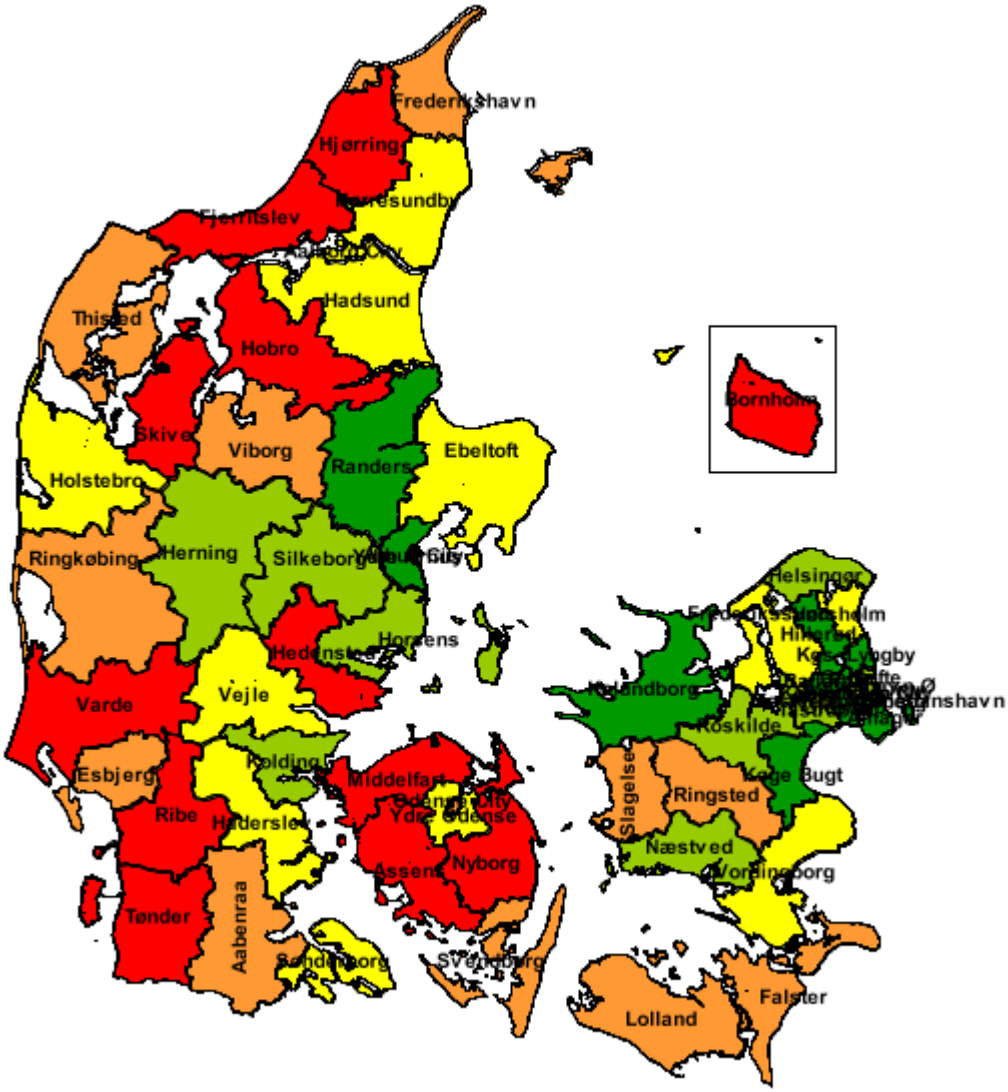
The pharmacies revenue – links between sale, geography and demography

DLIMI collects data related to the sale of medicinal products in Danish pharmacies. In connection to this, DLIMI is often asked if there are any relations in the sale of different types of drugs and the population composition in different parts of the country. The manufacturers would for example like to know whether their costumers are typically of higher or lower education levels, if they are pre-dominantly male or female, etc. They would also like to know if there are any regional differences in the consumption of their products, e.g. if people in Copenhagen mainly use a specific medical, whereas this medical is never used in Odense.

Data at a single pharmacy level is not publicly available, so each pharmacy is represented by a number instead of a name; ranging from 1 to 376. Furthermore, modules covering 60 areas of Denmark, each representing five pharmacies on average, have been constructed. These areas/modules enables us to link the demography of the population in the area to the pharmacies. Additionally, each pharmacy belongs to a given category.



Example of the module structure.

In this analysis we have chosen to focus on the following areas:

- The pharmacy's total revenue
- Revenue of prescription medicine (receptpligtige lægemidler)
- OTC revenue (over the counter drugs which are not on prescription such as Panodil, Nicorette, etc.)
- Branded goods (mærkevarer). These are products which are placed in front of the counter, e.g. skin care products, band aids, vitamins etc.
- *Diabetes*
- *Stop smoking*[1]
- *Asthma/COPD* (chronic obstructive pulmonary disease) (astma/KOL in Danish)

Furthermore, based on the geography of the pharmacy, each has been categorized according to the following categories:

- Metropolis (Metropol)
- Suburbs (Metropolomegn)
- Larger provincial city (Større provinsby)
- Smaller provincial city (Mindre provinsby)
- Countryside (Landsby)

Most pharmacies, in addition, belong to a chain, which among other things handles the marketing and procurement for all pharmacies in the chain. A variable indicating the chain each pharmacy belongs to is provided.

Focus on the story

You have freedom to choose methods within the frames of the course, and of course you should live up to the requirements given in the course. When you are to present your results, it is a good idea to focus on one story, which you want to present. You should present the story such that people that do not know methods like K-nearest neighbours, neural networks, and principal component analysis can understand your findings. Please also present your thoughts and the road to the goal.

Suggestion for analysis/problem formulation

- Is there a difference between the chains?
- Can the sales be used to classify the pharmacies into the categories (Metropolis, Suburbs, etc.)?
- Which markets follow each other – i.e. do the pharmacies sell more diabetes medicaments the same places where the stop smoking products are sold more?
- If e.g. a KNN analysis shows that Metropolis and Larger provincial cities pharmacies are alike – which parameters make them similar? And how does the countryside pharmacy separate out?

[1] OBS: The Pharmacies revenue on stop smoking products is about 1/3 of the total market for step smoking products. Thus, there is a large proportion of this market, which cannot be accounted for by the given data.