

Package ‘plsRglm’

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Depends R (>= 2.10)

Imports mvtnorm, boot, bipartite, car, MASS, Rcpp

LinkingTo Rcpp, RcppArmadillo

Enhances pls

Suggests chemometrics, knitr, plsdo, plsdepot, plspsm, fastglm,
plsRcox, rmarkdown, testthat (>= 3.0.0), xtable

Title Partial Least Squares Regression for Generalized Linear Models

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Description Provides (weighted) Partial least squares Regression for generalized linear models and repeated k-fold cross-validation of such models using various criteria <[doi:10.48550/arXiv.1810.01005](https://doi.org/10.48550/arXiv.1810.01005)>. It allows for missing data in the explanatory variables. Bootstrap confidence intervals constructions are also available.

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Encoding UTF-8

URL <https://fbertran.github.io/plsRglm/>,
<https://github.com/fbertran/plsRglm>

BugReports <https://github.com/fbertran/plsRglm/issues>

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aic.dof	<i>Akaike and Bayesian Information Criteria and Generalized minimum description length</i>
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Description

This function computes the Akaike and Bayesian Information Criteria and the Generalized minimum description length.

Usage

```

aic.dof(RSS, n, DoF, sigmahat)

bic.dof(RSS, n, DoF, sigmahat)

gmdl.dof(sigmahat, n, DoF, yhat)

```

Arguments

RSS	vector of residual sum of squares.
n	number of observations.
DoF	vector of Degrees of Freedom. The length of DoF is the same as the length of RSS.
sigmahat	Estimated model error. The length of sigmahat is the same as the length of RSS.
yhat	vector of squared norm of Yhat. The length of yhat is the same as the length of sigmahat.

Details

The gmdl criterion is defined as

$$gmdl = \frac{n}{2} \log(S) + \frac{DoF}{2} \log(F) + \frac{1}{2} \log(n)$$

with

$$S = \hat{\sigma}^2$$

Value

vector numerical values of the requested AIC, BIC or GMDL.

Author(s)

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References

M. Hansen, B. Yu. (2001). Model Selection and Minimum Description Length Principle, *Journal of the American Statistical Association*, 96, 746-774.
 N. Kraemer, M. Sugiyama. (2011). The Degrees of Freedom of Partial Least Squares Regression. *Journal of the American Statistical Association*, 106(494), 697-705.
 N. Kraemer, M.L. Braun, Kernelizing PLS, Degrees of Freedom, and Efficient Model Selection, *Proceedings of the 24th International Conference on Machine Learning*, Omni Press, (2007) 441-448.

See Also

[plsR.dof](#) for degrees of freedom computation and [infcrit.dof](#) for computing information criteria directly from a previously fitted plsR model.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsR(yCornell,XCornell,4)
dof.object <- plsR.dof(modpls)
aic.dof(modpls$RSS,modpls$nr,dof.object$DoF,dof.object$sigmahat)
bic.dof(modpls$RSS,modpls$nr,dof.object$DoF,dof.object$sigmahat)
gmdl.dof(dof.object$sigmahat,modpls$nr,dof.object$DoF,dof.object$yhat)
naive.object <- plsR.dof(modpls,naive=TRUE)
aic.dof(modpls$RSS,modpls$nr,naive.object$DoF,naive.object$sigmahat)
bic.dof(modpls$RSS,modpls$nr,naive.object$DoF,naive.object$sigmahat)
gmdl.dof(naive.object$sigmahat,modpls$nr,naive.object$DoF,naive.object$yhat)
```

AICpls

AIC function for plsR models

Description

This function provides AIC computation for an univariate plsR model.

Usage

```
AICpls(ncomp, residpls, weights = rep.int(1, length(residpls)))
```

Arguments

ncomp	Number of components
residpls	Residuals of a fitted univariate plsR model
weights	Weights of observations

Details

AIC function for plsR models with univariate response.

Value

real	AIC value
------	-----------

Author(s)

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References

Baibing Li, Julian Morris, Elaine B. Martin, Model selection for partial least squares regression, *Chemometrics and Intelligent Laboratory Systems* 64 (2002) 79-89, doi:10.1016/S01697439(02)00051-5.

See Also

[loglikpls](#) for loglikelihood computations for plsR models and [AIC](#) for AIC computation for a linear models

Examples

```
data(pine)
ypine <- pine[,11]
Xpine <- pine[,1:10]
(Pinscaled <- as.data.frame(cbind(scale(ypine),scale(as.matrix(Xpine)))))
colnames(Pinscaled)[1] <- "y"

lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)

modpls <- plsR(ypine,Xpine,10)
modpls$Std.Coeffs
lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)

AIC(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled))
print(logLik(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)))

