

Capstone Project - The Battle of Neighbourhoods

Taste of Manchester

Vicky Shao

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1. Introduction

I'm living in Manchester. Manchester is the nucleus of the largest metropolitan area in the north of England. The city is lovely and inclusive with people from different countries, cultures and classes, attracting tens of thousands of tourists every day. Spontaneously, the market potential of the catering business is very promising. But before starting a business to run a restaurant in this city, there are several questions that need to be considered seriously -- What kind of restaurant is best to open? Where is the best place to set up the business? How our price strategy should be? et al.

All of the above questions can be answered by data. Therefore, the purpose of this project is to identify the best business opportunity to open a restaurant in Manchester city by analysing and interpreting the data.

2. Data Acquisition

In order to find the answers of the above questions, the following data will be utilised in this project:

1. The coverage of the postcode districts of Manchester from Wikipedia
(https://en.wikipedia.org/wiki/M_postcode_area)
2. The geospatial data of each area in Manchester according to the postcode. This information can be found online: <https://www.doogal.co.uk/UKPostcodes.php>
3. Data from Foursquare will be used to provide information about which types of venues and restaurants are popular in each area of Manchester.

From these datasets, I can get the geospatial data of each coverage in Manchester. Then based on the geospatial data, information from Foursquare can be fetched to analyse the venues distribution, and even further the restaurants' distribution in Manchester. Finally, I think all the information will help me find the key factors to open a restaurant in the city with the highest possibility to succeed.

3.Exploratory Data Analysis

3.1 Visualise the Geospatial Data

Based on information from Wikipedia, I find that one of the ways to define the geographical areas of Manchester is using the postcode districts. Each postcode is corresponding to a certain coverage, which can be used to analyse the position of the restaurant. Manchester postcode districts and coverage were extracted from Wikipedia with a BeautifulSoup library, shown in Table 1. There are 52 postcode districts in Manchester.

	Postcode district	Coverage
0	M1	Piccadilly, City Centre, Market Street
1	M2	Deansgate, City Centre
2	M3(Sectors 1, 2, 3, 4 and 9)	City Centre, Deansgate, Castlefield
3	M3(Sectors 5, 6 and 7)	Blackfriars, Greengate, Trinity
4	M4	Ancoats, Northern Quarter, Strangeways

Table 1. Sample of the postcode district and coverage data of Manchester

In order to use the Foursquare API, it's essential to get the coordinates information of each borough. The coordinates information can be found online and is saved into a .csv file for the use of use.

	Postcode district	Latitude	Longitude
0	M1	53.479635	-2.230093
1	M2	53.476203	-2.247281
2	M3(Sectors 1, 2, 3, 4 and 9)	53.487457	-2.247121
3	M3(Sectors 5, 6 and 7)	53.483616	-2.248861
4	M4	53.482435	-2.236254

Table 2. Sample of the Geospatial Information of Different District in Manchester

The preceding two table are joined to get a table showing the geospatial coordinates of each coverage in Manchester, shown in Table 3.

	Postcode district	Coverage	Latitude	Longitude
0	M1	Piccadilly, City Centre, Market Street	53.479635	-2.230093
1	M2	Deansgate, City Centre	53.476203	-2.247281
2	M3(Sectors 1, 2, 3, 4 and 9)	City Centre, Deansgate, Castlefield	53.487457	-2.247121
3	M3(Sectors 5, 6 and 7)	Blackfriars, Greengate, Trinity	53.483616	-2.248861
4	M4	Ancoats, Northern Quarter, Strangeways	53.482435	-2.236254

Table 3. Sample of the Geospatial Information of Different Coverages in Manchester

Based on the table 3, a map of Manchester is created, in which all coverages are circled out.

