Package: wqs (via r-universe)

January 26, 2025

Type Package

Title Weighted Quantile Sum Regression

Version 0.0.1

Date 2015-10-05

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Maintainer Jenna Czarnota <jennaczarnota@gmail.com>

Description Fits weighted quantile sum regression models, calculates weighted quantile sum index and estimated component weights.

Depends R (>= 3.2.1)

Imports Rsolnp, glm2

License GPL (>= 2)

LazyLoad yes

NeedsCompilation no

Date/Publication 2015-10-05 22:13:29

Additional_repositories https://cranhaven.r-universe.dev

Repository https://cranhaven.r-universe.dev

RemoteUrl https://github.com/cranhaven/cranhaven.r-universe.dev

RemoteRef package/wqs

RemoteSha 4f0c23d02e83f07df810da8c5df62146ea583bf4

RemoteSubdir wqs

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wqs-package *Weighted Quantile Sum Regression*

Description

Fits weighted quantile sum regression models, calculates weighted quantile sum index and estimated component weights.

Details

The DESCRIPTION file:

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This package performs weighted quantile sum (WQS) regression, by fitting a WQS regression model for a continuous outcome variable. The components (e.g. chemicals) to be combined into an index are scored into quantiles and then used in the estimation of empirically derived weights and a final WQS index through bootstrap sampling. The weights are constrained to sum to 1 and be between 0 and 1, and can be used to identify important (highly weighted) components and those with no association with outcome (components recieving zero or negligable weight). Inference is constrained in a single direction and the index is interpretable as a measure of the mixture effect.

Author(s)

Jenna Czarnota, David Wheeler

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References

Carrico C, Gennings C, Wheeler D, Factor-Litvak P. Characterization of a weighted quantile sum regression for highly correlated data in a risk analysis setting. J Biol Agricul Environ Stat. 2014:1-21. ISSN: 1085-7117. DOI: 10.1007/ s13253-014-0180-3. http://dx.doi.org/10.1007/s13253-014-0180-3.

Czarnota J, Gennings C, Colt JS, De Roos AJ, Cerhan JR, Severson RK, Hartge P, Ward MH, Wheeler D. 2015. Analysis of environmental chemical mixtures and non-Hodgkin lymphoma risk in the NCI-SEER NHL study. Environmental Health Perspectives, DOI:10.1289/ehp.1408630.

Czarnota J, Gennings C, Wheeler D. 2015. Assessment of weighted quantile sum regression for modeling chemical mixtures and cancer risk. Cancer Informatics, 2015:14(S2) 159-171 DOI: 10.4137/CIN.S17295

Examples

```
data(WQSdata)
y.train <- WQSdata[,'y']
x.train <- WQSdata[,-10]
output <- wqs.est(y.train, x.train, B = 10)
```

`wqs.est` *Weighted Quantile Sum Regression*

Description

This function fits a weighted quantile sum regression model.

Usage

```
wqs.est(y.train, x.train, z.train = NULL, y.valid = y.train, x.valid = x.train,
z.valid = z.train, n.quantiles = 4, B = 100, b1.pos = TRUE)
```

Arguments

`y.train`	vector of the continuous explanatory variable from training data
`x.train`	matrix of explanatory variables (to be combined into an index) from training data
`z.train`	vector or matrix of covariates from training data
`y.valid`	vector of the continuous explanatory variable from validation data
`x.valid`	matrix of explanatory variables (to be combined into an index) from validation data
`z.valid`	vector or matrix of covariates from validation data
`n.quantiles`	number of quantiles to be used (needs to be between 2 and 10)
`B`	number of bootstrap samples to be used in estimation (needs to be greater than 1)
`b1.pos`	TRUE if the index is expected to be positively related to the outcome

Value

A list with the following items:

q.train	matrix of quantiles for training data
q.valid	matrix of quantiles for validation data
wts.matrix	matrix of estimated weights; each row corresponds to a bootstrap sample
weights	final estimated weights used in calculating the WQS index
WQS	weighted quantile sum estimate based on calculated weights
fit	WQS model fit to validation data

Author(s)

Jenna Czarnota, David Wheeler

References

Carrico C, Gennings C, Wheeler D, Factor-Litvak P. Characterization of a weighted quantile sum regression for highly correlated data in a risk analysis setting. J Biol Agricul Environ Stat. 2014:1-21. ISSN: 1085-7117. DOI: 10.1007/ s13253-014-0180-3. http://dx.doi.org/10.1007/s13253-014-0180-3.

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Examples

```
data(WQSdata)
y.train <- WQSdata[,'y']
x.train <- WQSdata[,-10]
output <- wqs.est(y.train, x.train, B = 10)
```

WQSdata *Simulated data to test WQS*

Description

Correlation and concentration patterns were loosely based on NHL data.

Usage

```
data("WQSdata")
```

Format

A data frame with 1000 observations on the following 10 variables.

`X1` a numeric vector

`X2` a numeric vector

`X3` a numeric vector

`X4` a numeric vector

`X5` a numeric vector

`X6` a numeric vector

`X7` a numeric vector

`X8` a numeric vector

`X9` a numeric vector

`y` a numeric vector; the outcome variable

Details

Correlation and concentration patterns were loosely based on NHL data.

References

Carrico C, Gennings C, Wheeler D, Factor-Litvak P. Characterization of a weighted quantile sum regression for highly correlated data in a risk analysis setting. J Biol Agricul Environ Stat. 2014:1-21. ISSN: 1085-7117. DOI: 10.1007/ s13253-014-0180-3. http://dx.doi.org/10.1007/s13253-014-0180-3.

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Examples

```
data(WQSdata)
```

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