

The Gamma-distribution with constant rate

Parametrisation

The Gamma-distribution has the following density

$$\pi(y) = \frac{b^a}{\Gamma(a)} y^{a-1} \exp(-by), \quad a > 0, \quad b > 0, \quad y > 0,$$

where $E(y) = \mu = a/b$ and $\text{Var}(y) = 1/\tau = a/b^2$, where τ is the precision and μ is the mean.

This version of the Gamma-distribution is to make the rate b constant, so we use

$$\mu = \exp(\eta)$$

where η is the linear predictor, and

$$\tau = (s\phi)/\mu$$

where ϕ is the precision parameter (or $1/\phi$ is the dispersion parameter with this definition) and $s > 0$ is a fixed scaling (for the regression model), which gives Gamma-density with

$$a = s\phi\mu \quad \text{and} \quad b = s\phi$$

Link-function

The linear predictor η is linked to the mean μ using a default log-link

$$\mu = \exp(\eta)$$

Hyperparameter

The hyperparameter is the precision parameter ϕ , which is represented as

$$\phi = \exp(\theta)$$

and the prior is defined on θ .

Specification

- `family="gammasv".`
- Required arguments: y and s (default value 1).

Hyperparameter spesification and default values

`doc` The Gamma likelihood with constant rate

`hyper`

`theta`

`hyperid` 58003

`name` precision parameter

`short.name` prec

`output.name` Precision-parameter for the Gammasv observations

`output.name.intern` Intern precision-parameter for the Gammasv observations

`initial` 4.60517018598809

`fixed` FALSE

```

prior loggamma
param 1 0.01
to.theta function(x) log(x)
from.theta function(x) exp(x)

status experimental

survival FALSE

discrete FALSE

link default log

pdf gammasv

```

Example

In the following example we estimate the parameters in a simulated example.

```

n <- 300
phi <- 1.1
s <- runif(n, min = 0.8, max = 1.25)
x <- rnorm(n)
eta <- 1 + 0.2 * x
mu <- exp(eta)
a <- phi * s * mu
b <- phi * s
y <- rgamma(n, shape = a, rate = b)
r <- inla(y ~ 1 + x,
          family = "gammasv",
          scale = s,
          data = data.frame(y, x, s))
summary(r)

```

Notes

None.