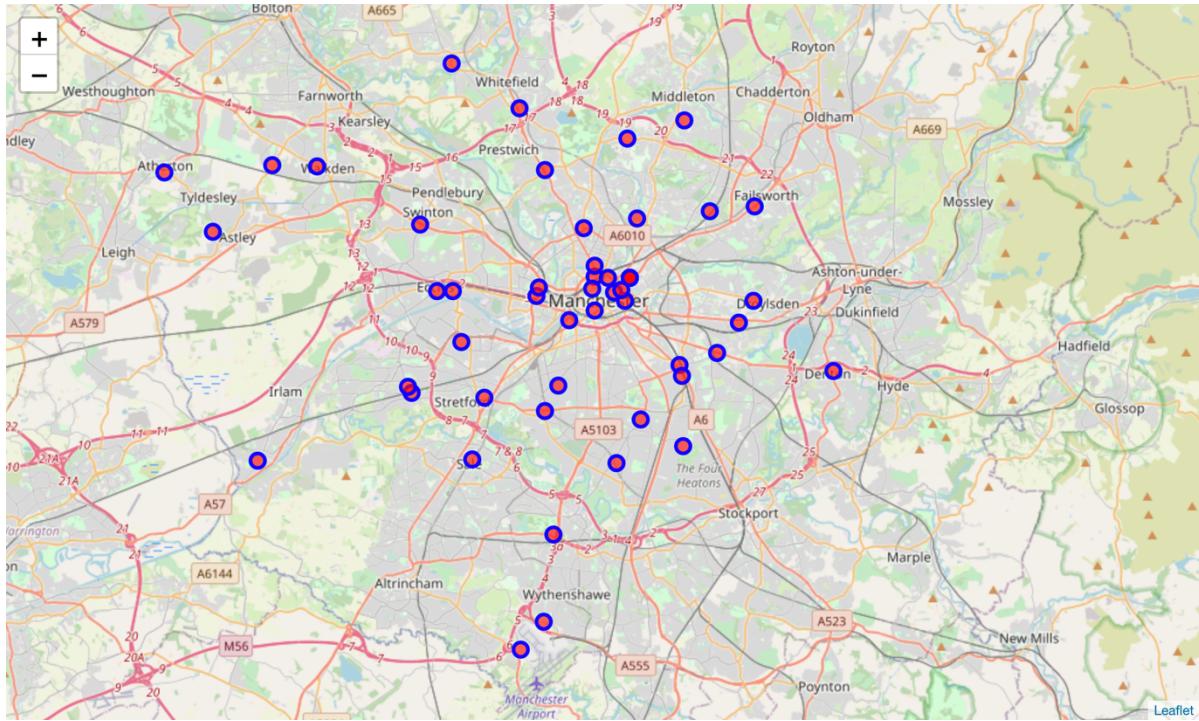


Fig 1. The Map of Manchester and Its 52 Postcode Districts

Then the Foursquare API is utilised to introduce details about the venues around each coverage in Manchester. The venue information is extracted shown as Table 4.

Coverage	Coverage Latitude	Coverage Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0 Piccadilly, City Centre, Market Street	53.479635	-2.230093	Takk	53.481130	-2.232531	Coffee Shop
1 Piccadilly, City Centre, Market Street	53.479635	-2.230093	Northern Monk Refectory	53.481286	-2.232283	Beer Bar
2 Piccadilly, City Centre, Market Street	53.479635	-2.230093	Tariff & Dale	53.481002	-2.232894	Bar
3 Piccadilly, City Centre, Market Street	53.479635	-2.230093	Idle Hands	53.481288	-2.233041	Coffee Shop
4 Piccadilly, City Centre, Market Street	53.479635	-2.230093	Port Street Beer House	53.482054	-2.231739	Beer Bar

Table 4. Sample of the Geospatial Information of Different Coverages in Manchester

3.2 The location of the restaurant

For the purpose to open a restaurant, I want to find an area which has a large flow of people. Generally speaking, the area with more venues means more people area active around the area. Therefore, I grouped the data in Table 4 by coverage and count the number of venues for each coverage returned by Foursquare. The result is shown in Fig.2. We can find that, coverages including Piccadilly, City Centre, Market Street, Deansgate, Blackfriars, Greengate, Trinity, Manchester X, JD Williams have distinctly higher numbers of venues than other areas.

