The best spot for a curry in Norway: Oslo or Stavanger?

An analysis of which neighbourhood is best for a new Indian restaurant

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Capstone Project - The Battle of the Neighborhoods, Applied Data Science Capstone by IBM/Coursera

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1 Introduction

Indian cuisine is one of the most popular foods worldwide, and in Norway at least 75% of Norwegians enjoy a good curry.

This report is focused on finding the best location for a new restaurant and is specifically of interest to stakeholders wishing to open an **Indian restaurant in Norway**.

We take a look at the distribution of restaurants by **neighbourhood** in two major Norwegian cities: **Oslo**, the populous capital city, and **Stavanger**, the cosmopolitan petroleum industry hub.

The focus is narrowed to finding neighbourhoods in which restaurants exist but Indian restaurants are absent, or where no restaurants exist but other leisure activities indicate the potential for a successful venture.

Finally, an evaluation is made of which city and neighbourhood **location is optimal** for a new Indian restaurant.

2 Data

To solve the business problem, we need to know:

- whether there are **any restaurants** present for each neighbourhood in Oslo and Stavanger and
- if there are any, whether any of these restaurants are **Indian restaurants**
- or if there are none, whether there is the potential for a restaurant based on **other factors**.

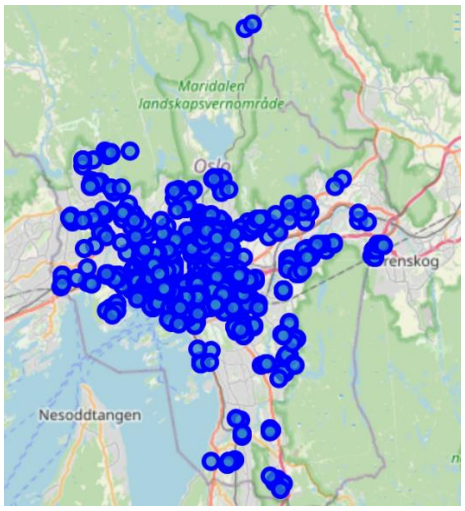
The data required to solve our business problem was sourced as follows:

- the approximate location of Oslo city and Stavanger city was obtained using geocoding and **Nominatim API** to access the OpenStreetMap location database;
- the names and locations of neighbourhoods in Oslo and in Stavanger was scraped from **Wiki Commons KML** files generated from OpenStreetMap then converted to csv;
- venues in each neighbourhood in Oslo and in Stavanger was obtained using the **Foursquare API**.

Oslo:

The coordinates are 59.913, 10.739 with 112 neighbourhoods and 1772 venues listed in 209 venue categories.

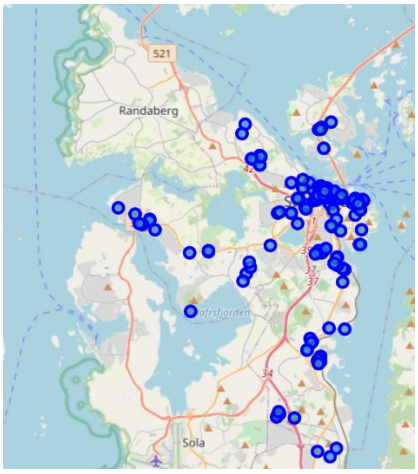
Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Abildsø	59.88	10.82	Abildsø tennisbane	59.879176	10.821553	Tennis Court
Abildsø	59.88	10.82	Abildsø 73 Bussen	59.880058	10.825420	Bus Station
Abildsø	59.88	10.82	Abildsø Grill & Pizza	59.880296	10.825413	Fast Food Restaurant
Abildsø	59.88	10.82	Gressbanen	59.880300	10.827307	Soccer Field
Adamstuen	59.93	10.73	L'ardoise	59.929322	10.732950	French Restaurant



Stavanger:

The coordinates for Stavanger are 59.102, 5.713, with 32 neighbourhoods and 203 venues in 76 venue categories.

Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Bekkefaret	58.950556	5.728611	Bussholdeplass	58.952187	5.729415	Bus Station
Bekkefaret	58.950556	5.728611	Prix	58.950971	5.727181	Grocery Store
Bekkefaret	58.950556	5.728611	Sykehuset vitunnel (B)	58.951588	5.731681	Bus Stop
Bekkefaret	58.950556	5.728611	St Svithun Hotell	58.952109	5.732264	Hotel
Bekkefaret	58.950556	5.728611	Stavanger St. Svithun Hostel	58.952170	5.732514	Hostel



3 Methodology

In the following section we explore the data from each city to get an idea of what data exists and whether it is usable to find the best location for a new venture. We begin by checking for discrepancies between the listed neighbourhoods from the open street map data vs foursquare venue data, and proceed to replacing/removing data that is incorrect so we have a clean database from which to carry out further analysis.