sum(dnorm(modpls$RepY, modpls$Std.ValsPredictY, sqrt(mean(modpls$residY^2)), log=TRUE))
sum(dnorm(Pinscaled$yy, fitted(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)),
sqrt(mean(residuals(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled))^2)), log=TRUE))
loglikpls(modpls$residY)
loglikpls(residuals(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)))
AICpls(10,residuals(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)))
AICpls(10,modpls$residY)
```

Description

This database was collected on patients carrying a colon adenocarcinoma. It has 104 observations on 33 binary qualitative explanatory variables and one response variable y representing the cancer stage according to the to Astler-Coller classification (Astler and Coller, 1954). This dataset has some missing data due to technical limits. A microsatellite is a non-coding DNA sequence.

Format

A data frame with 104 observations on the following 34 variables.

y the response: a binary vector (Astler-Coller score).

D2S138 a binary vector that indicates whether this microsatellite is altered or not.

D18S61 a binary vector that indicates whether this microsatellite is altered or not.

D16S422 a binary vector that indicates whether this microsatellite is altered or not.

D17S794 a binary vector that indicates whether this microsatellite is altered or not.

D6S264 a binary vector that indicates whether this microsatellite is altered or not.

D14S65 a binary vector that indicates whether this microsatellite is altered or not.

D18S53 a binary vector that indicates whether this microsatellite is altered or not.

D17S790 a binary vector that indicates whether this microsatellite is altered or not.

D1S225 a binary vector that indicates whether this microsatellite is altered or not.

D3S1282 a binary vector that indicates whether this microsatellite is altered or not.

D9S179 a binary vector that indicates whether this microsatellite is altered or not.

D5S430 a binary vector that indicates whether this microsatellite is altered or not.

D8S283 a binary vector that indicates whether this microsatellite is altered or not.

D11S916 a binary vector that indicates whether this microsatellite is altered or not.

D2S159 a binary vector that indicates whether this microsatellite is altered or not.

D16S408 a binary vector that indicates whether this microsatellite is altered or not.

D5S346 a binary vector that indicates whether this microsatellite is altered or not.

D10S191 a binary vector that indicates whether this microsatellite is altered or not.

D13S173 a binary vector that indicates whether this microsatellite is altered or not.

D6S275 a binary vector that indicates whether this microsatellite is altered or not.

D15S127 a binary vector that indicates whether this microsatellite is altered or not.

D1S305 a binary vector that indicates whether this microsatellite is altered or not.

D4S394 a binary vector that indicates whether this microsatellite is altered or not.

D20S107 a binary vector that indicates whether this microsatellite is altered or not.

D1S197 a binary vector that indicates whether this microsatellite is altered or not.

D1S207 a binary vector that indicates whether this microsatellite is altered or not.

D10S192 a binary vector that indicates whether this microsatellite is altered or not.

D3S1283 a binary vector that indicates whether this microsatellite is altered or not.

D4S414 a binary vector that indicates whether this microsatellite is altered or not.

D8S264 a binary vector that indicates whether this microsatellite is altered or not.

D22S928 a binary vector that indicates whether this microsatellite is altered or not.

TP53 a binary vector that indicates whether this microsatellite is altered or not.

D9S171 a binary vector that indicates whether this microsatellite is altered or not.

Source

Weber *et al.* (2007). Allelotyping analyzes of synchronous primary and metastasis CIN colon cancers identified different subtypes. *Int J Cancer*, 120(3), pages 524-32.

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Société Française de Statistique*, 151(2), pages 1-18.

Examples

```
data(aze)
str(aze)
```

```
aze_compl
```

```
As aze without missing values
```

Description

This is a single imputation of the [aze](#) dataset which was collected on patients carrying a colon adenocarcinoma. It has 104 observations on 33 binary qualitative explanatory variables and one response variable *y* representing the cancer stage according to the to Astler-Coller classification (Astler and Coller, 1954). A microsatellite is a non-coding DNA sequence.

Format

A data frame with 104 observations on the following 34 variables.

y the response: a binary vector (Astler-Coller score).

D2S138 a binary vector that indicates whether this microsatellite is altered or not.

D18S61 a binary vector that indicates whether this microsatellite is altered or not.

D16S422 a binary vector that indicates whether this microsatellite is altered or not.

D17S794 a binary vector that indicates whether this microsatellite is altered or not.

D6S264 a binary vector that indicates whether this microsatellite is altered or not.

D14S65 a binary vector that indicates whether this microsatellite is altered or not.

D18S53 a binary vector that indicates whether this microsatellite is altered or not.

D17S790 a binary vector that indicates whether this microsatellite is altered or not.

D1S225 a binary vector that indicates whether this microsatellite is altered or not.
D3S1282 a binary vector that indicates whether this microsatellite is altered or not.
D9S179 a binary vector that indicates whether this microsatellite is altered or not.
D5S430 a binary vector that indicates whether this microsatellite is altered or not.
D8S283 a binary vector that indicates whether this microsatellite is altered or not.
D11S916 a binary vector that indicates whether this microsatellite is altered or not.
D2S159 a binary vector that indicates whether this microsatellite is altered or not.
D16S408 a binary vector that indicates whether this microsatellite is altered or not.
D5S346 a binary vector that indicates whether this microsatellite is altered or not.
D10S191 a binary vector that indicates whether this microsatellite is altered or not.
D13S173 a binary vector that indicates whether this microsatellite is altered or not.
D6S275 a binary vector that indicates whether this microsatellite is altered or not.
D15S127 a binary vector that indicates whether this microsatellite is altered or not.
D1S305 a binary vector that indicates whether this microsatellite is altered or not.
D4S394 a binary vector that indicates whether this microsatellite is altered or not.
D20S107 a binary vector that indicates whether this microsatellite is altered or not.
D1S197 a binary vector that indicates whether this microsatellite is altered or not.
D1S207 a binary vector that indicates whether this microsatellite is altered or not.
D10S192 a binary vector that indicates whether this microsatellite is altered or not.
D3S1283 a binary vector that indicates whether this microsatellite is altered or not.
D4S414 a binary vector that indicates whether this microsatellite is altered or not.
D8S264 a binary vector that indicates whether this microsatellite is altered or not.
D22S928 a binary vector that indicates whether this microsatellite is altered or not.
TP53 a binary vector that indicates whether this microsatellite is altered or not.
D9S171 a binary vector that indicates whether this microsatellite is altered or not.

Source

Weber *et al.* (2007). Allelotyping analyzes of synchronous primary and metastasis CIN colon cancers identified different subtypes. *Int J Cancer*, 120(3), pages 524-32.

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Société Française de Statistique*, 151(2), pages 1-18.

Examples

