

## “Table”: a tabulated prior

This prior allow the user to submit a prior for  $\theta$  in a tabulated form, which is then interpolated to evaluate  $\log \pi(\theta)$  as a continous function of the corresponding  $\theta$ . Let

$$\theta_1, \theta_2, \dots, \theta_m$$

be  $m$  values for  $\theta$  with corresponding log-prior density

$$\log \pi(\theta_1), \log \pi(\theta_2), \dots, \log \pi(\theta_m).$$

To define this as a prior in R-INLA, define *one* object of type `character`, with content

```
table:  $\theta_1$   $\theta_2$  ...  $\theta_m$   $\log \pi(\theta_1)$   $\log \pi(\theta_2)$  ...  $\log \pi(\theta_m)$ 
```

and use this as the name for the prior.

### Example

This example define a loggamma-prior as the prior for the log-precision in three different ways.

```
prior.function = function(log_precision) {  
  a = 1;  
  b = 0.1;  
  precision = exp(log_precision);  
  logdens = log(b^a) - lgamma(a) + (a-1)*log_precision - b*precision;  
  log_jacobian = log_precision;  
  return(logdens + log_jacobian)  
}
```

```
prior.expression = "expression:  
  a = 1;  
  b = 0.1;  
  precision = exp(log_precision);  
  logdens = log(b^a) - lgamma(a)  
    + (a-1)*log_precision - b*precision;  
  log_jacobian = log_precision;  
  return(logdens + log_jacobian);"
```

```
lprec = seq(-10, 10, len=1000)  
prior.table = paste(c("table:", cbind(lprec, prior.function(lprec))),  
  sep = "", collapse = " ")
```

```
n = 100  
y = rnorm(n)
```

```
r = inla(y~1,  
  data = data.frame(y),  
  control.family = list(  
    hyper = list(  
      prec = list(  
        prior = "loggamma",  
        param = c(1, 0.1))))))
```

```

rr = inla(y~1,
  data = data.frame(y),
  control.family = list(
    hyper = list(
      prec = list(
        prior = prior.expression))))

rrr = inla(y~1,
  data = data.frame(y),
  control.family = list(
    hyper = list(
      prec = list(
        prior = prior.table))))

round(c(r$mlik[1], rr$mlik[1], rrr$mlik[1]), 5)

```

## Notes

- If the internal optimiser in R-INLA needs to evaluate the (log-)prior outside the domain given, it will stop and give an error.