Capstone assignment – the battle of neighborhoods

Sushi and ramen noodle business case in the Norwegian capital Oslo

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1. Introduction to the business problem

You work in the analytics division of an international food chain. The chain has become popular in Asia and North- America and is looking towards establishing a foothold in Europe. The chain has two kinds of restaurants – ramen noodle and sushi restaurants. The head of the strategy division asks you to analyze the market for sushi and noodle restaurants in the Norwegian capital, Oslo, and recommend which kind of restaurants to establish and in which boroughs. He tells you further that your input will be an important source of information for the executive team, who will take their decisions upon it and use it to carve out their strategy for entering Europe, beginning with Norway.

2. Data

We want the executive team to get a thorough understanding of the characteristics of Oslo. We decide to visualize the existing market for sushi and noodle restaurants within each Oslo borough through choropleth graphs, and use machine learning algorithms to show which borrows are similar and which are not.

The information sources we use to inform the executive on how to enter the Norwegian market are:

- A list of boroughs from Wikipedia: https://en.wikipedia.org/wiki/List_of_boroughs_of_Oslo

- FourSquare to search for existing sushi and noodle restaurants in each Oslo borough

- Coordinates for the Oslo boroughs from Statistcs Norway (to make the choropleth maps): https://kart.ssb.no/

From the table found in the Wikipedia page, we are able to segment Oslo into different boroughs. We can easily retrieve latitudes and longitudes of the boroughs from the Python Geopy library. These coordinates are then be used to search for sushi and noodle restaurants from FourSqaure within a 1 km. range of each coordinate.

We count the number of sushi and noodle restaurant, respectively, located in each borough. We use these to create choropleth maps of the Oslo boroughs showing the density of sushi and noodle restaurants in Oslo. Statistics Norway provides coordinates of Oslo boroughs that we can use to create choropleth maps.

3. Methodology

The purpose of the analysis is to understand where there are many sushi and noodle restaurants today. Boroughs that have a low density of sushi restaurants is likely not to have a market for neither sushi nor noodle restaurants. Boroughs with a high density of sushi restaurants and a low density of noodle restaurants is likely to be an ideal borough to open a new noodle restaurant, as the borough displays great demand for Asian food allready.

If there are boroughs with similar properties with the boroughs that have a high density of sushi restaurants, but has low sushi restaurant density, these boroughs are ideal for new sushi restaurants.

4. Analysis

We do some basic analysis to understand how many sushi and noodle restaurants that are established in Oslo, respectively, and how many of each are in the different Oslo boroughs.

Table 1 lists the number of sushi restaurants located in each Oslo borough, and table 2 lists the number of noodle restaurants in each Oslo borough.

Table 1. Number of sushi restaurants located in Oslo

	Borough	Borough Latitude	Borough Longitude	Venue_Category	Count	Borough_number	Borough_number1
0	Alna	59.932417	10.835276	Sushi restaurant	1	12	030112
1	Bjerke	59.941395	10.829208	Sushi restaurant	3	9	030109
2	Center	59.913330	10.738970	Sushi restaurant	50	16	030116
3	Frogner	59.922224	10.706649	Sushi restaurant	29	5	030105
4	Gamle Oslo	59.899237	10.734767	Sushi restaurant	3	1	030101
5	Grorud	59.961424	10.880549	Sushi restaurant	1	10	030110
6	Grünerløkka	59.925471	10.777421	Sushi restaurant	20	2	030102
7	Nordre Aker	59.953638	10.756412	Sushi restaurant	1	8	030108
8	Nordstrand	59.863525	10.785830	Sushi restaurant	2	14	030114
9	Sagene	59.938273	10.765849	Sushi restaurant	20	3	030103
10	St. Hanshaugen	59.927950	10.738958	Sushi restaurant	41	4	030104
11	Stovner	59.962140	10.922823	Sushi restaurant	1	11	030111
12	Søndre Nordstrand	59.835944	10.798496	Sushi restaurant	1	15	030115
13	Ullern	59.925818	10.665132	Sushi restaurant	2	6	030106
14	Østensjø	59.887563	10.832748	Sushi restaurant	2	13	030113

Table 2. Number of noodle restaurants located in Oslo

	Borough	Borough Latitude	Borough Longitude	Venue_category	Count	Borough_number	Borough_number1
0	Center	59.913330	10.738970	Noodle restaurant	2	16	030116
1	Frogner	59.922224	10.706649	Noodle restaurant	1	5	030105
2	Grünerløkka	59.925471	10.777421	Noodle restaurant	1	2	030102
3	St. Hanshaugen	59.927950	10.738958	Noodle restaurant	1	4	030104

There are 177 sushi restaurants located in Oslo in total. We can see that particularly five boroughs stand out with a high density of sushi restaurants: the city center, Frogner, Grunerløkka, Sagene and

St.Hanshaugen. In these five boruoghs a total of 160 sushi restaurants are located. There are only 5 noodle restaurants established in Oslo in total. All the noodle restaurants are established in boroughs with a high density of sushi restaurants. Only 4 out of 16 boroughs contain a noodle restaurant.

