Package 'erfe'

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Type Package

Title Fits Expectile Regression for Panel Fixed Effect Model

Version 0.0.1

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Description Fits the Expectile Regression for Fixed Effect (ERFE) estimator. The ERFE model extends the within-transformation strategy to solve the incidental parameter problem within the expectile regression framework. The ERFE model estimates the regressor effects on the expectiles of the response distribution. The ERFE estimate corresponds to the classical fixed-effect within-estimator when the asymmetric point is 0.5. The paper by Barry, Oualkacha, and Charpentier (2021, <arXiv:2108.04737>) gives more details about the ERFE model.

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URL https://arxiv.org/abs/2108.04737

BugReports https://github.com/amadoudiogobarry/erfe/issues

Depends R (>= 2.10)

Imports Matrix, mvtnorm, stats

Suggests covr, testthat (>= 3.0.0)

Config/testthat/edition 3

Encoding UTF-8

Language en-US

LazyData true

RoxygenNote 7.2.1

NeedsCompilation no

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R topics documented:

`dexpectilizeMatR` *Dexpectilize a matrix according the a single asymmetric point* $\tau \in (0, 1)$.

Description

This function is part of the erfe package. It de-expectilizes a matrix of data vertor-wise, which means subtracting the expectile of level $\tau \in (0, 1)$ to every vector of the matrix column-wise. When $\tau = 0.5$ then the process of de-expectilizing corresponds to the process of deamining the matrix column-wise. That is, subtracting the mean-column from the column vector.

Usage

```
dexpectilizeMatR(ymat, aweight, panSizeVec)
```

Arguments

`ymat`	Numeric matrix to de-expectilize column-wise.
`aweight`	Numeric vector of individual asymmetric weight.
`panSizeVec`	Numeric vector of individual panel size.

Value

Return a de-expectilized matrix of the matrix ymat.

Author(s)

Amadou Barry, <barryhafia@gmail.com>

References

Barry, Amadou, Oualkacha, Karim, and Charpentier Arthur. (2022). *Weighted asymmetric least squares regression with fixed-effects*. arXiv preprint arXiv:2108.04737

Examples

```
set.seed(13)
temps_obs <- 5
n_subj <- 50
id <- rep(1:n_subj, each=temps_obs)
asym <- 0.5
panSizeVec <- unname(unlist(lapply(split(id, id), function(x) length(x))))
ymat <- matrix(NA, nrow = n_subj * temps_obs, ncol = 5)
ymat <- matrix(mvtnorm::rmvnorm(n_subj * ncol(ymat),
sigma = diag(rep(1, temps_obs))), ncol = ncol(ymat))
aweight <- rep(asym, temps_obs * n_subj)
aweight[!(ymat[, 1] > mean(ymat[, 1]))] = 1 - asym
dexpectilizeMatR(ymat, aweight, panSizeVec)
```

`dexpectilizeVecR` *Dexpectilize a vector according the a single asymmetric point* $\tau \in (0, 1)$.

Description

This function is part of the erfe package. It de-expectilizes a vector of data, which means subtracting the expectile of level $\tau \in (0, 1)$ of the vector to the vector itself. When $\tau = 0.5$ then the process of de-expectilizing corresponds to the process of deamining the vector. That is, subtracting the mean of the vector from the vector itself.

Usage

```
dexpectilizeVecR(yvec, aweight, panSizeVec)
```

Arguments

`yvec`	Numeric vector to de-expectilize.
`aweight`	Numeric vector of individual asymmetric weight.
`panSizeVec`	Numeric vector of individual panel size.

Value

Return a de-expectilized vector of the vector yvec.

Author(s)

Amadou Barry, <barryhafia@gmail.com>

References

Barry, Amadou, Oualkacha, Karim, and Charpentier Arthur. (2022). *Weighted asymmetric least squares regression with fixed-effects*. arXiv preprint arXiv:2108.04737

Examples

```
set.seed(13)
temps_obs <- 5 # panel size
n_subj <- 50 # sample size
id <- rep(1:n_subj, each = temps_obs)
asym <- 0.5
panSizeVec <- unname(unlist(lapply(split(id, id), function(x) length(x))))
yvec <- c(mvtnorm::rmvnorm(n_subj, sigma = diag(rep(1,temps_obs))))
aweight <- rep(asym, temps_obs * n_subj)
aweight[!(yvec > mean(yvec))] = 1 - asym
dexpectilizeVecR(yvec, aweight, panSizeVec)
```

`erfe` *Dexpectilize a vector according the a single asymmetric point*

Description

This function is the main fucntion of the erfe package. It estimates the ERFE model for a panel dataset and for a sequence of asymmetric point $\tau \in (0, 1)$. When $\tau = 0.5$ the function estimate the classical within-transformation estimator and its sandwich covariance matrix.

