Package 'DREGAR'

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Type Package

Title Regularized Estimation of Dynamic Linear Regression in the
Presence of Autocorrelated Residuals (DREGAR)

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Description A penalized/non-penalized implementation for dynamic regression in the presence of autocorrelated residuals (DREGAR) using iterative penalized/ordinary least squares. It applies Mallows CP, AIC, BIC and GCV to select the tuning parameters.

License GPL (>= 2)

LazyLoad no

Repository CRAN

NeedsCompilation yes

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R topics documented:

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dregar2   *Estimating (just) adaptive-DREGAR coefficients using an iterative 2-*
                                 step procedure

Description

Estimating coefficients for penalized/non-penalized dynamic regression in the presence of autocorrelated residuals using an iterative 2-step procedure.

Usage

```
dregar2(data, da = 0, ar = 0, mselection = 4,
      normalize = FALSE, penalized = TRUE,
      iteration = 15)
```

Arguments

data	Data matrix of order (time, response, covariates)
da	A vector of lags. Autoregressive orders for response. For example 1:p for all lags from 1 to p
ar	A vector of lags. Autoregressive orders for residuals. For example 1:q for all lags from 1 to q
mselection	Model selection criteria. Choosing among 1 (CP), 2 (AIC), 3 (GCV) and 4 (BIC)
normalize	Logical flag. Setting to TRUE to normalize data prior to analysis
penalized	Logical flag. Setting to TRUE to estimate coefficients through penalized likelihood. Otherwise the algorithm applies iterative OLS.
iteration	The number of iterations

Author(s)

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See Also

[dregar6](#) , [generateAR](#) , [sim.dregar](#)

Examples

```
par(mfrow=c(2,2))
  m=sim.dregar(n=500 ,  beta=1:4, phi=generateAR(2), theta=.3,
               n.z.coeffs=3 , plot=TRUE) # generating data
  r=dregar2(data = m$rawdata,da = 1:3,ar = 1:2,mselection = 4,
           penalized = 1 )# estimating parameters using2-step adaptive-DREGAR
  round(cbind(
    true      = c(phi=c(m$phi,0),theta=c(m$theta,0),beta=m$beta),
    estimates = c(phi=r$phi,theta=r$theta,beta=r$beta)
```

```
    )
    ,3
    )
plot(r$obj)
acf(r$res, main='Residual ACF')
pacf(r$res,main='Residual PACF')
```

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dregar6	*Estimating adaptive/non-adaptive DREGAR coefficients using an iterative 6-step procedure*

Description

Estimating coefficients for penalized dynamic regression in the presence of autocorrelated residuals using an iterative 6-step procedure.

Usage

```
dregar6(data , da, ar, mselection = 4, type = "alasso",
       normalize = FALSE, iteration = 15,  intercept=FALSE)
```

Arguments

data	Data matrix of order (time, response, covariates)
da	A vector of lags. Autoregressive orders for the response. For example 1:p for all lags from 1 to p
ar	A vector of lags. Autoregressive orders for residuals. For example 1:q for all lags from 1 to q
mselection	Model selection criteria. Choosing among 1 (CP), 2 (AIC), 3 (GCV) and 4 (BIC)
type	Type of penalty. Choosing between 'enet' and 'alasso' for DREGAR and adaptive-DREGAR penalties.
normalize	Logical flag. Setting to TRUE to normalise data prior to analysis
iteration	The number of iterations
intercept	Logical flag. Setting to TRUE to have intercept in the model.

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See Also

[dregar2](), [generateAR]() , [sim.dregar]()

Examples

```
par(mfrow=c(2,2))
 m=sim.dregar(n=500 ,  beta=1:4, phi=generateAR(2), theta=.1,
               n.z.coeffs=3 , plot=TRUE) # generating data
 r=dregar6(data=m$rawdata, da = 1:3,
     ar = 1:2,mselection = 4,
     type='alasso')# estimating parameters using (non-apdative) DREGAR
 round(cbind(
   true      = c(phi=c(m$phi,0),theta=c(m$theta,0),beta=m$beta),
   estimates = c(phi=r$phi,theta=r$theta,beta=r$beta)
 )
 ,3
 )
 plot(r$mod.phi,main='phi')
 plot(r$mod.theta,main='theta')
 plot(r$mod.beta,main='beta')
```

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generateAR	*Generating stationary autoregressive coefficients*

Description

Generating stationary autoregressive coefficients

Usage

```
generateAR(n = 1, l = -1, u = 1     ,
            min.distance = .Machine$double.eps ,
            sort.coeff = FALSE)
```

Arguments

n	The number of coefficients
l	Lower bound for coefficients
u	Upper bound for coefficients
min.distance	Minimum distance amongst all pair of coefficients
sort.coeff	Logical flag. If TRUE, then resulting coefficients are sorted descending

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See Also

[dregar2](#) , [dregar6](#) , [sim.dregar](#)

Examples

```
generateAR(3 , -1 , 1 , .01 )
```

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sim.dregar *Simulating data from DREGAR model*

Description

Simulating a mean zero Gaussian lagged response regression in the presence of autocorrelated residuals

Usage

```
sim.dregar(n = 500    , beta = 1, ind = FALSE  ,
            phi = .3, theta = .5, var = 1 , n.z.coeffs=0,
            shuffle = FALSE    , plot = FALSE  )
```

Arguments

n	The number of data points to be simulated
beta	Regression coefficients
ind	Logical flag. If TRUE then observations are assumed to be independent. Otherwise they are generated from random AR(1) processes. In both cases, variables are assumed to be mutually independent and follow Gaussian distribution.
phi	Dynamic coefficient(s)
theta	Residuals coefficient(s)
var	Variance of the error term
n.z.coeffs	Number of zero coefficients if needed
shuffle	Logical flag. If TRUE shuffle coefficients. Otherwise data are grouped corresponded to non-zero and zero coefficients.
plot	Logical flag. Plot response

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See Also

[dregar2](#) , [dregar6](#) , [generateAR](#)

Examples

```
simdata=sim.dregar(n = 100 , beta = 1,
  ind = TRUE , phi = .40 , theta = -.25,
  var = 1 , plot = TRUE)
str(simdata)
```

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