Figure 1 and figure 2 present Oslo maps showing the density of sushi and noodle restaurants, respectively.
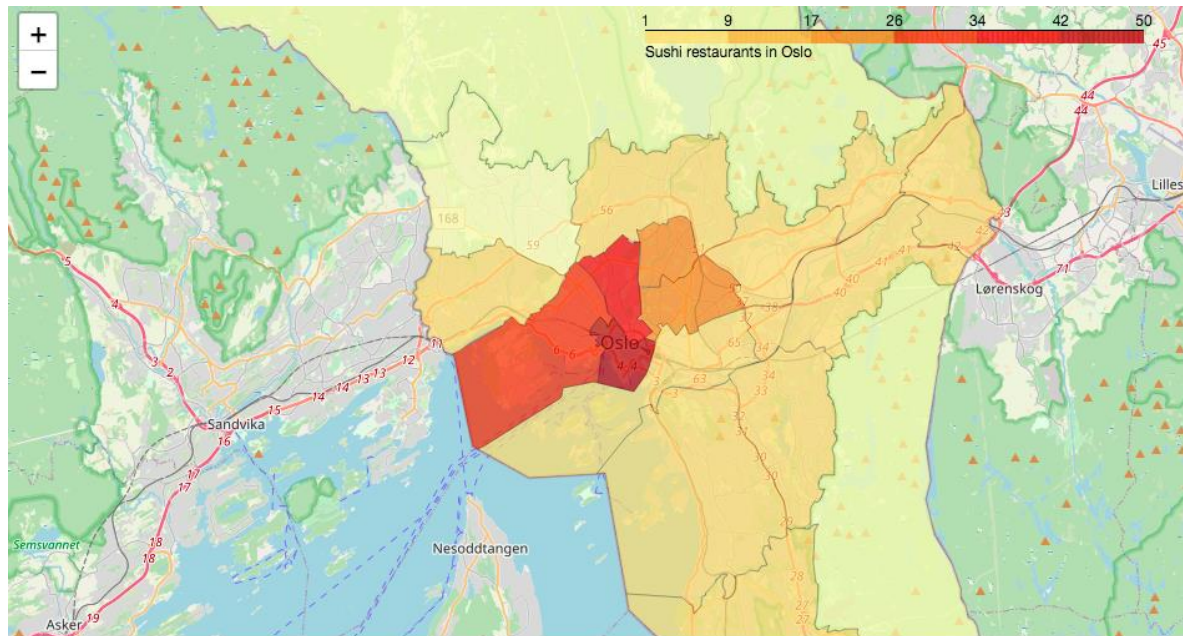
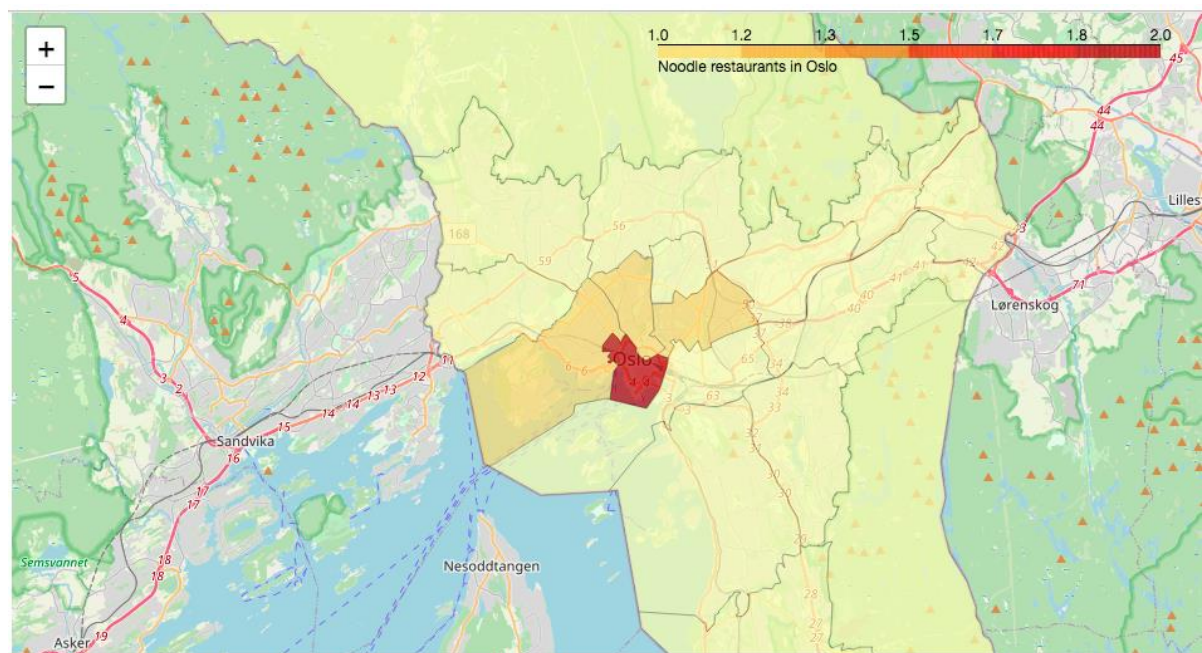Figure 1 Choropleth map of sushi restaurants located in Oslo boroughs

Figure 2 Choropleth map of noodle restaurants located in Oslo boroughs

Now that we know where the sushi restaurants are located, we can analyze the boroughs to see which of the boroughs are similar and which are not. Boroughs with few sushi restaurants that are similar to the boroughs with a high density of sushi restaurants are candidate boroughs to establish new restaurants.