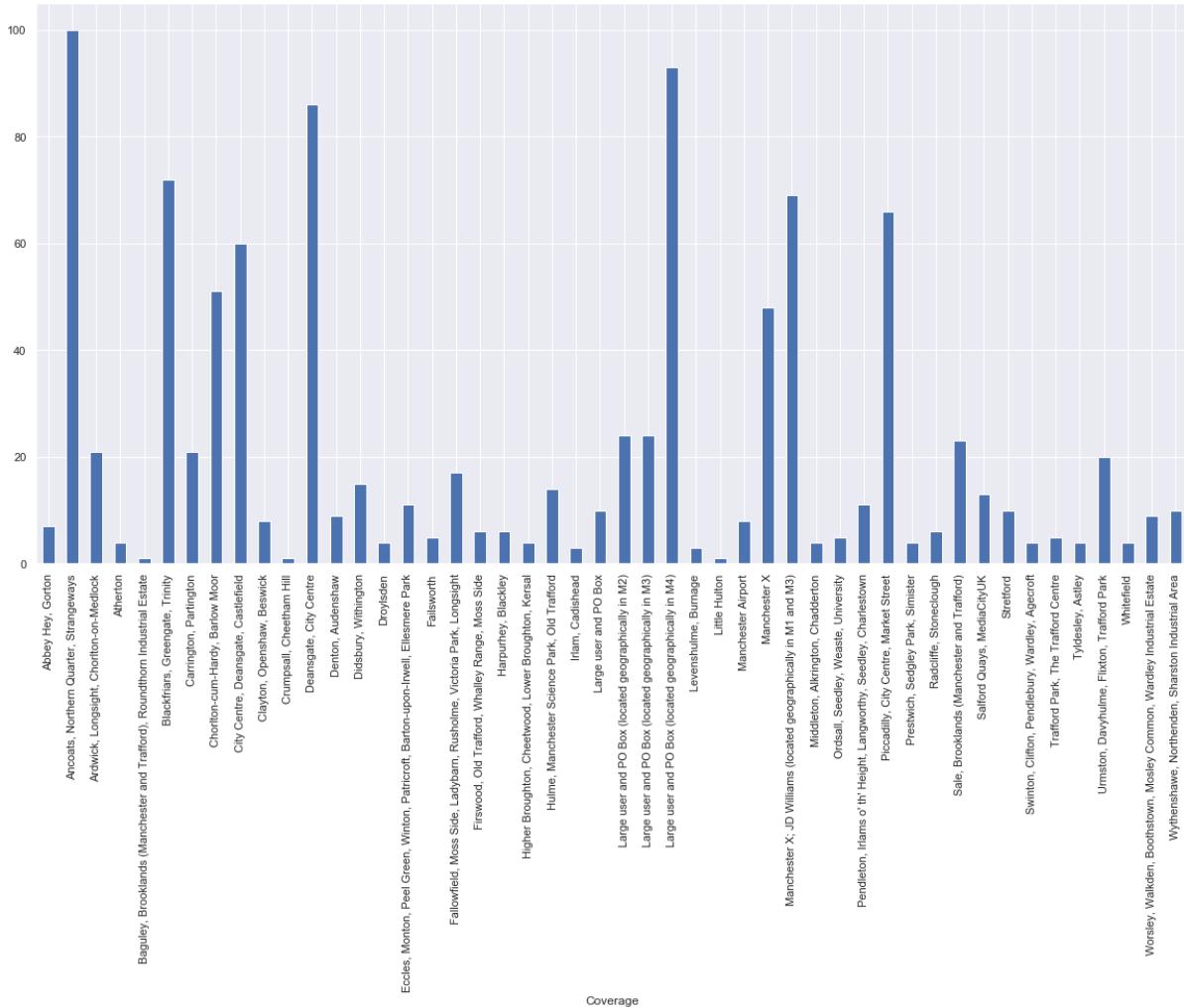


Fig 2. Number of Venues in Different Coverages in Manchester

Ulteriorly, since this report focuses on finding suggestions for opening a restaurant in Manchester, I did a filter on the records given back from Foursquare. By using the categories endpoint of Foursquare, I find there are 10 kinds of parent-categories for the venue categories, among which a type “Food” can be used to identify all the venues related to food. Table 5 shows the filtered results. It displayed every single restaurant in Manchester with all information we cared, such as the precise coordinates, the coverage it locates in, the venue name, the restaurant type, et al.

	Coverage	Coverage Latitude	Coverage Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Parent Category
0	Piccadilly, City Centre, Market Street	53.479635	-2.230093	Takk	53.481130	-2.232531	Coffee Shop	Food
1	Piccadilly, City Centre, Market Street	53.479635	-2.230093	Idle Hands	53.481288	-2.233041	Coffee Shop	Food
2	Piccadilly, City Centre, Market Street	53.479635	-2.230093	Ezra & Gil	53.482068	-2.232842	Coffee Shop	Food
3	Piccadilly, City Centre, Market Street	53.479635	-2.230093	Fig and Sparrow	53.482626	-2.235609	Coffee Shop	Food
4	Piccadilly, City Centre, Market Street	53.479635	-2.230093	Ancoats Coffee Co	53.483536	-2.227407	Coffee Shop	Food

Table 5. The Information of All Venues in Manchester Belonging to Category Food.

