

# New Seafood Restaurant in Aarhus

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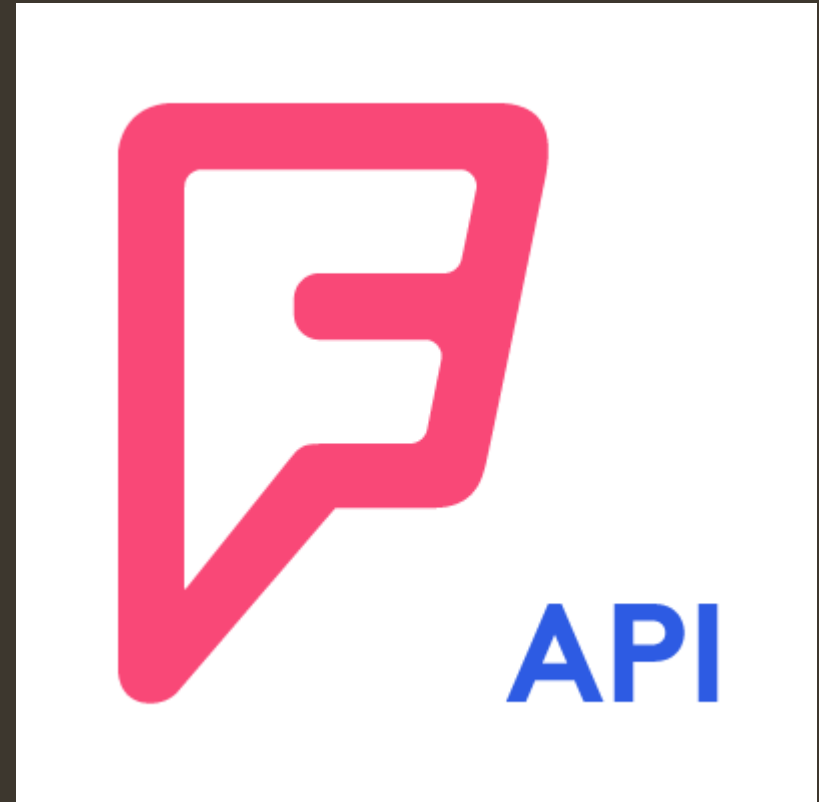


# Introduction

- Aarhus – second largest city in Denmark – is a growing dynamic city
- Aarhus is a good location for a new restaurant
- We try to find a good location for the restaurant from these criteria:
  - There must be something interesting close by the restaurant
  - It should be located where few other food venues are
  - It should be located far from other seafood restaurants
- We use a k-means clustering analysis in order to find good neighbourhoods for the restaurant

# Data

- We need to construct a mesh of areas covering the centre of Aarhus, Denmark
- From these locations we obtain Foursquare venue data of food venues and seafood restaurant venues, and visualize them
- We make a k-means clustering of all venues





