Continous random walk model of order 2 (CRW2)

Parametrization

The continous random walk model of order 2 (CRW2) for the Gaussian vector $\mathbf{x} = (x_1, \ldots, x_n)$ is descibed in the GMRF-book chapter 3. It is an exact representation of the continous CRW2 model augmented with its derivaties. The use its the same as for RW2.

Hyperparameters

The precision parameter τ is represented as

$$\theta = \log \tau$$

and the prior is defined on θ. Note that τ is the precision for the first order increments.

Specification

The CRW2 model is specified inside the `f()` function as

```
f(<whatever>, model="crw2", values=<values>, hyper = <hyper>)
```

The (optional) argument `values` is a numeric or factor vector giving the values assumed by the covariate for which we want the effect to be estimated. See next example for an application.

Hyperparameter spesification and default values

hyper

- **theta**
  - **hyperid** 6001
  - **name** log precision
  - **short.name** prec
  - **prior** loggamma
  - **param** 1 5e-05
  - **initial** 4
  - **fixed** FALSE
  - **to.theta** `function(x) log(x)`
  - **from.theta** `function(x) exp(x)`

constr TRUE

nrow.ncol FALSE

augmented FALSE

aug.factor 2

aug.constr 1

n.div.by

n.required FALSE

set.default.values FALSE

min.diff 0.001

pdf crw2

Example

```
n=100
z=seq(0,6,length.out=n)
y=sin(z)+rnorm(n,mean=0,sd=0.5)
data=data.frame(y=y,z=z)

formula=y~f(z,model="crw2")
result=inla(formula,data=data,family="gaussian")
```

Notes

- The CRW2 is a intrinsic with rank deficiency 2.
- The CRW2 model for irregular locations are supported although not described here.
- The $\frac{n-r}{2}\log(|R|^*)$-part (with $r=2$) of the normalisation constant is not computed, hence you need to add this part to the log marginal likelihood estimate, if you need it.
- Usually, you may want to use the model RW2 instead.