For each city we want to use the dataset to determine:

- which neighbourhoods do not have any restaurants and which do. Since we are interested in Indian restaurants in particular, we also want to know
- which neighbourhoods with a restaurant has an Indian restaurant and which neighbourhoods do not.

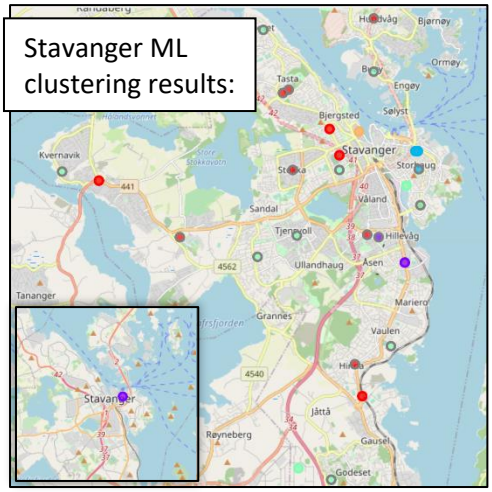
Statistical analysis reveals:

Neighbourhoods with:	Oslo	Stavanger
no restaurants	48	20
restaurants (types)	63 (35)	11 (13)
restaurants but not Indian	39	10
Indian restaurant(s)	24	1

Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue
Bergjeland	Hotel	Indian Restaurant	Bar	Coffee Shop

Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue
Gamle Stavanger	Bar	Hotel	Café	French Restaurant

Stavanger ML clustering results:



For Oslo, there are many neighbourhoods with an Indian restaurant and even more without one. Conversely, for Stavanger there is only 1 Indian restaurant listed and many neighbourhoods with no restaurants - this dataset is poor and insufficient to draw any real insight. However, it may be possible by comparing Stavanger to Oslo.

We can use onehot to reframe the data by venue category so we can further our statistical analysis.

Neighbourhood	Grocery Store	Coffee Shop	Café	Bakery	Bar
Grønland	2	6	2	0	8
Vaterland	3	5	4	0	6
Enerhaugen	0	5	2	1	7
Skillebekk	0	2	1	2	1
Bjørvika	0	3	0	1	1

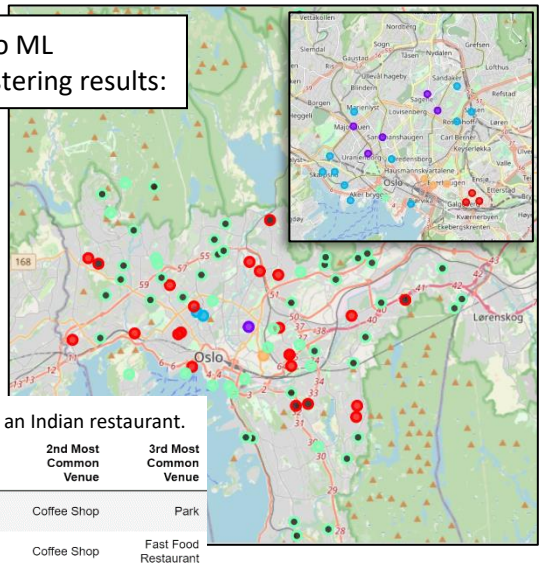
Neighbourhood	Grocery Store	Bar	Hotel	Coffee Shop
Bergjeland	0	3	4	3
Bekkefaret	1	0	1	0
Kampen	1	0	0	0
Vaulen	0	0	0	0
Varden	0	0	0	0

Format of Oslo and Stavanger venue data after onehot reframe.

To gain insight we divided the dataset, into
(i) neighbourhoods with an Indian restaurant,
(ii) neighbourhoods without Indian restaurants,
and found the top 10 venues for each neighbourhood.

We then used KMeans clustering machine learning to better understand what venues are popular in (i) neighbourhoods with an Indian restaurant and tested whether we could find neighbourhoods with similarly popular venues in (ii) neighbourhoods with no Indian restaurants.

Oslo ML clustering results:



Neighbourhoods with an Indian restaurant.

