the shopping mall. And Hongkou might be preferred, since it has a relatively better performance—high population density, low shopping mall density, and better visibility (close to the city center). This result may benefit the stakeholders who are seeking market opportunity to open a shopping mall in Shanghai successfully.

Conclusion

Hongkou District



Jing'an District



6. Future Improvements

- Other factors can be considered:
Traffic/Transportation; Household Income...
- More accurate clustering approach
Train model; Deeper analysis
- Paid Foursquare API account:
Get more API calls and results returned





THANKS!