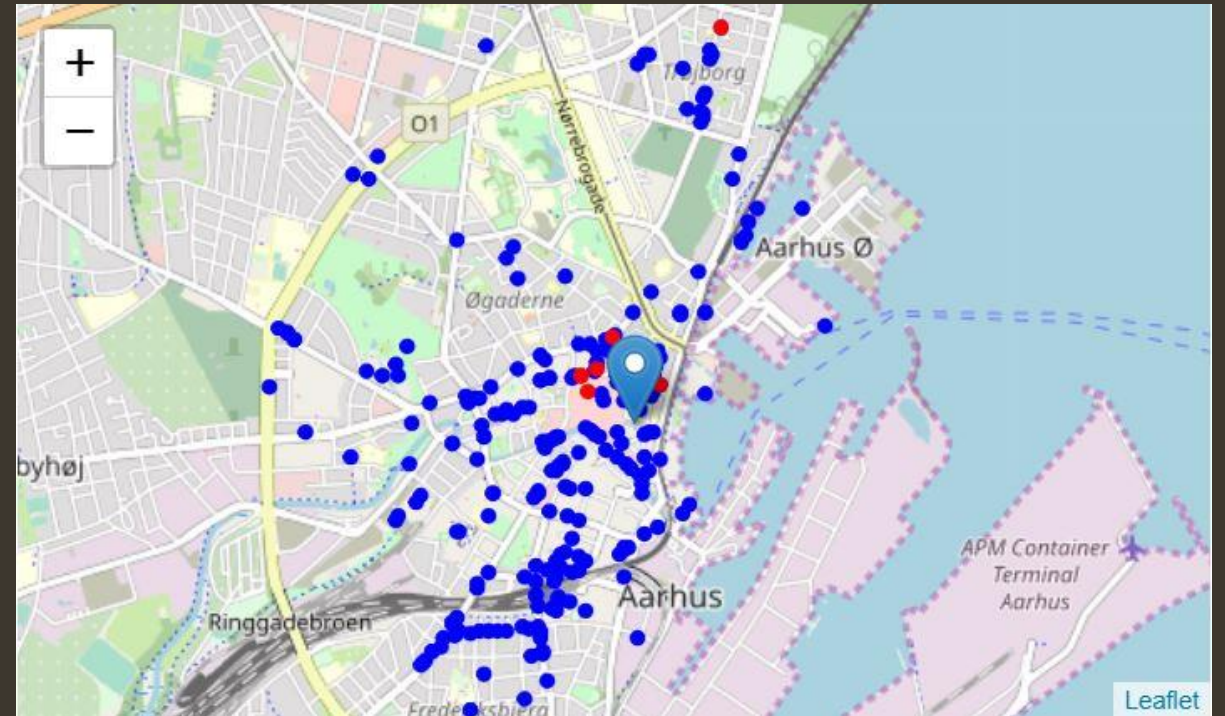
# Construction of neighbourhoods

- We install the packages shapely to make the neighbourhoods.
- We use pyproj to transform between lat/lon and cartesian coordinates.
- We make hexagonal shaped points, so we get almost circular neighbourhoods.
- The points go 1.800 metres from Aarhus centre.
- The points are 300 metres apart, so each neighbourhood has appr. 150 meter radius.
- The most eastern points are cut off.



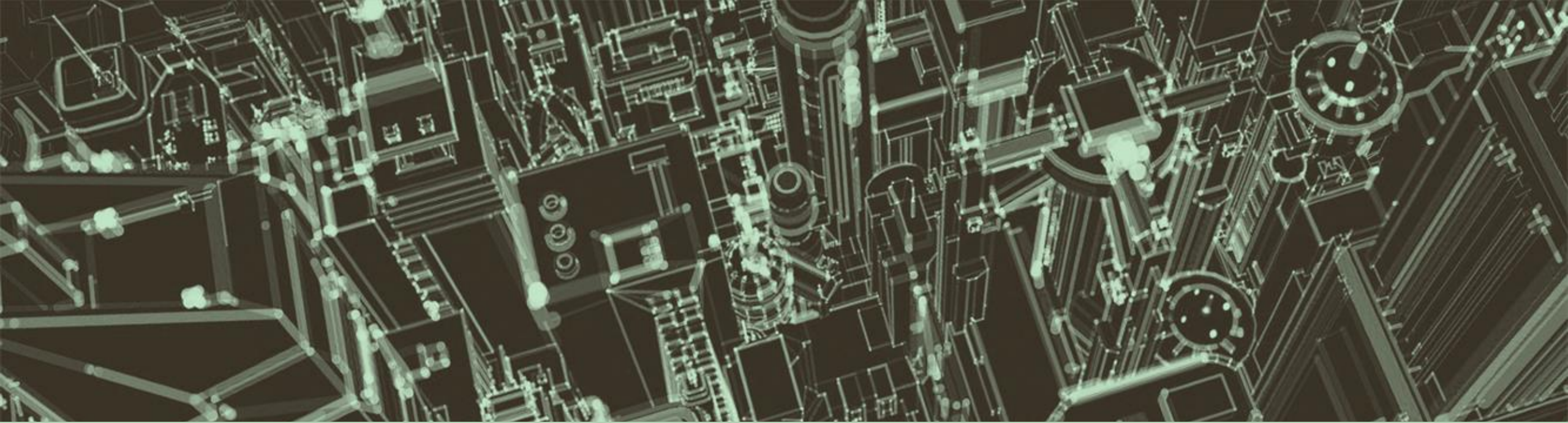
# Getting food venues in neighbourhoods

- We use Foursquare API to get venues in the neighbourhoods.
- Food venues are found and visualized.
- Seafood Restaurants are found and visualized.
- All venues are found and used for a k-means clustering.



