EXERCISE FINAL LATTICE

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Data of the incidence of larynx cancer diagnosed during 10 years (1982-1991) in the districts of **Mersey** and **West Lancashire** in the north-east of England is in the file larynx-dates.odc.

They have detected 876 cases in 144 electoral districts. The number of expected cases were calculated using internal standardization, based on the specific rates of sex and age in the zone of study (with the population of the census 1991).

Complementary material: map of north-east of England in *Arview* format (to import the map to R package you need that the three files are in the same directory: NWengland.shp, NWengland.dbf and NWengland.shx)

Answers to the following questions:

1. Perform an exploratory analysis to study the possible spatial correlation of the larynx incidence (Standardized Mobility Ratio SMR) (considering neighbours those regions that share geographic limits and the matrix of weights as the matrix standardised by rows).

2. If we consider that the number of cases of Larynx are a Poisson distribution, are data over-dispersed?

3. Fit the SMR taking into account the over- dispersion of the data using a heterogeneity model, a spatial (CAR intrinsic) and the convolution model. Estimate the models using Bayesian inference (*Gibbs Sampling*). Use three chains of initial values.

4. Check the convergence of the chains and decide which model fit better the data.

5. Using the model that better fit the data:

   Make a map of the observed SMRs and Relative Risk estimated by the model (mean posterior of SMR). Compare them and discuss the differences.

   Make a map of the posterior probability of relative risk of the electoral districts that exceed 1. What do you observe?

   Make a map of the random effects (exponential scale) and their significance. What do you observe?

Last day to delivery is the **December 13th** via *Atenea*.