```
data(aze_compl)
str(aze_compl)
```

bootpls

*Non-parametric Bootstrap for PLS models***Description**

Provides a wrapper for the bootstrap function `boot` from the `boot` R package. Implements non-parametric bootstraps for PLS Regression models by either (Y,X) or (Y,T) resampling.

Usage

```
bootpls(
  object,
  typeboot = "plsmodel",
  R = 250,
  statistic = NULL,
  sim = "ordinary",
  stype = "i",
  stabvalue = 1e+06,
  verbose = TRUE,
  ...
)
```

Arguments

<code>object</code>	An object of class <code>plsRmodel</code> or <code>plsRmultiModel</code> to bootstrap.
<code>typeboot</code>	The type of bootstrap. Either (Y,X) bootstrap (<code>typeboot="plsmodel"</code>) or (Y,T) bootstrap (<code>typeboot="fmodel_np"</code>). Defaults to (Y,X) resampling.
<code>R</code>	The number of bootstrap replicates. Usually this will be a single positive integer. For importance resampling, some resamples may use one set of weights and others use a different set of weights. In this case <code>R</code> would be a vector of integers where each component gives the number of resamples from each of the rows of weights.
<code>statistic</code>	A function which when applied to data returns a vector containing the statistic(s) of interest. <code>statistic</code> must take at least two arguments. The first argument passed will always be the original data. The second will be a vector of indices, frequencies or weights which define the bootstrap sample. Further, if predictions are required, then a third argument is required which would be a vector of the random indices used to generate the bootstrap predictions. Any further arguments can be passed to <code>statistic</code> through the <code>...</code> argument.
<code>sim</code>	A character string indicating the type of simulation required. Possible values are "ordinary" (the default), "balanced", "permutation", or "antithetic".
<code>stype</code>	A character string indicating what the second argument of <code>statistic</code> represents. Possible values of <code>stype</code> are "i" (indices - the default), "f" (frequencies), or "w" (weights).

stabvalue	A value to hard threshold bootstrap estimates computed from atypical resamplings. Especially useful for Generalized Linear Models.
verbose	should info messages be displayed ?
...	Other named arguments for <code>statistic</code> which are passed unchanged each time it is called. Any such arguments to <code>statistic</code> should follow the arguments which <code>statistic</code> is required to have for the simulation. Beware of partial matching to arguments of <code>boot</code> listed above.

Details

More details on bootstrap techniques are available in the help of the `boot` function.

Value

An object of class "boot". See the Value part of the help of the function `boot`.

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

A. Lazraq, R. Cleroux, and J.-P. Gauchi. (2003). Selecting both latent and explanatory variables in the PLS1 regression model. *Chemometrics and Intelligent Laboratory Systems*, 66(2):117-126.
 P. Bastien, V. Esposito-Vinzi, and M. Tenenhaus. (2005). PLS generalised linear regression. *Computational Statistics & Data Analysis*, 48(1):17-46.
 A. C. Davison and D. V. Hinkley. (1997). *Bootstrap Methods and Their Applications*. Cambridge University Press, Cambridge.

See Also

`boot`

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

# Lazraq-Cleroux PLS ordinary bootstrap
set.seed(250)
modpls <- plsR(yCornell,XCornell,3)

#(Y,X) resampling
Cornell.bootYX <- bootpls(modpls, R=250, verbose=FALSE)

#(Y,T) resampling
Cornell.bootYT <- bootpls(modpls, typeboot="fmodel_np", R=250, verbose=FALSE)
```

```

# Using the boxplots.bootpls function
boxplots.bootpls(Cornell.bootYX,indices=2:8)
# Confidence intervals plotting
confints.bootpls(Cornell.bootYX,indices=2:8)
plots.confints.bootpls(confints.bootpls(Cornell.bootYX,indices=2:8))
# Graph similar to the one of Bastien et al. in CSDA 2005
boxplot(as.vector(Cornell.bootYX$t[,,-1])~factor(rep(1:7,rep(250,7))))
main="Bootstrap distributions of standardised bj (j = 1, ..., 7).")
points(c(1:7),Cornell.bootYX$t0[-1],col="red",pch=19)

library(boot)
boot.ci(Cornell.bootYX, conf = c(0.90,0.95), type = c("norm","basic","perc","bca"), index=2)
plot(Cornell.bootYX,index=2)
jack.after.boot(Cornell.bootYX, index=2, useJ=TRUE, nt=3)
plot(Cornell.bootYX,index=2,jack=TRUE)

car::dataEllipse(Cornell.bootYX$t[,2], Cornell.bootYX$t[,3], cex=.3,
levels=c(.5, .95, .99), robust=TRUE)
rm(Cornell.bootYX)

# PLS balanced bootstrap

set.seed(225)
Cornell.bootYX <- bootpls(modpls, sim="balanced", R=250, verbose=FALSE)
boot.array(Cornell.bootYX, indices=TRUE)

# Using the boxplots.bootpls function
boxplots.bootpls(Cornell.bootYX,indices=2:8)
# Confidence intervals plotting
confints.bootpls(Cornell.bootYX,indices=2:8)
plots.confints.bootpls(confints.bootpls(Cornell.bootYX,indices=2:8))
# Graph similar to the one of Bastien et al. in CSDA 2005
boxplot(as.vector(Cornell.bootYX$t[,,-1])~factor(rep(1:7,rep(250,7))))
main="Bootstrap distributions of standardised bj (j = 1, ..., 7).")
points(c(1:7),Cornell.bootYX$t0[-1],col="red",pch=19)

library(boot)
boot.ci(Cornell.bootYX, conf = c(0.90,0.95), type = c("norm","basic","perc","bca"),
index=2, verbose=FALSE)
plot(Cornell.bootYX,index=2)
jack.after.boot(Cornell.bootYX, index=2, useJ=TRUE, nt=3)
plot(Cornell.bootYX,index=2,jack=TRUE)

rm(Cornell.bootYX)

# PLS permutation bootstrap

set.seed(500)

