Bym model for spatial effects

Parametrization

This model is simply the sum of a besag model and a iid model.

The benefite is that this allows to get the posterior marginals of the sum of the spatial and iid model; otherwise it offers no advantages.

Hyperparameters

The hyperparameters are the precision τ_1 of the iid model and the precision τ_2 of the besag model. The precision parameters are represented as

$$\theta = (\theta_1, \theta_2) = (\log \tau_1, \log \tau_2)$$

and the prior is defined on θ.

Specification

The bym model is specified inside the `f()` function as

```
f(<whatever>,model="bym",graph.file=<graph file name>, hyper=<hyper>)
```

The neighbourhood structure of **x** is passed to the program through the `graph.file` argument. The structure of this file is described below.

Hyperparameter spesification and defaults

hyper

    theta1

        name precision iid

        short.name prec.iid

        initial 4

        fixed FALSE

        prior loggamma

        param c(1, 1e-04)

    theta2

        name precision spatial

        short.name prec.spatial

        initial 4

        fixed FALSE

        prior normal

        param c(0, 1e-04)

constr TRUE

nrow.ncol FALSE

augmented TRUE

aug.factor 2

aug.constr 2

n.div.by   NULL

n.required   TRUE

set.default.values   TRUE

Structure of the graph file

We describe the required format for the graph file using a small example. Let the file `gra.dat`, relative to a small graph of only 5 elements, be

```
5
1  1  2
2  2  1  3
3  3  2  4  5
4  1  3
5  1  3
```

Line 1 declares the total number of nodes in the graph (5), then, in lines 2-6 each node is described. For example, line 4 states that node 3 has 4 neighbours and these are nodes 2, 4 and 5.

The graph file can either have nodes indexed from 1 to n, or from 0 to $n-1$. Note that in the latter case, node i seen from R corresponds to node $i-1$ in the 0-indexed graph.

Example

For examples of application of this model see the `Bym` example in Volume I.

The model is modified accordingly is the graph has more than one connected components.

Notes

None