Generic3 model

Parametrization

The generic3 model implements the following precision matrix

$$\mathbf{Q} = \tau_{\text{common}} \sum_{i=1}^{m} \tau_i \boldsymbol{R}_i, \qquad 1 < m \le 10, \tag{1}$$

where each $\boldsymbol{R}_i \ge 0$, and τ_i is the specific precision parameter and τ_{common} is a shared one.

Hyperparameters

The hyperparameters are defined as

$$\theta_i = \log(\tau_i), \qquad i = 1, 10$$

and

$$\theta_{11} = \log(\tau_{\text{common}})$$

and priors are assigned to $(\theta_1, \theta_2, \ldots)$.

Specification

The generic3 model is specified inside the `f()` function as

```
 f(<whatever>, model="generic3", Cmatrix = <list.of.Cmat>, hyper = <hyper>)
```

where `<list.of.Cmat>` a list of length m (maximum 10) of $\boldsymbol{R}_i$-matrices. By default, θ_j for $j = m+1, \ldots, 11$ is set to fixed (this includes τ_{common}).

Hyperparameter spesification and default values

hyper

> **theta1**
>> **name** log precision1
>> **short.name** prec1
>> **initial** 4
>> **fixed** FALSE
>> **prior** loggamma
>> **param** 1 5e-05
>> **to.theta** function(x) log(x)
>> **from.theta** function(x) exp(x)
>
> **theta2**
>> **name** log precision2
>> **short.name** prec2
>> **initial** 4
>> **fixed** FALSE
>> **prior** loggamma
>> **param** 1 5e-05
>> **to.theta** function(x) log(x)

from.theta `function(x) exp(x)`

theta3

    name log precision3

    short.name prec3

    initial 4

    fixed FALSE

    prior loggamma

    param 1 5e-05

    to.theta `function(x) log(x)`

    from.theta `function(x) exp(x)`

theta4

    name log precision4

    short.name prec4

    initial 4

    fixed FALSE

    prior loggamma

    param 1 5e-05

    to.theta `function(x) log(x)`

    from.theta `function(x) exp(x)`

theta5

    name log precision5

    short.name prec5

    initial 4

    fixed FALSE

    prior loggamma

    param 1 5e-05

    to.theta `function(x) log(x)`

    from.theta `function(x) exp(x)`

theta6

    name log precision6

    short.name prec6

    initial 4

    fixed FALSE

    prior loggamma

    param 1 5e-05

    to.theta `function(x) log(x)`

    from.theta `function(x) exp(x)`

theta7

    name log precision7

    short.name prec7

    initial 4

    fixed FALSE

    prior loggamma

    param 1 5e-05

to.theta function(x) log(x)

from.theta function(x) exp(x)

theta8

name log precision8

short.name prec8

initial 4

fixed FALSE

prior loggamma

param 1 5e-05

to.theta function(x) log(x)

from.theta function(x) exp(x)

theta9

name log precision9

short.name prec9

initial 4

fixed FALSE

prior loggamma

param 1 5e-05

to.theta function(x) log(x)

from.theta function(x) exp(x)

theta10

name log precision10

short.name prec10

initial 4

fixed FALSE

prior loggamma

param 1 5e-05

to.theta function(x) log(x)

from.theta function(x) exp(x)

theta11

name log precision common

short.name prec.common

initial 0

fixed TRUE

prior loggamma

param 1 5e-05

to.theta function(x) log(x)

from.theta function(x) exp(x)

constr FALSE

nrow.ncol FALSE

augmented FALSE

aug.factor 1

aug.constr

n.div.by

n.required TRUE

set.default.values TRUE

pdf generic3

Example

```
make.sm = function(n, prob = 0.1)
{
    A = matrix(runif(n*n), n, n)
    Patt = matrix(runif(n*n), n, n)
    Patt[Patt > prob] = 0
    A = A * Patt
    diag(A) = runif(n)
    A = A %*% t(A)
    A = A / max(diag(A))
    return (inla.as.sparse(A))
}

nsim = 100
n = 5
m = 3
Cmat = list()
Q = inla.as.sparse(matrix(0, n, n))
for(i in 1:m) {
    Cmat[[i]] = make.sm(n)
    Q = Q + i*Cmat[[i]]
}

yy = inla.qsample(nsim, Q)
y = c(yy)
idx = rep(1:n, nsim)
r = rep(1:nsim, each = n)

r = inla(y ~ -1 +
    f(idx, model="generic3",
      Cmatrix = Cmat, replicate = r,
      hyper = list(
          prec1 = list(initial = log(1)),
          prec2 = list(initial = log(2)),
          prec3 = list(initial = log(3)))),
    data = list(y=y, Cmat=Cmat, r=r),
    verbose=TRUE,
    control.family = list(
        hyper = list(
            prec = list(
                initial = 10,
                fixed = TRUE))))
summary(r)
```

Notes