

# Exponential

## Parametrisation

The Exponential distribution is

$$\text{Prob}(y) = \lambda \exp(-\lambda y) \quad \lambda > 0$$

for responses  $y > 0$ .

In survival analysis, models are generally specified through the hazard function. For exponential model, the baseline hazard is constant over time and the hazard function is:

$$h(y) = \lambda$$

## Link-function

The parameter  $\lambda$  is linked to the linear predictor as:

$$\lambda = \exp(\eta)$$

## Hyperparameters

None.

## Specification

- family = Exponential
- Required arguments:  $y$  (to be given in a format by using `inla.surv()` function )

## Hyperparameter spesification and default values

**hyper**

**survival** TRUE

**discrete** FALSE

**link** default log

**pdf** exponential

## Example

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

```
n = 10000
x = runif(n)
lambda = exp(1+x)
y = rexp(n, rate=lambda)
event = rep(1,n)
data = list(y=y, event=event, x=x)
formula = inla.surv(y,event)~ x
model = inla(formula, family ="exponential", data=data, verbose=T)
```

## Notes

- Exponential model can be used for right censored, left censored and interval censored data.
- A general frame work to represent time is given by `inla.surv()`