The data is grouped by in the same way as above-mentioned for all venues. The number of restaurants in each coverage in Manchester is shown in Fig.3. Unsurprisingly, Fig. 3 has a same pattern of distribution as Fig.2.

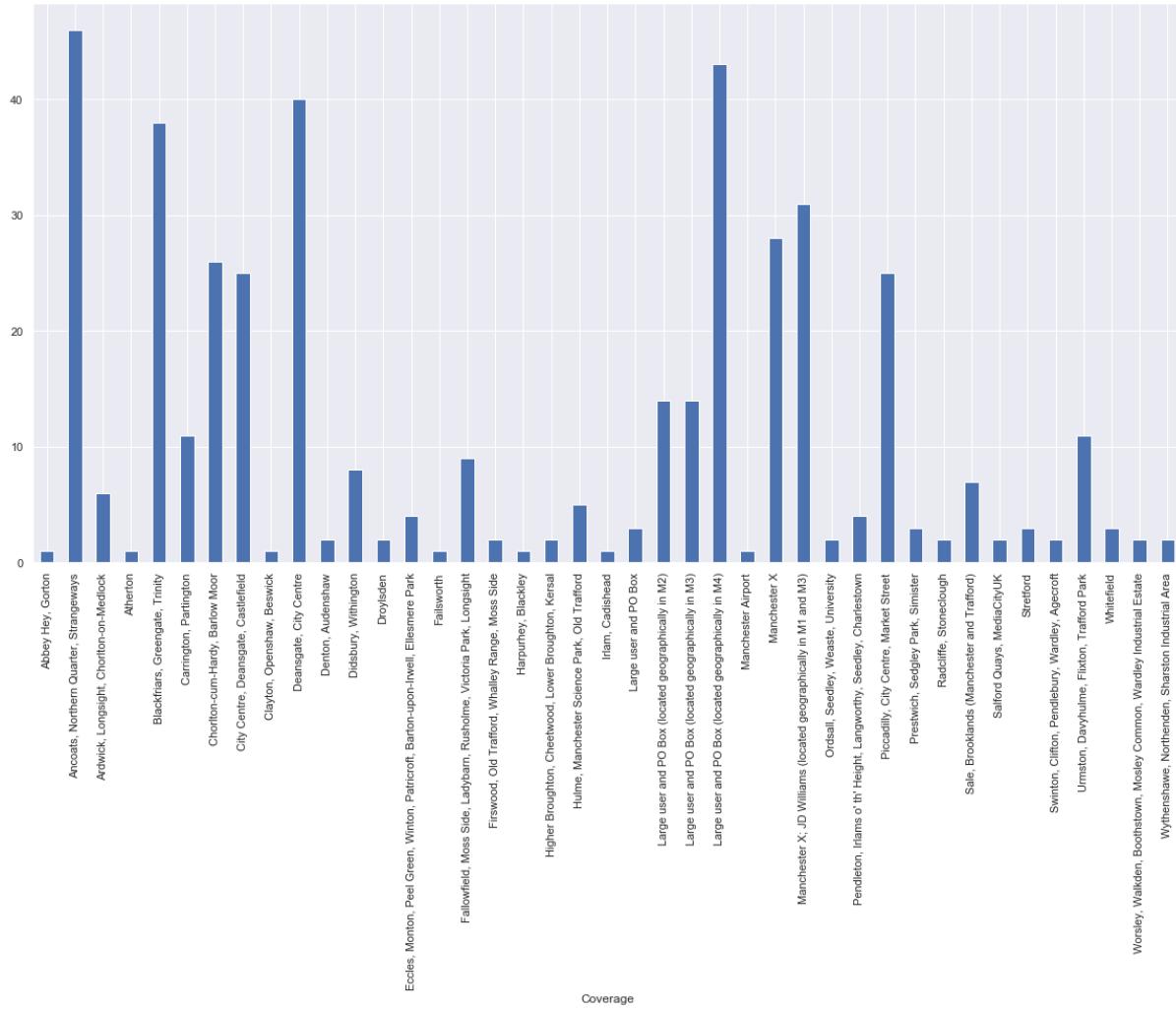


Fig 3. Number of Restaurants in Different Coverages in Manchester

3.3 The type of the restaurant

Beside the location of the restaurant, another important question we need to consider is to what kind of food does the restaurant serve will have the highest possibility to succeed.