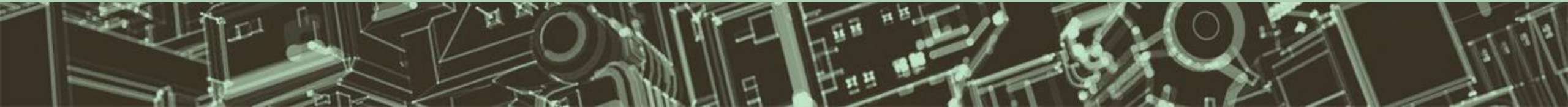
Food venues are blue-dotted and Seafood Restaurants are red-dotted.





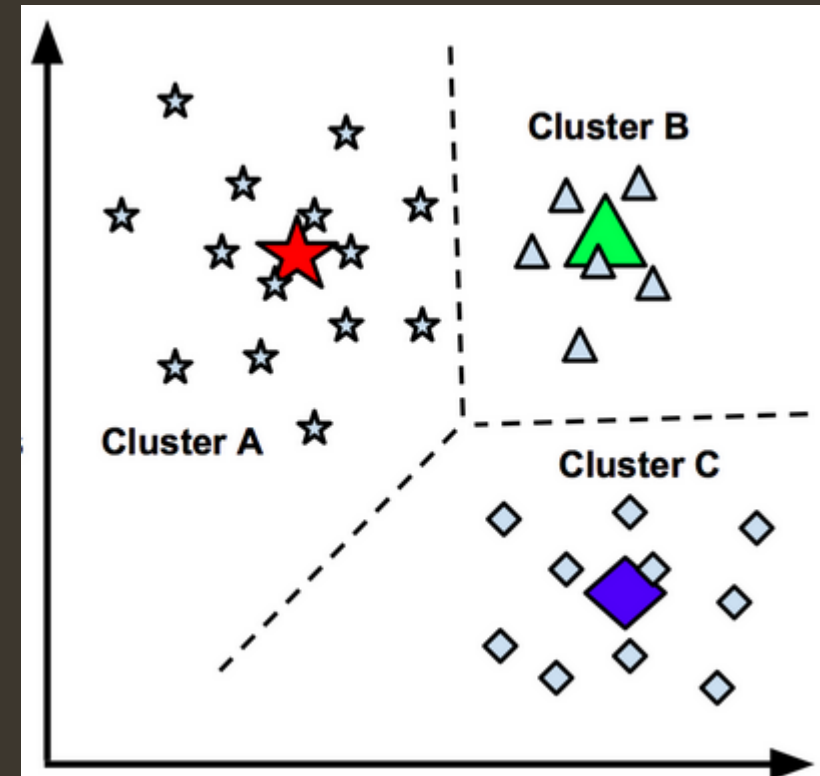
# Methodology

K-means clustering



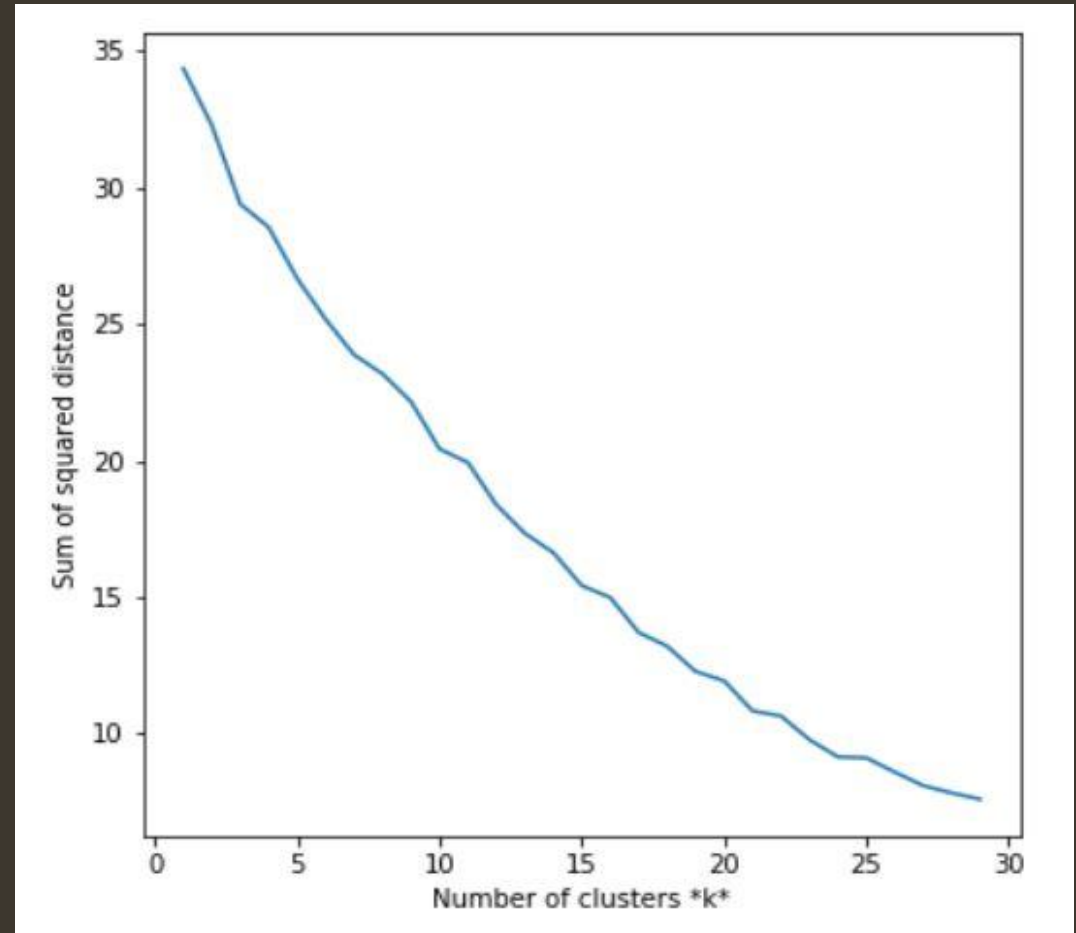
# Methodology

- Make a k-means clustering analysis. We analyse the clusters, in order to find a suitable cluster to locate a new seafood restaurant.
- Find spots not crowded with food venues.
- Find a spot away from other seafood restaurants.



# K-means clustering

- We find the frequency of the top 10 venues in each neighbourhood.
- We use the scikit-learn estimator to develop the clustering algorithm.
- We calculate the sum of squares for different values of  $K$  - (see picture). No 'elbow'. We set  $K=10$ .