```

```

Cornell.bootYX <- bootpls(modpls, sim="permutation", R=1000, verbose=FALSE)
boot.array(Cornell.bootYX, indices=TRUE)

# Graph of bootstrap distributions
boxplot(as.vector(Cornell.bootYX$t[, -1])~factor(rep(1:7, rep(1000, 7))),
main="Bootstrap distributions of standardised bj (j = 1, ..., 7).")
points(c(1:7), Cornell.bootYX$t0[-1], col="red", pch=19)
# Using the boxplots.bootpls function
boxplots.bootpls(Cornell.bootYX, indices=2:8)

library(boot)
plot(Cornell.bootYX, index=2)

qqnorm(Cornell.bootYX$t[, 2], ylim=c(-1, 1))
abline(h=Cornell.bootYX$t0[2], lty=2)
(sum(abs(Cornell.bootYX$t[, 2])>=abs(Cornell.bootYX$t0[2]))+1)/(length(Cornell.bootYX$t[, 2])+1)

rm(Cornell.bootYX)

```

bootplsglm

Non-parametric Bootstrap for PLS generalized linear models

Description

Provides a wrapper for the bootstrap function `boot` from the `boot` R package. Implements non-parametric bootstraps for PLS Generalized Linear Regression models by either (Y,X) or (Y,T) resampling.

Usage

```

bootplsglm(
  object,
  typeboot = "fmodel_np",
  R = 250,
  statistic = NULL,
  sim = "ordinary",
  stype = "i",
  stabvalue = 1e+06,
  verbose = TRUE,
  ...
)

```

Arguments

<code>object</code>	An object of class <code>plsRglmmodel</code> to bootstrap
<code>typeboot</code>	The type of bootstrap. Either (Y,X) bootstrap (<code>typeboot="plsmode1"</code>) or (Y,T) bootstrap (<code>typeboot="fmodel_np"</code>). Defaults to (Y,T) resampling.
<code>R</code>	The number of bootstrap replicates. Usually this will be a single positive integer. For importance resampling, some resamples may use one set of weights and others use a different set of weights. In this case <code>R</code> would be a vector of integers where each component gives the number of resamples from each of the rows of weights.
<code>statistic</code>	A function which when applied to data returns a vector containing the statistic(s) of interest. <code>statistic</code> must take at least two arguments. The first argument passed will always be the original data. The second will be a vector of indices, frequencies or weights which define the bootstrap sample. Further, if predictions are required, then a third argument is required which would be a vector of the random indices used to generate the bootstrap predictions. Any further arguments can be passed to <code>statistic</code> through the <code>...</code> argument.
<code>sim</code>	A character string indicating the type of simulation required. Possible values are "ordinary" (the default), "balanced", "permutation", or "antithetic".
<code>stype</code>	A character string indicating what the second argument of <code>statistic</code> represents. Possible values of <code>stype</code> are "i" (indices - the default), "f" (frequencies), or "w" (weights).
<code>stabvalue</code>	A value to hard threshold bootstrap estimates computed from atypical resamplings. Especially useful for Generalized Linear Models.
<code>verbose</code>	should info messages be displayed ?
<code>...</code>	Other named arguments for <code>statistic</code> which are passed unchanged each time it is called. Any such arguments to <code>statistic</code> should follow the arguments which <code>statistic</code> is required to have for the simulation. Beware of partial matching to arguments of <code>boot</code> listed above.

Details

More details on bootstrap techniques are available in the help of the `boot` function.

Value

An object of class "boot". See the Value part of the help of the function `boot`.

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

- A. Lazraq, R. Cleroux, and J.-P. Gauchi. (2003). Selecting both latent and explanatory variables in the PLS1 regression model. *Chemometrics and Intelligent Laboratory Systems*, 66(2):117-126.
- P. Bastien, V. Esposito-Vinzi, and M. Tenenhaus. (2005). PLS generalised linear regression. *Computational Statistics & Data Analysis*, 48(1):17-46.
- A. C. Davison and D. V. Hinkley. (1997). *Bootstrap Methods and Their Applications*. Cambridge University Press, Cambridge.

