

# Gaussian model for Stochastic volatility

## Parametrization

The Gaussian likelihood for stochastic volatility models is defined as:

$$\pi(y|\eta) = \sigma\epsilon$$

where

$$\epsilon \sim \mathcal{N}(0, 1)$$

## Link-function

The scale parameter  $\sigma$  is linked to the linear predictor  $\eta$  as:

$$\sigma = \exp(\eta/2)$$

## Hyperparameters

None

## Specification

- family = `stochvol`
- Required argument:  $y$ .

## Hyperparameter specification and default values

**hyper**

**theta1**

**name** log precision  
**short.name** prec  
**initial** 4  
**fixed** FALSE  
**prior** loggamma  
**param** 1 5e-05  
**to.theta** function(x) log(x)  
**from.theta** function(x) exp(x)

**theta2**

**name** gev parameter  
**short.name** gev  
**initial** 0  
**fixed** FALSE  
**prior** gaussian  
**param** 0 6.25  
**to.theta** function(x) x  
**from.theta** function(x) x

**survival** FALSE

**discrete** FALSE

**link** default identity

**pdf** gev

## Example

In the following example we specify the likelihood for the stochastic volatility model to be Gaussian

```
#simulated data
n=500
phi=0.53
eta=rep(0.1,n)
for(i in 2:n)
  eta[i]=0.1+phi*(eta[i-1]-0.1)+rnorm(1,0,0.6)
y=exp(eta/2)*rnorm(n)
time=1:n
data=list(ret=y,time=time)

#fit the model
formula=ret~f(time,model="ar1",
              hyper = list(prec = list(param=c(1,0.001))))
result=inla(formula,family="stochvol",data=data)
```

## Notes

None