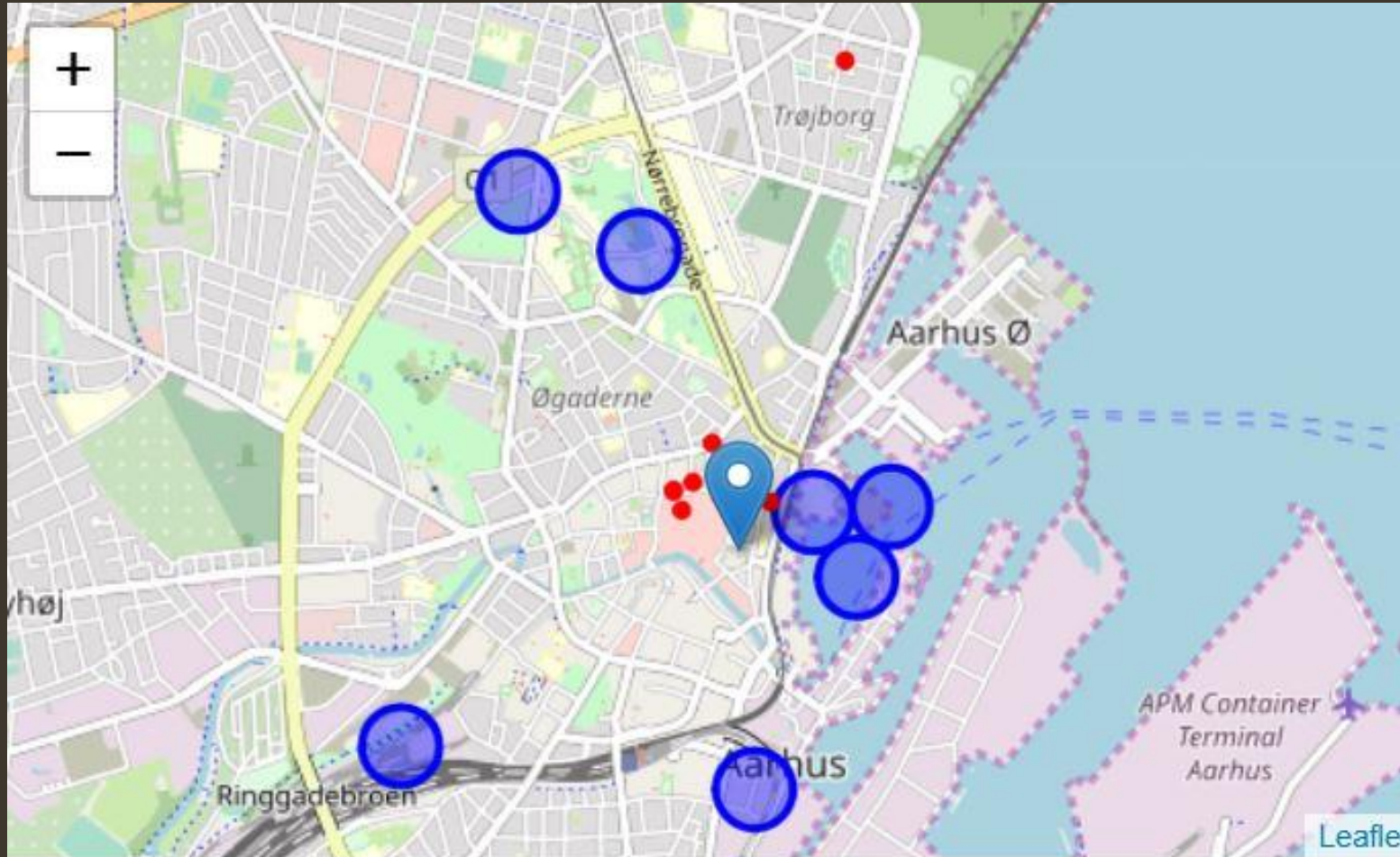


# The 10 clusters



- One large cluster and several smaller ones!
- The one large cluster was chosen to further investigation.