See Also

[boot](#)

Examples

```
#Imputed aze dataset
data(aze_compl)
Xaze_compl<-aze_compl[,2:34]
yaze_compl<-aze_compl$y

dataset <- cbind(y=yaze_compl,Xaze_compl)
modplsglm <- plsRglm(y~.,data=dataset,3,model="pls-glm-logistic")

library(boot)
# Bastien (Y,T) PLS bootstrap
aze_compl.bootYT <- bootpls(glm(modplsglm, R=250, verbose=FALSE)
boxplots.bootpls(aze_compl.bootYT)
confints.bootpls(aze_compl.bootYT)
plots.confints.bootpls(confints.bootpls(aze_compl.bootYT))

# (Y,X) PLS bootstrap
aze_compl.bootYX <- bootpls(glm(modplsglm, R=250, verbose=FALSE,
typeboot = "plsmodel")
boxplots.bootpls(aze_compl.bootYX)
confints.bootpls(aze_compl.bootYX)
plots.confints.bootpls(confints.bootpls(aze_compl.bootYX))

# (Y,X) PLS bootstrap raw coefficients
aze_compl.bootYX.raw <- bootpls(glm(modplsglm, R=250, verbose=FALSE,
typeboot = "plsmodel", statistic=coefs.plsRglm.raw)
boxplots.bootpls(aze_compl.bootYX.raw)
confints.bootpls(aze_compl.bootYX.raw)
plots.confints.bootpls(confints.bootpls(aze_compl.bootYX.raw))

plot(aze_compl.bootYT,index=2)
jack.after.boot(aze_compl.bootYT, index=2, useJ=TRUE, nt=3)
plot(aze_compl.bootYT, index=2,jack=TRUE)
aze_compl.tilt.boot <- tilt.bootpls(glm(modplsglm, statistic=coefs.plsRglm,
R=c(499, 100, 100), alpha=c(0.025, 0.975), sim="ordinary", stype="i", index=1)

# PLS bootstrap balanced
```

```

aze_compl.bootYT <- bootplsglm(modplsglm, sim="balanced", R=250, verbose=FALSE)
boxplots.bootpls(aze_compl.bootYT)
confints.bootpls(aze_compl.bootYT)
plots.confints.bootpls(confints.bootpls(aze_compl.bootYT))

plot(aze_compl.bootYT)
jack.after.boot(aze_compl.bootYT, index=1, useJ=TRUE, nt=3)
plot(aze_compl.bootYT, jack=TRUE)
aze_compl.tilt.boot <- tilt.bootplsglm(modplsglm, statistic=coefs.plsR,
R=c(499, 100, 100), alpha=c(0.025, 0.975), sim="balanced", stype="i", index=1)

# PLS permutation bootstrap

aze_compl.bootYT <- bootplsglm(modplsglm, sim="permutation", R=250, verbose=FALSE)
boxplots.bootpls(aze_compl.bootYT)
plot(aze_compl.bootYT)

#Original aze dataset with missing values
data(aze)
Xaze<-aze[,2:34]
yaze<-aze$y

library(boot)
modplsglm2 <- plsRglm(yaze,Xaze,3,modele="pls-glm-logistic")
aze.bootYT <- bootplsglm(modplsglm2, R=250, verbose=FALSE)
boxplots.bootpls(aze.bootYT)
confints.bootpls(aze.bootYT)
plots.confints.bootpls(confints.bootpls(aze.bootYT))

#Ordinal logistic regression
data(bordeaux)
Xbordeaux<-bordeaux[,1:4]
ybordeaux<-factor(bordeaux$Quality,ordered=TRUE)
dataset <- cbind(y=ybordeaux,Xbordeaux)
options(contrasts = c("contr.treatment", "contr.poly"))
modplsglm3 <- plsRglm(ybordeaux,Xbordeaux,1,modele="pls-glm-polr")
bordeaux.bootYT<- bootplsglm(modplsglm3, sim="permutation", R=250, verbose=FALSE)
boxplots.bootpls(bordeaux.bootYT)
boxplots.bootpls(bordeaux.bootYT,ranget0=TRUE)

bordeaux.bootYT2<- bootplsglm(modplsglm3, sim="permutation", R=250,
strata=unclass(ybordeaux), verbose=FALSE)
boxplots.bootpls(bordeaux.bootYT2,ranget0=TRUE)

if(require(chemometrics)){
data(hyptis)

```

```

hyptis
yhyptis <- factor(hyptis$Group,ordered=TRUE)
Xhyptis <- as.data.frame(hyptis[,c(1:6)])
dataset <- cbind(y=yhyptis,Xhyptis)
options(contrasts = c("contr.treatment", "contr.poly"))
modplsglm4 <- plsRglm(yhyptis,Xhyptis,3,modele="pls-glm-polr")
hyptis.bootYT3<- bootpls(glm(modplsglm4, sim="permutation", R=250, verbose=FALSE)
rownames(hyptis.bootYT3$t0)<-c("Sabi\nnene", "Pin\nnene",
"Cine\nole", "Terpi\nnene", "Fenc\nhone", "Terpi\nnolene")
boxplots.bootpls(hyptis.bootYT3)
boxplots.bootpls(hyptis.bootYT3,xaxisticks=FALSE)
boxplots.bootpls(hyptis.bootYT3,ranget0=TRUE)
boxplots.bootpls(hyptis.bootYT3,ranget0=TRUE,xaxisticks=FALSE)
}

```

bordeaux

Quality of wine dataset

Description

Quality of Bordeaux wines (Quality) and four potentially predictive variables (Temperature, Sunshine, Heat and Rain).

Format

A data frame with 34 observations on the following 5 variables.

Temperature a numeric vector

Sunshine a numeric vector

Heat a numeric vector

Rain a numeric vector

Quality an ordered factor with levels 1 < 2 < 3

Source

P. Bastien, V. Esposito-Vinzi, and M. Tenenhaus. (2005). PLS generalised linear regression. *Computational Statistics & Data Analysis*, 48(1):17-46.

