

# Independent random noise model

## Parametrization

This model simply defines  $\mathbf{x}$  to be a vector of independent and Gaussian distributed random variable (possibly scaled) with precision  $\tau$ :

$$\pi(\mathbf{x}|\tau) = \prod_{i=1}^n \frac{1}{\sqrt{2\pi}} \sqrt{(s_i\tau)} \exp\left(\frac{1}{2}(s_i\tau)x_i^2\right)$$

where  $s_i > 0$  is an optional fixed scale

## Hyperparameters

The precision parameter  $\tau$  is represented as

$$\theta = \log \tau$$

and the prior is defined on  $\theta$ .

## Specification

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

```
f(<whatever>, model="iid", hyper = <hyper>, scale = <scale>)
```

where the option `scale` is optional and default to (all) 1.

## Hyperparameter spesification and default values

`hyper`

`theta`

`hyperid` 1001

`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` FALSE

`nrow.ncol` FALSE

`augmented` FALSE

`aug.factor` 1

`aug.constr`

`n.div.by`

`n.required` FALSE

`set.default.values` FALSE

`pdf` indep

## Example

```
n=12
Ntrials = sample(c(80:100), size=n, replace=TRUE)
eta = rnorm(n,0,0.5)
prob = exp(eta)/(1 + exp(eta))
y = rbinom(n, size=Ntrials, prob = prob)

data=data.frame(y=y,z=1:n)

formula=y~f(z,model="iid",
            hyper=list(theta=list(prior="loggamma",param=c(1,0.01))))
result=inla(formula,data=data,family="binomial",Ntrials=Ntrials)
```

## Notes

The option **scale** defines the scaling in the same order as argument **values**. It is therefore advised to also give argument **values** when **scale** is used to be sure that they are consistent.