Considering people's preferences are various, I clustered the coverages based on the 5 most common types of restaurants around the coverages by k-means clustering algorithm. With this analysis, I want to find that what is the most welcomed food type in different areas. The result of the clustering can be visualised in Fig. 4, with different colours of the circle indicates different clusters.

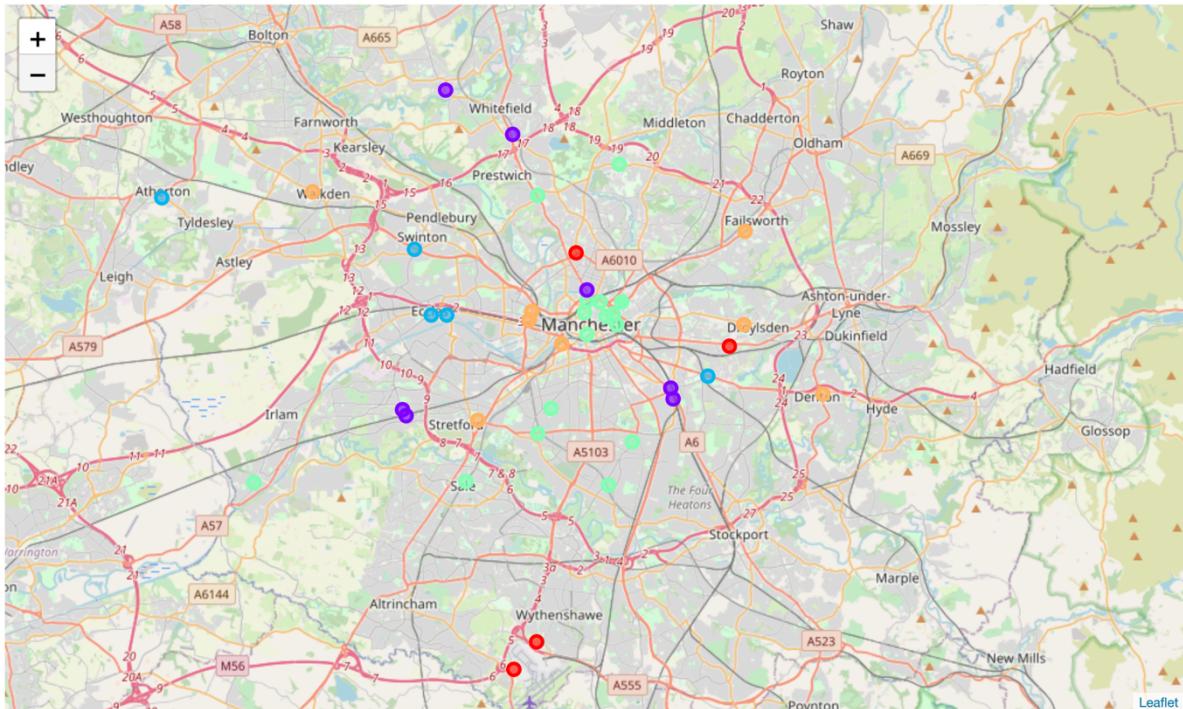


Fig 4. Clustering Result

Table 5 ~ Table 9 are the results showing the clusters of coverages based on their taste of food. Take Table 5 as an example, we can easily see that there are many Vietnamese Restaurant, Greek Restaurant, Coffee Shop and Fried Chicken Joint within these coverages. It is likely that these types of food are very welcome in these areas.

	Coverage	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Postcode district
8	Clayton, Openshaw, Beswick	Coffee Shop	Vietnamese Restaurant	Greek Restaurant	Fried Chicken Joint	Food Truck	M11
18	Higher Broughton, Cheetwood, Lower Broughton, ...	Bagel Shop	Coffee Shop	Vietnamese Restaurant	Chinese Restaurant	Fried Chicken Joint	M7
25	Manchester Airport	Coffee Shop	Vietnamese Restaurant	Greek Restaurant	Fried Chicken Joint	Food Truck	M90
40	Wythenshawe, Northenden, Sharston Industrial Area	Coffee Shop	Vietnamese Restaurant	Greek Restaurant	Fried Chicken Joint	Food Truck	M22