References

M. Tenenhaus. (2005). La regression logistique PLS. In J.-J. Dreesbeke, M. Lejeune, and G. Saporta, editors, *Modeles statistiques pour donnees qualitatives*. Editions Technip, Paris.

Examples

```

data(bordeaux)
str(bordeaux)

```

bordeauxNA

Quality of wine dataset

Description

Quality of Bordeaux wines (Quality) and four potentially predictive variables (Temperature, Sunshine, Heat and Rain).

Format

A data frame with 34 observations on the following 5 variables.

Temperature a numeric vector

Sunshine a numeric vector

Heat a numeric vector

Rain a numeric vector

Quality an ordered factor with levels 1 < 2 < 3

Details

The value of x1 for the first observation was removed from the matrix of predictors on purpose.

The bordeauxNA is a dataset with a missing value for testing purpose.

Source

P. Bastien, V. Esposito-Vinzi, and M. Tenenhaus. (2005). PLS generalised linear regression. *Computational Statistics & Data Analysis*, 48(1):17-46.

References

M. Tenenhaus. (2005). La regression logistique PLS. In J.-J. Dreesbeke, M. Lejeune, and G. Saporta, editors, *Modeles statistiques pour donnees qualitatives*. Editions Technip, Paris.

Examples

```
data(bordeauxNA)
str(bordeauxNA)
```

boxplots.bootpls	<i>Boxplot bootstrap distributions</i>
------------------	--

Description

Boxplots for bootstrap distributions.

Usage

```
boxplots.bootpls(
  bootobject,
  indices = NULL,
  prednames = TRUE,
  articlestyle = TRUE,
  xaxisticks = TRUE,
  ranget0 = FALSE,
  las = par("las"),
  mar,
  mgp,
  ...
)
```

Arguments

bootobject	a object of class "boot"
indices	vector of indices of the variables to plot. Defaults to NULL: all the predictors will be used.
prednames	do the original names of the predictors shall be plotted ? Defaults to TRUE: the names are plotted.
articlestyle	do the extra blank zones of the margin shall be removed from the plot ? Defaults to TRUE: the margins are removed.
xaxisticks	do ticks for the x axis shall be plotted ? Defaults to TRUE: the ticks are plotted.
ranget0	does the vertical range of the plot shall be computed to include the initial estimates of the coefficients ? Defaults to FALSE: the vertical range is calculated only using the bootstrapped values of the statistics. Especially using for permutation bootstrap.
las	numeric in 0,1,2,3; the style of axis labels. 0: always parallel to the axis [default], 1: always horizontal, 2: always perpendicular to the axis, 3: always vertical.
mar	A numerical vector of the form <code>c(bottom, left, top, right)</code> which gives the number of lines of margin to be specified on the four sides of the plot. The default is <code>c(5, 4, 4, 2) + 0.1</code> .
mgp	The margin line (in mex units) for the axis title, axis labels and axis line. Note that <code>mgp[1]</code> affects title whereas <code>mgp[2:3]</code> affect axis. The default is <code>c(3, 1, 0)</code> .
...	further options to pass to the <code>boxplot</code> function.

Value

NULL

Author(s)

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<https://fbertran.github.io/homepage/>

See Also[bootpls](#)**Examples**

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

# Lazraq-Cleroux PLS ordinary bootstrap
set.seed(250)
modpls <- plsR(yCornell,XCornell,3)
Cornell.bootYX <- bootpls(modpls, R=250)

# Graph similar to the one of Bastien et al. in CSDA 2005
boxplots.bootpls(Cornell.bootYX,indices=2:8)

data(aze_compl)
modplsglm<-plsRglm(y~.,data=aze_compl,3,modele="pls-glm-logistic")
aze_compl.boot3 <- bootplsglm(modplsglm, R=250, verbose=FALSE)
boxplots.bootpls(aze_compl.boot3)
boxplots.bootpls(aze_compl.boot3,las=3,mar=c(5,2,1,1))
boxplots.bootpls(aze_compl.boot3,indices=c(2,4,6),prednames=FALSE)
```

`classbiplot`*Grouped biplot for PLS scores and loadings*

Description

This helper plots the individuals and predictors from a fitted `plsR` or `plsRglm` model while coloring the individuals according to a grouping variable.

Usage

```

classbiplot(
  object,
  group = NULL,
  comps = 1:2,
  col,
  colvar = "gray30",
  pch = 19,
  cex = rep(par("cex"), 2),
  xlabs = NULL,
  ylabs = NULL,
  point.labels = FALSE,
  show.legend = TRUE,
  legendpos = "topright",
  var.axes = TRUE,
  expand = 1,
  xlim = NULL,
  ylim = NULL,
  arrow.len = 0.1,
  main = NULL,
  sub = NULL,
  xlab = NULL,
  ylab = NULL,
  ...
)

```

Arguments

object	an object containing score and loading matrices in <code>object\$tt</code> and <code>object\$pp</code> , typically returned by plsR or plsRglm .
group	optional grouping vector for the individuals. When supplied, observations are colored according to the levels of group.
comps	integer vector of length 2 giving the components to display.
col	colors for the individuals. If group is provided, col can have length 1, the number of groups, or the number of individuals.
colvar	color used for variable labels, arrows and axes.
pch	plotting character for the individuals.
cex	character expansion. Length 1 is recycled to length 2: the first value is used for the individuals and the second one for the variables.
xlabs	optional labels for the individuals.
ylabs	optional labels for the variables.
point.labels	shall the individuals be displayed using text labels instead of points? Defaults to FALSE.
show.legend	shall a legend be added when group is provided? Defaults to TRUE.
legendpos	position of the legend as in legend , defaults to "topright".

`var.axes` shall arrows be drawn for the variables? Defaults to TRUE.
`expand` expansion factor for the variables layer, as in `biplot`. Defaults to 1.
`xlim, ylim` limits for the scores panel. When both are missing they are chosen symmetrically as in `biplot`.
`arrow.len` length of the arrows for the variables.
`main, sub, xlab, ylab` usual graphical parameters passed to `plot`.
`...` further graphical parameters passed to `plot` for the scores panel.

Value

Invisibly returns a list with the scores, loadings, colors, grouping factor and scaling ratio used in the plot.

Author(s)

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See Also

`plsR`, `plsRglm`, `biplot`

Examples

