

## “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.

```
rprior.func = function(lprec) {
  return (dgamma(exp(lprec), a, b, log = TRUE) + lprec)
}
rprior <- inla.rprior.define(rprior.func, a = 1, b = 0.1)

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

prior.func = function(lprec) {
  a = 1; b = 0.1;
  return (dgamma(exp(lprec), a, b, log = TRUE) + lprec)
}
lprec = seq(-10, 10, len=1000)
prior.table = paste(c("table:", cbind(lprec, prior.func(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))))

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

round(c(r$mlik[1], rr$mlik[1], rrr$mlik[1], rrrr$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.