Generic3 model

Parametrization

The generic3 model implements the following precision matrix

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

where each $\mathbf{R}_i \geq 0$, 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 cf.Cmat> a list of length m (maximum 10) of 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

```
\operatorname{doc} A generic model (type 3)
```

hyper

theta1

hyperid 21001
name log precision1
short.name prec1
initial 4
fixed FALSE
prior loggamma
param 1 5e-05
to.theta function(x) log(x)

tottleta ranotion(x) rog(x)

from.theta function(x) exp(x)

theta2

hyperid 21002 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
    hyperid 21003
    {\bf 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
    hyperid 21004
    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
    hyperid 21005
    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
    hyperid 21006
    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
    hyperid 21007
    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
    hyperid 21008
    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
    hyperid 21009
    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
    hyperid 21010
    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
    hyperid 21011
    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,
```

Notes