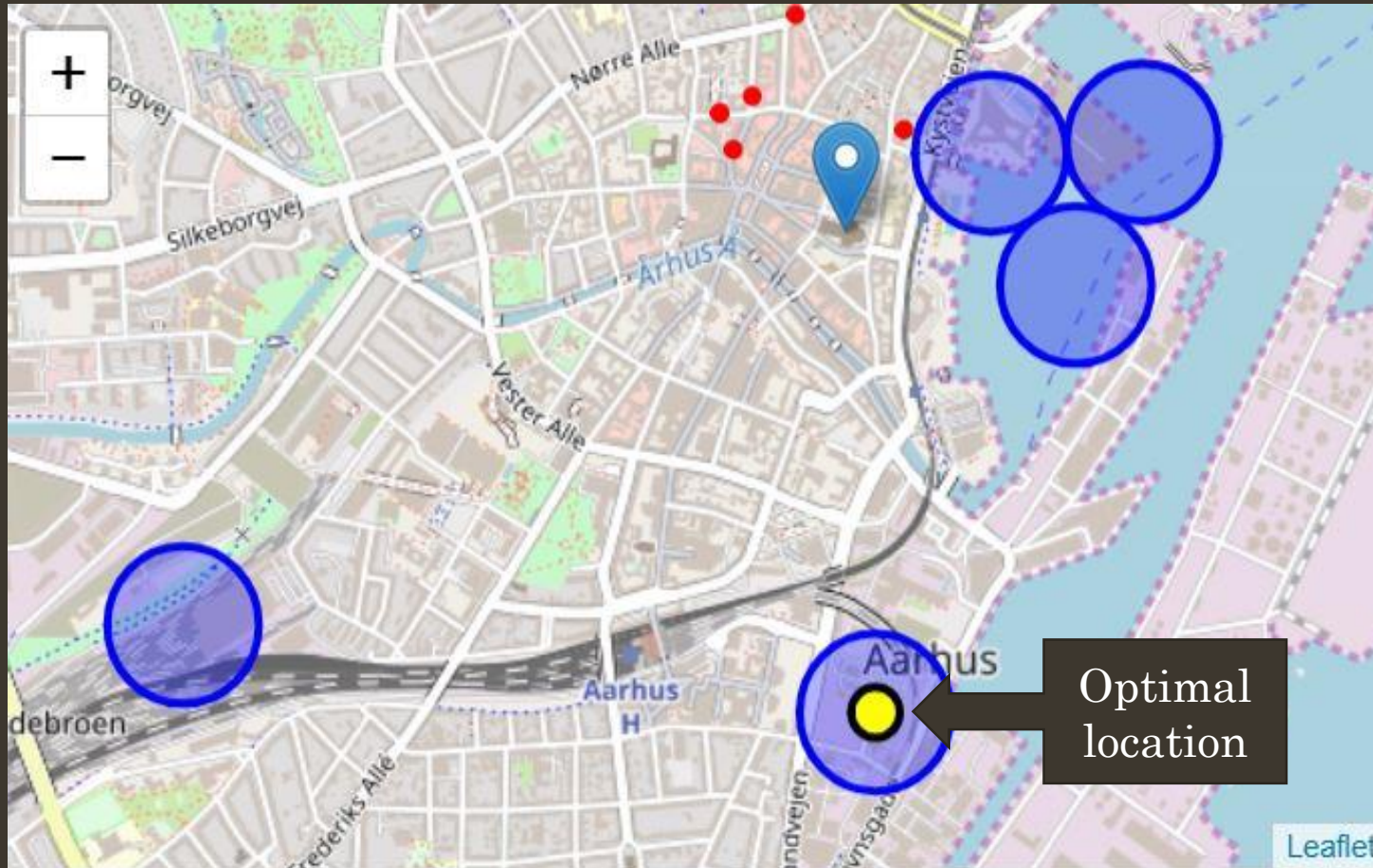
# Top 7 picked neighbourhoods



- We picked the 7 neighbourhoods with fewest food venues.
- The red dots show how the incumbent seafood restaurants are located compared to the 7 chozen neighbourhoods.



# Optimal location for the Seafood Restaurant



- We found the neighbourhoods farthest away from other seafood restaurants.
- The most western neighbourhood was situated on railway tracks – so it was omitted.
- We are left with the location shown with a yellow dot.



# Conclusion

- We reached the set goal to find a suitable location for a seafood restaurant in Aarhus, Denmark.
- This was based on three criteria. It should be placed in a suitable neighbourhood, this was done by using a K-means clustering of the neighbourhoods of Aarhus. It should be located in a neighbourhood with few other food venues and last, it should be located far from other seafood restaurants.
- We found such a location and recommended that the restaurant owner tried to negotiate a lease in a building near the “kulbroen” area.
- In this exercise, we simplified the criteria, for making a location decision, but with a little more effort it is possible to incorporate more criteria's in order to get a better recommendation. Foursquare API does not have all the venues in Aarhus, so a more thorough analysis must use other data also in order to get a better picture of the situation.