We gather information on all venues located in the different boroughs. We count the type of venues in the boroughs and we use the unsupervised machine learning method k-means, to assess which of the boroughs are similar and which differ from one another, based on the top 10 venue types located in each borough. The number of clusters is set to 5. Figure 3 show how the boroughs cluster.

Figure 3 Similarity of Oslo boroughs based on k-means
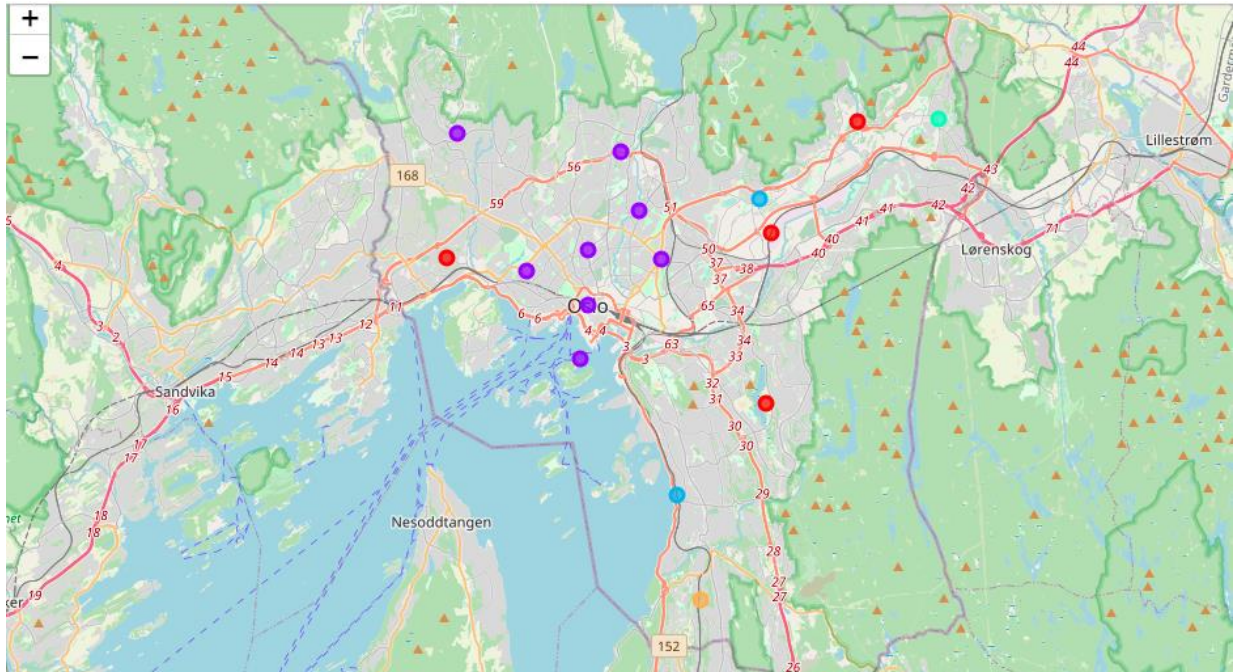
The boroughs that have a high density of sushi restaurants (the six southern boroughs with purple color located in the middle of the map) are all similar to each other. In addition two other boroughs (Nordre Aker and Vestre Aker) located in the north of Oslo are similar to these 6 boroughs. These two boroughs contain few sushi restaurants and stand out as candidates for establishing new restaurants.

5.   Results and discussion

Our analysis shows that there are a great number of sushi restaurants located in Oslo, but very few noodle restaurants. Most of the sushi restaurants are located in mainly five boroughs. The few noodle restaurants that exist today are also located within these five boroughs. This suggests that there is great demand for Asian food in these five boroughs. You conclude that a noodle restaurant should be opened within one of these five boroughs. Looking at the city map you decide to recommend opening a noodle restaurant in the southern part of St. Hanshaugen, which is geographically closest to all of the five boroughs with a high sushi restaurant density.

Based on the k-means results, you also see that two boroughs have few sushi restaurants, but these are similar to the boroughs with a high density of sushi restaurants. You recommend opening a sushi restaurant in wither of the two boroughs.

6. Conclusion

The purpose of the analysis was to identify which boroughs are ideal for opening new sushi and/ or noodle restaurants. You have successfully identified five candidate boroughs for noodle restaurants, of which St. Hanshaugen seems to be most tempting based on its geographical location. You have also identified seven candidate boroughs for sushi restaurants, out of which 2 contain few competitors today.