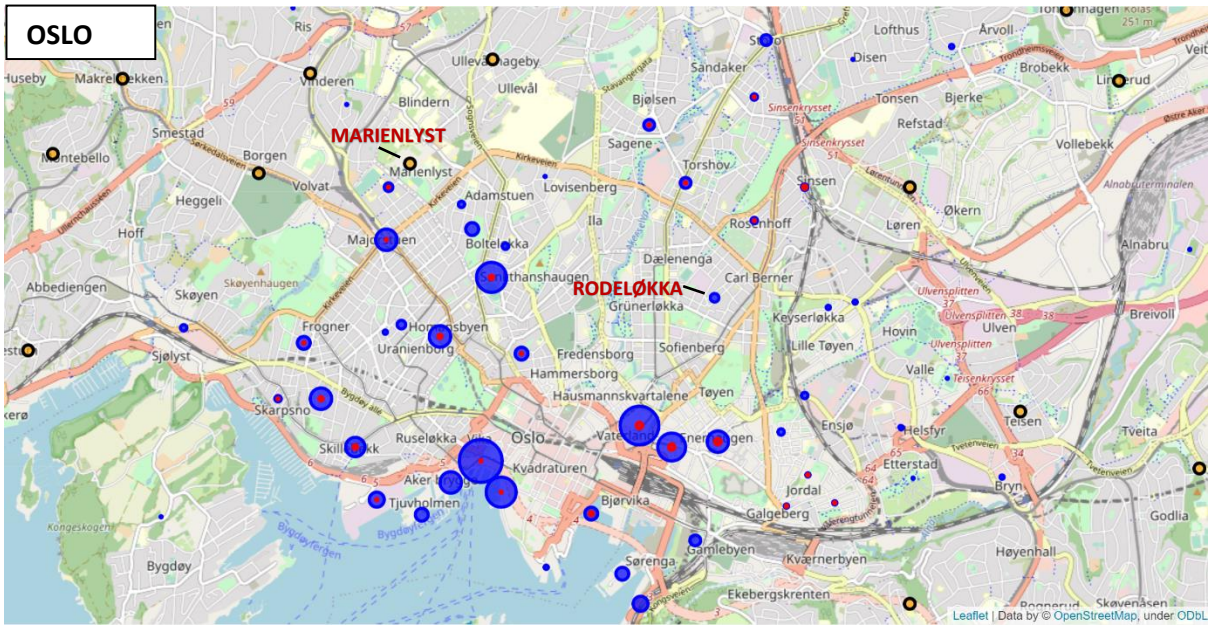
Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Enerhaugen	Bar	Coffee Shop	Park
Grønland	Bar	Coffee Shop	Fast Food Restaurant
Vaterland	Bar	Coffee Shop	Café

Neighbourhoods without an Indian restaurant.

Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue
Rodeløkka	Grocery Store	Pizza Place	Bus Station	Coffee Shop	Café	Bar

Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Kampen	Café	Bar	Coffee Shop

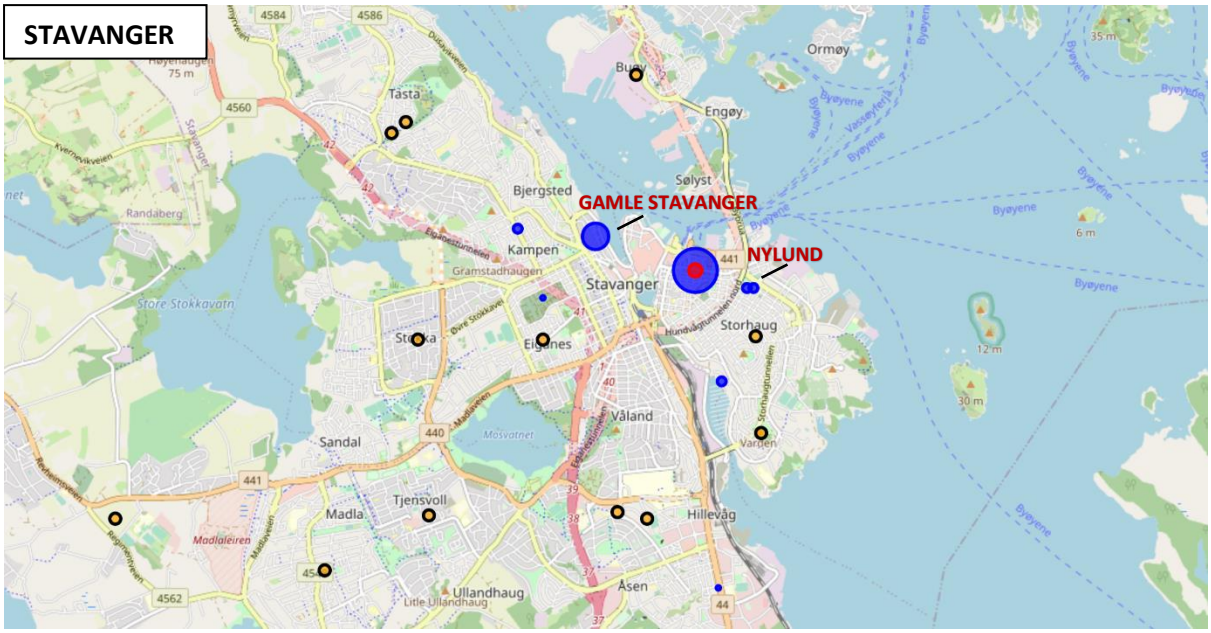
Map of Oslo and Stavanger showing the distribution of neighbourhoods and restaurant venues.