```

data(Cornell)
modpls <- plsR(Y ~ ., data = Cornell, nt = 2)
grp <- factor(Cornell$Y > median(Cornell$Y), labels = c("Low", "High"))
classbiplot(modpls, group = grp, col = c("firebrick3", "steelblue3"))
  
```

`coef.plsRglmmodel` *coef method for plsR models*

Description

This function provides a `coef` method for the class `"plsRglmmodel"`

Usage

```

## S3 method for class 'plsRglmmodel'
coef(object, type = c("scaled", "original"), ...)
  
```

Arguments

object	an object of the class "plsRglmmodel"
type	if scaled, the coefficients of the predictors are given for the scaled predictors, if original the coefficients are to be used with the predictors on their original scale.
...	not used

Value

An object of class coef.plsRglmmodel.

CoeffC	Coefficients of the components.
Std.Coeffs	Coefficients of the scaled predictors in the regression function.
Coeffs	Coefficients of the untransformed predictors (on their original scale).

Author(s)

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See Also

[coef](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsRglm(yCornell,XCornell,3,modele="pls-glm-family",family=gaussian())
class(modpls)
coef(modpls)
coef(modpls,type="scaled")
rm(list=c("XCornell","yCornell","modpls"))
```

coef.plsRmodel

coef method for plsR models

Description

This function provides a coef method for the class "plsRmodel"

Usage

```
## S3 method for class 'plsRmodel'  
coef(object, type = c("scaled", "original"), ...)
```

Arguments

object	an object of the class "plsRmodel"
type	if scaled, the coefficients of the predictors are given for the scaled predictors, if original the coefficients are to be used with the predictors on their original scale.
...	not used

Value

An object of class `coef.plsRmodel`.

CoeffC	Coefficients of the components.
Std.Coeffs	Coefficients of the scaled predictors.
Coeffs	Coefficients of the untransformed predictors (on their original scale).

Author(s)

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See Also

[coef](#)

Examples

```
data(Cornell)  
XCornell<-Cornell[,1:7]  
yCornell<-Cornell[,8]  
modpls <- plsRglm(yCornell,XCornell,3,modele="pls")  
class(modpls)  
coef(modpls)  
coef(modpls,type="scaled")  
rm(list=c("XCornell","yCornell","modpls"))
```

coefs.plsR	<i>Coefficients for bootstrap computations of PLSR models</i>
------------	---

Description

A function passed to `boot` to perform bootstrap.

Usage

```
coefs.plsR(dataset, ind, nt, modele, maxcoefvalues, ifbootfail, verbose)
```

Arguments

dataset	dataset to resample
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsR
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
ifbootfail	value to return if the estimation fails on a bootstrap sample
verbose	should info messages be displayed ?

Value

estimates on a bootstrap sample or `ifbootfail` value if the bootstrap computation fails.

Author(s)

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<https://fbertran.github.io/homepage/>

See Also

See also [bootpls](#).

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

# Lazraq-Cleroux PLS (Y,X) bootstrap
# statistic=coefs.plsR is the default for (Y,X) resampling of PLSR models.
set.seed(250)
modpls <- plsR(yCornell,XCornell,1)
Cornell.bootYX <- bootpls(modpls, R=250, statistic=coefs.plsR, verbose=FALSE)
```

coefs.plsR.raw	<i>Raw coefficients for bootstrap computations of PLSR models</i>
----------------	---

Description

A function passed to boot to perform bootstrap.

Usage

```
coefs.plsR.raw(dataset, ind, nt, modele, maxcoefvalues, ifbootfail, verbose)
```

Arguments

dataset	dataset to resample
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsR
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
ifbootfail	value to return if the estimation fails on a bootstrap sample
verbose	should info messages be displayed ?

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Author(s)

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<https://fbertran.github.io/homepage/>

See Also

See also [bootpls](#).

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

# Lazraq-Cleroux PLS (Y,X) bootstrap
set.seed(250)
modpls <- coefs.plsR.raw(Cornell[, -8], 1:nrow(Cornell), nt=3,
maxcoefvalues=1e5, ifbootfail=rep(0, 3), verbose=FALSE)
```

`coefs.plsRglm`*Coefficients for bootstrap computations of PLSGLR models*

Description

A function passed to `boot` to perform bootstrap.

Usage

```
coefs.plsRglm(  
  dataset,  
  ind,  
  nt,  
  modele,  
  family = NULL,  
  fit_backend = "stats",  
  maxcoefvalues,  
  ifbootfail,  
  verbose  
)
```

Arguments

<code>dataset</code>	dataset to resample
<code>ind</code>	indices for resampling
<code>nt</code>	number of components to use
<code>modele</code>	type of <code>modele</code> to use, see plsRglm
<code>family</code>	glm family to use, see plsRglm
<code>fit_backend</code>	backend used for repeated non-ordinal score-space GLM fits. Use "stats" or "fastglm".
<code>maxcoefvalues</code>	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
<code>ifbootfail</code>	value to return if the estimation fails on a bootstrap sample
<code>verbose</code>	should info messages be displayed ?

