Generic3 model

Parametrization

The generic3 model implements the following precision matrix

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

where each $\boldsymbol{R}_i \geq 0$, and τ_i is the spesific 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

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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