Student-t model for Stochastic volatility

Parametrization

The Student-t likelihood for stochastic volatility models is defined as:

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

where

$$\epsilon \sim T_\nu$$

and T_ν is a Student-t distribution with ν degrees of freedom *standardised* to that is has mean 0 and variance 1 for any value of ν.

Link-function

The scale parameter σ is linked to the linear predictor η as:

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

Hyperparameters

The degrees of freedom ν is represented as

$$\theta = \log(\nu - 2)$$

and the prior is defined on θ

Specification

- family = `stochvol.t`

- Required argument: y.

Example

In the following example we specify the likelihood for the stochastic volatility model to be Student-t

```
#simulated data
n=1000
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)*rt(n,df=4)
time=1:n
data=list(ret=y,time=time)

#fit the model
formula=ret~f(time,model="ar1",param=c(1,0.001,0,0.4))
result=inla(formula,family="stochvol.t",data=data)
hyper=inla.hyperpar(result)
```

Notes

None