

Package: wqs (via r-universe)

August 25, 2024

Type Package

Title Weighted Quantile Sum Regression

Version 0.0.1

Date 2015-10-05

Author Jenna Czarnota, David Wheeler

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

Repository CRAN

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

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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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```

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wqs.est          Weighted Quantile Sum Regression

```

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 receiving zero or negligible 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

Maintainer: Jenna Czarnota <jennaczarnota@gmail.com>

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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