Table 5. Coverages and Their Five Most Common Restaurants in Cluster 0

	Coverage	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Postcode district
2	Ardwick, Longsight, Chorlton-on-Medlock	Indian Restaurant	Fast Food Restaurant	Dessert Shop	Vietnamese Restaurant	Chinese Restaurant	M12
2	Ardwick, Longsight, Chorlton-on-Medlock	Indian Restaurant	Fast Food Restaurant	Dessert Shop	Vietnamese Restaurant	Chinese Restaurant	M13
5	Carrington, Partington	Indian Restaurant	Italian Restaurant	Café	Pizza Place	Steakhouse	M31
21	Large user and PO Box	Pizza Place	Turkish Restaurant	Indian Restaurant	Caucasian Restaurant	Food Truck	M60(Sector 9)
32	Radcliffe, Stoneclough	Gastropub	Indian Restaurant	Chinese Restaurant	Fried Chicken Joint	Food Truck	M26
37	Urmston, Davyhulme, Flixton, Trafford Park	Indian Restaurant	Italian Restaurant	Café	Pizza Place	Steakhouse	M41
38	Whitefield	Indian Restaurant	Bakery	Vietnamese Restaurant	Chinese Restaurant	Fried Chicken Joint	M45

Table 6. Coverages and Their Five Most Common Restaurants in Cluster 1

	Coverage	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Postcode district
0	Abbey Hey, Gorton	Sandwich Place	Vietnamese Restaurant	Caucasian Restaurant	Fried Chicken Joint	Food Truck	M18
3	Atherton	Sandwich Place	Vietnamese Restaurant	Caucasian Restaurant	Fried Chicken Joint	Food Truck	M46
13	Eccles, Monton, Peel Green, Winton, Patricroft...	Sandwich Place	Fast Food Restaurant	Chinese Restaurant	Vietnamese Restaurant	Caucasian Restaurant	M30
34	Salford Quays, MediaCityUK	Sandwich Place	Vietnamese Restaurant	Caucasian Restaurant	Fried Chicken Joint	Food Truck	M50
36	Swinton, Clifton, Pendlebury, Wardley, Agecroft	English Restaurant	Sandwich Place	Vietnamese Restaurant	Caucasian Restaurant	Fried Chicken Joint	M27

Table 7. Coverages and Their Five Most Common Restaurants in Cluster 2

	Coverage	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Postcode district
1	Ancoats, Northern Quarter, Strangeways	Coffee Shop	Pizza Place	Tea Room	Café	American Restaurant	M4
4	Blackfriars, Greengate, Trinity	Coffee Shop	Italian Restaurant	Restaurant	Sandwich Place	Asian Restaurant	M3(Sectors 5, 6 and 7)
6	Chorlton-cum-Hardy, Barlow Moor	Pizza Place	Café	Coffee Shop	Deli / Bodega	Turkish Restaurant	M21
7	City Centre, Deansgate, Castlefield	Italian Restaurant	Coffee Shop	Tea Room	Indian Restaurant	American Restaurant	M3(Sectors 1, 2, 3, 4 and 9)
9	Deansgate, City Centre	Italian Restaurant	Coffee Shop	Restaurant	Asian Restaurant	Café	M2
11	Didsbury, Withington	Pizza Place	Vegetarian / Vegan Restaurant	Thai Restaurant	Café	Restaurant	M20
15	Fallowfield, Moss Side, Ladybarn, Rusholme, Vi...	Fast Food Restaurant	Pizza Place	Asian Restaurant	Greek Restaurant	Fish & Chips Shop	M14
16	Firswood, Old Trafford, Whalley Range, Moss Side	Tibetan Restaurant	Chinese Restaurant	Vietnamese Restaurant	Caucasian Restaurant	Fried Chicken Joint	M16
17	Harrowhey, Blackley	Breakfast Spot	Vietnamese Restaurant	Chinese Restaurant	Fried Chicken Joint	Food Truck	M9
20	Irlam, Cadishead	Food Truck	Vietnamese Restaurant	Greek Restaurant	Fried Chicken Joint	Food Court	M44
22	Large user and PO Box (located geographically ...)	Coffee Shop	Italian Restaurant	Vietnamese Restaurant	Restaurant	Fish & Chips Shop	M60(Sectors 2 and 8)
23	Large user and PO Box (located geographically ...)	Coffee Shop	Italian Restaurant	Vietnamese Restaurant	Restaurant	Fish & Chips Shop	M60(Sectors 3 and 9)
24	Large user and PO Box (located geographically ...)	Coffee Shop	Italian Restaurant	American Restaurant	Burger Joint	Pizza Place	M60(Sectors 4 and 0)
26	Manchester X	Coffee Shop	Italian Restaurant	Vietnamese Restaurant	Restaurant	Fish & Chips Shop	M60(Sectors 5 and 6)
26	Manchester X	Coffee Shop	Italian Restaurant	Vietnamese Restaurant	Restaurant	Fish & Chips Shop	M61
27	Manchester X; JD Williams (located geographica...	Coffee Shop	Tea Room	Pizza Place	Café	Indian Restaurant	M99
30	Piccadilly, City Centre, Market Street	Coffee Shop	Tea Room	Bakery	Italian Restaurant	Sandwich Place	M1
31	Prestwich, Sedgley Park, Simister	Pizza Place	Asian Restaurant	Deli / Bodega	Vietnamese Restaurant	Fried Chicken Joint	M25
33	Sale, Brooklands (Manchester and Trafford)	Italian Restaurant	Coffee Shop	Greek Restaurant	Thai Restaurant	Burger Joint	M33