Usage

```
erfe(predictors, response, asymp = c(0.25, 0.5, 0.75), id)
```

Arguments

`predictors`	Numeric matrix of covariates/regressors.
`response`	Numeric vector of response variable.
`asymp`	Sequence of asymmetric points.
`id`	Ordered vector of subject ids.

Value

Returns a list of list according to the asymmetric points. Each list has objects related to the erfe model such as the asymmetric point, the coefficient-estimate, the standard deviation, the estimated covariance.

Author(s)

Amadou Barry, <barryhafia@gmail.com>

References

Barry, Amadou, Oualkacha, Karim, and Charpentier Arthur. (2022). *Weighted asymmetric least squares regression with fixed-effects*. arXiv preprint arXiv:2108.04737

Examples

```
set.seed(13)
temps_obs <- 5
n_subj <- 50
sig <- diag(rep(1,temps_obs))
id <- rep(1:n_subj, each=temps_obs)
rvec <- c(mvtnorm::rmvnorm(n_subj, sigma = sig))
fvec <- (1 + rep(rnorm(n_subj) , each=temps_obs))
predictors <- cbind(rt(n_subj * temps_obs, df=2, ncp=1.3),
 1.2 * fvec + rnorm(n_subj * temps_obs, mean = 0.85, sd = 1.5) )
response <- 0.6 * predictors[, 1] + predictors[, 2] + fvec + rvec
asymp <- c(0.25,0.5,0.75)
erfe(predictors, response, asymp=c(0.25,0.5,0.75), id)
```

`erfeVecR` *Dexpectilize a vector according the a single asymmetric point*

Description

This function is part of the erfe package. It estimates the ERFE model for a panel dataset and for a single asymmetric point $\tau \in (0, 1)$. When $\tau = 0.5$ the function estimate the classical within-transformation estimator and its sandwich covariance matrix.

Usage

```
erfeVecR(xmat, yvec, panSizeVec, asym, id)
```

Arguments

`xmat`	Numeric vector to de-expectilize.
`yvec`	Numeric vector of individual asymmetric weight.
`panSizeVec`	Numeric vector to individual panel size.
`asym`	Numeric vector to individual panel size.
`id`	Numeric vector to individual panel size.

Value

Return a list of objects related to the erfe model such as the asymmetric point, the coefficient-estimate, the standard deviation, the estimated covariance.

Author(s)

Amadou Barry, <barryhafia@gmail.com>

References

Barry, Amadou, Oualkacha, Karim, and Charpentier Arthur. (2022). *Weighted asymmetric least squares regression with fixed-effects*. arXiv preprint arXiv:2108.04737

Examples

```
set.seed(13)
temps_obs <- 5
n_subj <- 50
sig <- diag(rep(1,temps_obs))
id <- rep(1:n_subj, each=temps_obs)
rvec <- c(mvtnorm::rmvnorm(n_subj, sigma = sig))
fvec <- (1 + rep(rnorm(n_subj) , each=temps_obs))
xmat <- cbind(rt(n_subj*temps_obs, df=2, ncp=1.3),
 1.2 * fvec + rnorm(n_subj * temps_obs, mean = 0.85, sd = 1.5) )
yvec <- 0.6*xmat[, 1] + xmat[, 2] + fvec + rvec
asym <- 0.5
panSizeVec <- unname(unlist(lapply(split(id, id), function(x) length(x))))
erfeVecR(xmat, yvec, panSizeVec, asym, id)
```

`sim_panel_data` *sim_panel_data for the erfe package*

Description

Simulated toy data that comes with the erfe package. The dataset is generated according to a location-shift Gaussian model which corresponds to model I of the manuscript simulation section. The dataset is a balanced panel with 50 units and 5 within observations. The dataset has 6 variables: id, pred1, pred2, resp, nobs, and year. The variable id is the unit's ids, pred1 and pred2 are the main regressors. The response variable is generated by two regressors (pred1 and pred2), and one fixed-effect and a Gaussian error. The variable nobs is the number of units and year is the panel number.

Usage

```
data(sim_panel_data)
```

Format

An object of class `"data.frame"`

id The variable id is the unit's ids.

pred1 The first regressor.

pred2 The second regressor.

resp The response variable.

nobs The number of units.

year The time ou panel variable.

References

This data set was artificially created for the erfe package.

Examples

```
data(sim_panel_data)
```

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