Package ‘BayesGWQS’

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Bayesian Grouped WQS Regression

Description

This function fits a Bayesian grouped weighted quantile sum (BGWQS) regression model.

Usage

bgwqs.fit(
  y,
  x,
  z,
  x.s,
  n.quantiles = 4,
  working.dir,
  n.chains = 1,
  n.iter = 10000,
  n.burnin = 5000,
  n.thin = 1,
  n.adapt = 500,
  DIC = FALSE
)

Arguments

y  A vector containing outcomes.

x  A matrix of component data.

z  A vector or matrix of controlling covariates.

x.s  A vector of the number of components in each index.

n.quantiles  The number of quantiles to apply to the component data.

working.dir  A file path to the directory.

n.chains  The number of Markov chains; must be a positive integer.

n.iter  The number of total iterations per chain, including burn in.

n.burnin  The number of iterations to discard at the beginning.

n.thin  The thinning rate; must be a positive integer.

n.adapt  The number of adaptation iterations.

DIC  Logical; whether or not the user desires the function to return DIC.

Value

A list which includes BUGS output, sample chains post-burnin, and convergence test results.
## Description

This function returns a matrix of component variables, X. The user can specify the desired chemicals and order by creating a list of string vectors, each vector containing the variable names of all desired elements of that group.

### Usage

```r
make.X(df, num.groups, groups)
```

### Arguments

- **df**: A dataframe containing named component variables
- **num.groups**: An integer representing the number of component groups desired
- **groups**: A list, each item in the list being a string vector of variable names for one component group

### Value

A matrix of component variables

### Examples

```r
data("simdata")
group_list <- list(c("pcb_118", "pcb_138", "pcb_153", "pcb_180", "pcb_192"),
                   c("as", "cu", "pb", "sn"),
                   c("carbaryl", "propoxur", "methoxychlor", "diazinon", "chlorpyrifos"))
x.s <- make.x.s(simdata, 3, group_list)
X <- make.X(simdata, 3, group_list)
Y <- simdata$Y
work_dir <- tempdir()
results <- bgwqs.fit(y = Y, x = X, x.s = x.s, n.quantiles=4,
                     working.dir = work_dir,
                     n.chains = 1, n.iter = 10000, n.burnin = 5000, n.thin = 1, n.adapt = 500)
```

## Examples

```r
## Not run:
data("simdata")
group_list <- list(c("pcb_118", "pcb_138", "pcb_153", "pcb_180", "pcb_192"),
                   c("as", "cu", "pb", "sn"),
                   c("carbaryl", "propoxur", "methoxychlor", "diazinon", "chlorpyrifos"))
x.s <- make.x.s(simdata, 3, group_list)
X <- make.X(simdata, 3, group_list)
Y <- simdata$Y
work_dir <- tempdir()
results <- bgwqs.fit(y = Y, x = X, x.s = x.s, n.quantiles=4,
                     working.dir = work_dir,
                     n.chains = 1, n.iter = 10000, n.burnin = 5000, n.thin = 1, n.adapt = 500)

## End(Not run)
```
make.x.s

Forms component group ID vector of X

Description

This function returns a vector which lets WQS.fit know the size and order of groups in X

Usage

make.x.s(df, num.groups, groups)

Arguments

df A dataframe containing named component variables
num.groups An integer representing the number of component groups desired
groups A list, each item in the list being a string vector of variable names for one component group

Value

A vector of integers, each integer relating how many columns are in each group

Examples

data("simdata")
group_list <- list(c("pcb_118", "pcb_138", "pcb_153", "pcb_180", "pcb_192"),
c("as", "cu", "pb", "sn"),
c("carbaryl", "propoxur", "methoxychlor", "diazinon", "chlorpyrifos"))
x.s <- make.x.s(simdata, 3, group_list)
x.s

simdata

Simulated data of chemical concentrations and one binary outcome variable

Description

Data were simulated to have 0.7 in-group correlation and 0.3 between-group correlation. There are three groups, with the third being significantly correlated to the outcome variable.

Usage

simdata
Format

A data frame with 1000 rows and 15 variables:

- pcb_118 a numeric vector; part of group 1
- pcb_138 a numeric vector; part of group 1
- pcb_153 a numeric vector; part of group 1
- pcb_180 a numeric vector; part of group 1
- pcb_192 a numeric vector; part of group 1
- as a numeric vector; part of group 2
- cu a numeric vector; part of group 2
- pb a numeric vector; part of group 2
- sn a numeric vector; part of group 2
- carbaryl a numeric vector; part of group 3
- propoxur a numeric vector; part of group 3
- methoxychlor a numeric vector; part of group 3
- diazinon a numeric vector; part of group 3
- chlorpyrifos a numeric vector; part of group 3
- Y a numeric vector; the outcome variable

weight.plot  Generates Plots of weights by group

Description

This function takes the object created by the bgwqs.fit function and a vector of group names and generates a random forest variable importance plot for each group. The weights in each group are listed in descending order.

Usage

weight.plot(fit.object, group.names, group.list, x.s)

Arguments

- fit.object: The object that is returned by the bgwqs.fit function
- group.names: A string vector containing the name of each group included in the BGWQS regression. Will be used for plot titles.
- group.list: A list, each item in the list being a string vector of variable names for one component group.
- x.s: A vector of the number of components in each index.

Value

A plot for each group of the BGWQS regression
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