- Neighbourhoods with no restaurants
- Neighbourhoods with restaurants*
- Neighbourhoods with Indian restaurants**

*The size of the circle represents the number of restaurants present for that neighbourhood relative to other Oslo neighbourhoods with restaurants.

**The size of the circle represents the number of Indian restaurants present in that particular neighbourhood relative to other restaurants in that neighbourhood.



4 Results and Discussion

We successfully sourced, explored and analysed neighbourhood venue data for Oslo and Stavanger.

❖

In **Oslo**, approximately 57 % of neighbourhoods have at least one restaurant listed and only 22 % have an Indian restaurant. These neighbourhoods appear to be located mainly in the *central parts* of Oslo.

If we look closer, we see that neighbourhoods with the most Indian restaurants - Enerhaugen, Grønland, Vaterland - have *'Bar' and 'Coffee Shop'* listed as the 1st and 2nd most popular venues, respectively.

Neighbourhoods with similarly popular venues, but no Indian restaurants, are Kampen and Rodeløkka. Kampen is an old neighbourhood closer to areas where Indian restaurants are popular; whereas, Rodeløkka is a little further away and within the trendy Grunneløkka borough. Similarly, to a lesser extent, Adamstuen and Bolteløkka are neighbourhoods which have 'Pub' listed as a top 10 venue. Both are part of the St Hanshaugen borough, known for its park and close to schools.

However, these neighbourhoods already have restaurants present so we expand to the closest neighbourhoods without a restaurant: Teisen, Grefsen and Marienlyst. Teisen is primarily a residential area with many apartment blocks, Grefsen is also an outlying residential area. Marienlyst, however, incorporates NRK (TV broadcaster) headquarters as well as Oslo University Campuses.

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The **Stavanger** dataset was small. About 2/3 of neighourhoods have no restaurants listed, and the rest are scattered across the city. Only 1 Indian restaurant is listed in Bjergeland, *central* Stavanger.

Bjergeland is also associated with *'Bar' and 'Coffee Shop'* – similar to neighbourhoods in Oslo with an Indian restaurant.

The only neighbourhood in Stavanger with similarly popular venues is Gamle Stavanger, but this neighbourhood already has many restaurants listed. The closest neighbourhoods to central Stavanger are Eiganes and Nylund. Eiganes is a historic and affluent residential area; while, Nylund is an old neighbourhood closer to downtown in the Storhaug borough,vested for improvement.

5 Conclusion

This report was focused on finding the best location in which to open an Indian restaurant in Norway, in either the city of Oslo or Stavanger.

While Indian cuisine is popular with Norwegians, the data shows that this is not reflected in the number of Indian restaurants listed – Stavanger has only one and just 20 % of all restaurants in Oslo are Indian food. These restaurants are concentrated close to downtown for both the cities of Oslo and Stavanger.

Our analysis suggests that Indian restaurants are common in neighbourhoods where bars and coffee shops (and possibly pubs) are the most popular venues.

❖

For **Oslo**, based on our data analysis and neighbourhood synopsis given in the discussion, we recommend the neighbourhoods of:

- *Rodeløkka*, in the trendy Grunnerløkka borough with an already established restaurant scene; or
- *Marienlyst*, located closer to downtown and serving a University campus and TV headquarters.

Other potential neighbourhoods are *Kampen* in the east, *Adamstuen* and *Bolteløkka* to the west, as well as the outlying neighbourhoods of *Tiesen* and *Grefsen*.

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Stavanger is a smaller city and the sparse dataset makes drawing a conclusion difficult. We therefore compared this to our trend results from Oslo and can suggest the following as potential locations:

- *Gamle Stavanger*, an already established restaurant area but very popular with tourists and locals; or
- *Nylund*, an old area close to downtown in the Storhaug borough currently vested for improvements.

Another potential area which may require further investigation is the affluent *Eiganes* neighbourhood.

6 Link to presentation

For an overview of the study check out this blog.