Package 'bws'

October 12, 2022

Title Bayesian Weighted Sums

Version 0.1.0

Description An interface to the Bayesian Weighted Sums model implemented in 'RStan'. It estimates the summed effect of multiple, often moderately to highly correlated, continuous predictors. Its applications can be found in analysis of exposure mixtures. The model was proposed by Hamra, Maclehose, Croen, Kauffman, and Newschaffer (2021) <doi:10.3390/ijerph18041373>. This implementation includes an extension to model binary outcome.

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Encoding UTF-8

RoxygenNote 7.1.1

Biarch true

Depends R (>= 3.4.0)

Imports methods, Rcpp (>= 0.12.0), RcppParallel (>= 5.0.1), rstan (>= 2.18.1), rstantools (>= 2.1.1)

LinkingTo BH (>= 1.66.0), Rcpp (>= 0.12.0), RcppEigen (>= 0.3.3.3.0), RcppParallel (>= 5.0.1), rstan (>= 2.18.1), StanHeaders (>= 2.18.0)

SystemRequirements GNU make

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

NeedsCompilation yes

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Repository CRAN

Date/Publication 2022-08-12 14:20:02 UTC

R topics documented:

`bws-package` *The 'bws' package.*

Description

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References

Stan Development Team (2020). RStan: the R interface to Stan. R package version 2.21.2. https://mc-stan.org

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`bws` *Bayesian Weighted Sums*

Description

Fits a Bayesian Weighted Sums as described in Bayesian Weighted Sums: A Flexible Approach to Estimate Summed Mixture Effects. Ghassan B. Hamra 1, Richard F. MacLehose, Lisa Croen, Elizabeth M. Kauffman and Craig Newschaffer. 2021. International Journal of Environmental Research and Public Health. An extension for binary outcome is included.

Usage

```
bws(iter, y, X, Z = NULL, alpha = NULL, family = "gaussian", ...)
```

Arguments

`iter`	Number of Hamiltonian Monte Carlo iterations
`y`	Am n-vector of outcomes
`X`	An n-by-p matrix of mixtures to be weighted-summed
`Z`	Default NULL. A matrix of confounders whose linear effects are estimated
`alpha`	A p-vector of hyperparameters for the Dirichlet prior on the weights. Default to be a vector of 1's.
`family`	A string "gaussian" for linear regression and "binomial" for logistic regression
`...`	Additional arguments for `rstan::sampling`

Value

An object of class `stanfit` returned by `rstan::sampling`

Examples

```
N <- 50; P <- 3; K <- 2
X <- matrix(rnorm(N*P), N, P)
Z <- matrix(rnorm(N*K), N, K)  # confounders
theta0 <- 0.5; theta1 <- 1.25
w <- c(0.3, 0.2, 0.5)
beta <- c(0.5, 0.3)
y <- theta0 + theta1*(X%*%w) + Z%*%beta + rnorm(N)
fit <- bws::bws(iter = 2000, y = y, X = X, Z = Z, family = "gaussian",
                chains = 2, cores = 2, refresh = 0)
```

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