

## Gaussian

### Parametrisation

The Gaussian distribution is

$$f(y) = \frac{\sqrt{w\tau}}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}w\tau (y - \mu)^2\right)$$

for continuously responses  $y$  where

$\mu$ : is the the mean

$\tau$ : is the precision

$w$ : is a fixed weight,  $w > 0$ .

### Link-function

The mean and variance of  $y$  are given as

$$\mu \quad \text{and} \quad \sigma^2 = \frac{1}{w\tau}$$

and the mean is linked to the linear predictor by

$$\mu = \eta$$

### Hyperparameters

The precision is represented as

$$\theta = \log \tau$$

and the prior is defined on  $\theta$ .

### Specification

- family = gaussian
- Required arguments:  $y$  and  $w$  (keyword **weights**)

The weights has default value 1.

### Example

In the following example we estimate the parameters in a simulated example with Gaussian responses, giving  $\tau$  a Gamma-prior with parameters (1, 0.01) and initial value (for the optimisations) of exp(2.0).

```
n=100
a = 1
b = 1
z = rnorm(n)
eta = a + b*z
tau = 100
scale = exp(rnorm(n))
prec = scale*tau
y = rnorm(n, mean = eta, sd = 1/sqrt(prec))
```

```
data = list(y=y, z=z)
formula = y ~ 1+z
result = inla(formula, family = "gaussian", data = data,
              control.data = list(prior = "loggamma",
                                  param = c(1.0,0.01),
                                  initial = 2),
              scale=scale, keep=TRUE)
summary(result)
```

## Notes

None.