Table 8. Coverages and Their Five Most Common Restaurants in Cluster 3

	Coverage	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Postcode district
10	Denton, Audenshaw	Fast Food Restaurant	Café	Vietnamese Restaurant	Chinese Restaurant	Fried Chicken Joint	M34
12	Droylsden	Fast Food Restaurant	Chinese Restaurant	Vietnamese Restaurant	Greek Restaurant	Fried Chicken Joint	M43
14	Falsworth	Fast Food Restaurant	Vietnamese Restaurant	Greek Restaurant	Fried Chicken Joint	Food Truck	M35
19	Hulme, Manchester Science Park, Old Trafford	Gastropub	Fast Food Restaurant	Restaurant	Caucasian Restaurant	Fried Chicken Joint	M15
28	Ordsall, Seedley, Weaste, University	Fast Food Restaurant	Burger Joint	Vietnamese Restaurant	Chinese Restaurant	Fried Chicken Joint	M5
29	Pendleton, Irlams o' th' Height, Langworthy, S...	Fast Food Restaurant	Burger Joint	Coffee Shop	Vietnamese Restaurant	Chinese Restaurant	M6
35	Stretford	Food Court	Fast Food Restaurant	Coffee Shop	Vietnamese Restaurant	Greek Restaurant	M32
39	Worsley, Walkden, Boothstown, Mosley Common, W...	Fast Food Restaurant	Coffee Shop	Vietnamese Restaurant	Greek Restaurant	Fried Chicken Joint	M28

Table 9. Coverages and Their Five Most Common Restaurants in Cluster 4

For each of the 5 cluster, I accumulated the number of each kind of restaurants in the five most common venues in the corresponding coverages. The plots are shown below as Fig.5.



Fig 5. Plots for the Five Clusters

4. Results and Discussion

As analysed and demonstrated above, we can find that:

- For almost all the coverages, the number of restaurants is about 50% of the number of all kinds of venues, which shows a huge demands of catering services.
- Areas such as Piccadilly, City Centre, Market Street, Deansgate, Blackfriars, Greengate, Trinity, Manchester X, JD Williams have distinctly higher numbers of restaurants than other areas. It leads to more opportunities as well as more competitions, as there will have sufficient customer flows within these areas, but you also need to stand out from other restaurants.
- Each cluster of coverages has significant difference in the preference of the food type.
- To start a catering business in Piccadilly, City Centre, Market Street, Deansgate, Blackfriars, Greengate, Trinity, Manchester X, JD Williams, these areas, Coffee shop, Italian restaurant, Vietnamese Restaurant and Pizza Place are some good choices.
- However, if you have already decided the type of the restaurant, e.g, an Indian restaurant, coverages in Cluster 1 could be more suitable.

5. Conclusion

In this project, I have approached to get data from web resources like Wikipedia, Foursquare API and ultised python libraries like Geopy, folium, BeautifulSoup and so on to set up a very realistic data-analysis scenario. I analysed the venues and restaurants distribution in different areas in Manchester and found the most popular types of restaurants in different areas.

Finally, I would recommend opening a coffee shop or Italian restaurant in the following places: Piccadilly, Market Street, Deansgate, Blackfriars, Greengate, Trinity or Manchester X.