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

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

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.

Hyperparameter spesification and default values

doc `The Student-t stochvol likelihood`

hyper

>   **theta**
>
>>   **hyperid** `83001`
>>   **name** `log degrees of freedom`
>>   **short.name** `dof`
>>   **output.name** `degrees of freedom for stochvol student-t`
>>   **output.name.intern** `dof_intern for stochvol student-t`
>>   **initial** `4`
>>   **fixed** `FALSE`
>>   **prior** `pc.dof`
>>   **param** `15 0.5`
>>   **to.theta** `function(x) log(x - 2)`
>>   **from.theta** `function(x) 2 + exp(x)`

survival `FALSE`

discrete `FALSE`

link `default log`

pdf `stochvolt`

Example

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

```
n=1000
x = 0.1 * arima.sim(n = n, model = list(ar = 0.9))
y=exp(x/2)*rt(n,df=6)
time=1:n
data=data.frame(y,time)

formula=y~f(time, model="ar1")+1
result=inla(formula,family="stochvol.t",data=data)
## sometimes we need to add
## control.inla = list(cmin = 1e-2)
## to make it converge
hyper=inla.hyperpar(result)
```

Notes

None