

GaussianJW

Parametrisation

The GaussianJW likelihood is a two-part likelihood for $\{(y, v)_i\}$. First a Gaussian observation y

$$y|\dots \sim \mathcal{N}(p, V(p, n))$$

with mean (probability) p and a variance function

$$V(p, n) = \exp(\beta_1 + \beta_2 \log(p(1-p)) + \beta_3 \log(n))$$

and then an (conditional independent) observed variance v , where

$$\nu \frac{v}{V(p, n)} | \dots \sim \chi^2_\nu.$$

The case $\beta_1 = 0, \beta_2 = 1, \beta_3 = -1$ resembles the case where a Binomial is approximated with a Normal. (n, ν) is considered as fixed.

Link-function

The probability p is linked to the linear predictor η with a (default) logit link

$$p = \frac{1}{1 + \exp(-\eta)}$$

but other links are also possible.

Hyperparameters

The hyperparameters are

$$\theta_1 = \beta_1$$

$$\theta_2 = \beta_2$$

$$\theta_3 = \beta_3$$

and the prior is defined on $(\theta_1, \theta_2, \theta_3)$.

Specification

- `family="gaussianjw"`
- Required arguments: y , n and ν (all vectors of the same length) as an `inla.mdata()`-object with this specific ordering, see the example.

Hyperparameter specification and default values

`doc` The GaussianJW likelihood

`hyper`

`theta1`

`hyperid 65101`

`name beta1`

`short.name beta1`

`output.name beta1 for GaussianJW observations`

```

    output.name.intern beta1 for GaussianJW observations
    initial 0
    fixed FALSE
    prior normal
    param 0 100
    to.theta function(x) x
    from.theta function(x) x
theta2
    hyperid 65102
    name beta2
    short.name beta2
    output.name beta2 for GaussianJW observations
    output.name.intern beta2 for GaussianJW observations
    initial 1
    fixed FALSE
    prior normal
    param 1 100
    to.theta function(x) x
    from.theta function(x) x
theta3
    hyperid 65103
    name beta3
    short.name beta3
    output.name beta3 for GaussianJW observations
    output.name.intern beta3 for GaussianJW observations
    initial -1
    fixed FALSE
    prior normal
    param -1 100
    to.theta function(x) x
    from.theta function(x) x

survival FALSE

discrete FALSE

link default logit probit

pdf gaussianjw

```

Example

```

n <- 300
x <- rnorm(n, sd = 0.5)
eta <- 1 + x
p <- 1/(1 + exp(-eta))
df <- sample(10:100, n, replace = TRUE)
size <- df

```

```

va <- p * (1.0 - p) / size
v <- rchisq(n, df = df) * va / df
phat <- rnorm(n, mean = p, sd = sqrt(v))
Y <- inla.mdata(phat, v, size, df)

r <- inla( Y ~ 1 + x,
          data = list(Y = Y, x = x),
          family = "gaussianjw",
          ## this might be needed
          control.inla = list(cmin = 0))
summary(r)

```