

Package ‘bolasso’

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Title Model Consistent Lasso Estimation Through the Bootstrap

Version 0.2.0

Description Implements the bolasso algorithm for consistent variable selection and estimation accuracy. Includes support for many parallel backends via the future package. For details see: Bach (2008), 'Bolasso: model consistent Lasso estimation through the bootstrap', <[arXiv:0804.1302](https://arxiv.org/abs/0804.1302)>.

Depends Matrix (>= 1.0-6), R (>= 3.6.0)

Imports future.apply (>= 1.1.0), gamlr (>= 1.0), ggplot2, glmnet (>= 3.0), progressr, Rdpack, stats, tibble

Suggests testthat (>= 3.0.0), mlbench, covr

RdMacros Rdpack

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 bolasso

Bootstrap-enhanced Lasso

Description

This function implements model-consistent Lasso estimation through the bootstrap. It supports parallel processing by way of the `future` package, allowing the user to flexibly specify many parallelization methods. This method was developed as a variable-selection algorithm, but this package also supports making ensemble predictions on new data using the bagged Lasso models.

Usage

```
bolasso(
  formula,
  data,
  n.boot = 100,
  progress = TRUE,
  implement = "glmnet",
  x = NULL,
  y = NULL,
  ...
)
```

Arguments

<code>formula</code>	An optional object of class <code>formula</code> (or one that can be coerced to that class): a symbolic description of the model to be fitted. Can be omitted when <code>x</code> and <code>y</code> are non-missing.
<code>data</code>	An optional object of class <code>data.frame</code> that contains the modeling variables referenced in form. Can be omitted when <code>x</code> and <code>y</code> are non-missing.
<code>n.boot</code>	An integer specifying the number of bootstrap replicates.
<code>progress</code>	A boolean indicating whether to display progress across bootstrap folds.
<code>implement</code>	A character; either <code>'glmnet'</code> or <code>'gamlr'</code> , specifying which Lasso implementation to utilize. For specific modeling details, see <code>glmnet::cv.glmnet</code> or <code>gamlr::cv.gamlr</code> .
<code>x</code>	An optional predictor matrix in lieu of <code>form</code> and <code>data</code> .
<code>y</code>	An optional response vector in lieu of <code>form</code> and <code>data</code> .
<code>...</code>	Additional parameters to pass to either <code>glmnet::cv.glmnet</code> or <code>gamlr::cv.gamlr</code> .

Value

An object of class `bolasso`. This object is a list of length `n.boot` of `cv.glmnet` or `cv.gamlr` objects.

References

Bach FR (2008). “Bolasso: model consistent Lasso estimation through the bootstrap.” *CoRR*, abs/0804.1302. 0804.1302, <https://arxiv.org/abs/0804.1302>.

See Also

[glmnet::cv.glmnet](#) and [gamlr::cv.gamlr](#) for full details on the respective implementations and arguments that can be passed to . . .

Examples

```
mtcars[, c(2, 10:11)] <- lapply(mtcars[, c(2, 10:11)], as.factor)
idx <- sample(nrow(mtcars), 22)
mtcars_train <- mtcars[idx, ]
mtcars_test <- mtcars[-idx, ]

## Formula Interface

# Train model
set.seed(123)
bolasso_form <- bolasso(
  form = mpg ~ .,
  data = mtcars_train,
  n.boot = 20,
  nfolds = 5,
  implement = "glmnet"
)

# Extract selected variables
selected_vars(bolasso_form, threshold = 0.9, select = "lambda.min")

# Bagged ensemble prediction on test data
predict(bolasso_form,
  new.data = mtcars_test,
  select = "lambda.min")

## Alternating Matrix Interface

# Train model
set.seed(123)
bolasso_mat <- bolasso(
  x = model.matrix(mpg ~ . - 1, mtcars_train),
  y = mtcars_train[, 1],
  data = mtcars_train,
  n.boot = 20,
  nfolds = 5,
  implement = "glmnet"
)

# Extract selected variables
selected_vars(bolasso_mat, threshold = 0.9, select = "lambda.min")
```

```
# Bagged ensemble prediction on test data
predict(bolasso_mat,
        new.data = model.matrix(mpg ~ . - 1, mtcars_test),
        select = "lambda.min")
```

selected_vars

Bolasso-selected Variables

Description

Identifies independent variables that are selected by the Bolasso algorithm at least the fraction of the time specified by the user-defined threshold. The typical value for this threshold is 0.9 and typically shouldn't be lower than that.

Usage

```
selected_vars(object, threshold = 0.9, summarise = TRUE, ...)
```

Arguments

object	An object of class bolasso .
threshold	A numeric between 0 and 1, specifying the fraction of bootstrap replicates for which Lasso must select a variable for it to be considered a selected variable.
summarise	A Boolean indicator where FALSE indicates returning the full set of coefficients at the selected variable/bootstrap replicate level and TRUE indicates taking the average of each variable's coefficient across bootstrap replicates. The default value is TRUE as it's more efficient and interpretable.
...	Additional arguments to pass to predict on objects with class cv.glmnet or cv.gamlr .

Value

A tibble with each selected variable and its respective coefficient for each bootstrap replicate.

See Also

[glmnet::predict.glmnet\(\)](#) and [gamlr:::predict.gamlr](#) for details on additional arguments to pass to ...

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