Value

estimates on a bootstrap sample or `ifbootfail` value if the bootstrap computation fails.

Author(s)

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See Also

See also [bootplsglm](#).

Examples

```
data(Cornell)

# (Y,X) bootstrap of a PLSGLR model
# statistic=coefs.plsRglm is the default for (Y,X) bootstrap of a PLSGLR models.
set.seed(250)
modplsglm <- plsRglm(Y~.,data=Cornell,1,modele="pls-glm-family",family=gaussian)
Cornell.bootYX <- bootplsglm(modplsglm, R=250, typeboot="plsmode1",
statistic=coefs.plsRglm, verbose=FALSE)
```

coefs.plsRglm.raw *Raw coefficients for bootstrap computations of PLSGLR models*

Description

A function passed to boot to perform bootstrap.

Usage

```
coefs.plsRglm.raw(
  dataset,
  ind,
  nt,
  modele,
  family = NULL,
  fit_backend = "stats",
  maxcoefvalues,
  ifbootfail,
  verbose
)
```

Arguments

dataset	dataset to resample
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsRglm
family	glm family to use, see plsRglm
fit_backend	backend used for repeated non-ordinal score-space GLM fits. Use "stats" or "fastglm".

maxcoefvalues maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
 ifbootfail value to return if the estimation fails on a bootstrap sample
 verbose should info messages be displayed ?

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Author(s)

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See Also

See also [bootplsglm](#).

Examples

```
data(Cornell)

# (Y,X) bootstrap of a PLSGLR model
set.seed(250)
modplsglm <- coefs.plsRglm.raw(Cornell[, -8], 1:nrow(Cornell), nt=3,
modele="pls-glm-family", family=gaussian, maxcoefvalues=1e5,
ifbootfail=rep(0, 3), verbose=FALSE)
```

coefs.plsRglmnp *Coefficients for bootstrap computations of PLSGLR models*

Description

A function passed to boot to perform bootstrap.

Usage

```
coefs.plsRglmnp(
  dataRepYtt,
  ind,
  nt,
  modele,
  family = NULL,
  maxcoefvalues,
  wwetoile,
  ifbootfail
)
```

Arguments

dataRepYtt	components' coordinates to bootstrap
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsRglm
family	glm family to use, see plsRglm
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
wwetoile	values of the Wstar matrix in the original fit
ifbootfail	value to return if the estimation fails on a bootstrap sample

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Note

~~some notes~~

Author(s)

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See Also

See also [bootplsglm](#)

Examples

```
data(Cornell)

# (Y,X) bootstrap of a PLSGLR model
# statistic=coefs.plsRglm is the default for (Y,X) bootstrap of a PLSGLR models.
set.seed(250)
modplsglm <- plsRglm(Y~.,data=Cornell,1,modele="pls-glm-family",family=gaussian)
Cornell.bootYT <- bootplsglm(modplsglm, R=250, statistic=coefs.plsRglmnp, verbose=FALSE)
```

coefs.plsRnp *Coefficients for bootstrap computations of PLSR models*

Description

A function passed to boot to perform bootstrap.

Usage

```
coefs.plsRnp(dataRepYtt, ind, nt, modele, maxcoefvalues, wwetoile, ifbootfail)
```

Arguments

dataRepYtt	components' coordinates to bootstrap
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsRglm
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
wwetoile	values of the Wstar matrix in the original fit
ifbootfail	value to return if the estimation fails on a bootstrap sample

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Author(s)

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See Also

See also [bootpls](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

# Lazraq-Cleroux PLS (Y,X) bootstrap
# statistic=coefs.plsR is the default for (Y,X) resampling of PLSR models.
set.seed(250)
modpls <- plsR(yCornell,XCornell,1)
Cornell.bootYT <- bootpls(modpls, R=250, typeboot="fmodel_np",
```

```
statistic=coefs.plsRnp, verbose=FALSE)
```

confints.bootpls *Bootstrap confidence intervals*

Description

This function is a wrapper for `boot.ci` to derive bootstrap-based confidence intervals from a "boot" object.

Usage

```
confints.bootpls(bootobject, indices = NULL, typeBCa = TRUE)
```

Arguments

bootobject	an object of class "boot"
indices	the indices of the predictor for which CIs should be calculated. Defaults to NULL: all the predictors will be used.
typeBCa	shall BCa bootstrap based CI derived ? Defaults to TRUE. This is a safety option since sometimes computing BCa bootstrap based CI fails whereas the other types of CI can still be derived.

Value

Matrix with the limits of bootstrap based CI for all (defaults) or only the selected predictors (`indices` option). The limits are given in that order: Normal Lower then Upper Limit, Basic Lower then Upper Limit, Percentile Lower then Upper Limit, BCa Lower then Upper Limit.

Author(s)

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See Also

See also `bootpls` and `bootplsglm`.

Examples

```
data(Cornell)

#Lazraq-Cleroux PLS (Y,X) bootstrap
set.seed(250)
modpls <- plsR(Y~., data=Cornell, 3)
```

```
Cornell.bootYX <- bootpls(modpls, R=250, verbose=FALSE)
confints.bootpls(Cornell.bootYX,2:8)
confints.bootpls(Cornell.bootYX,2:8,typeBCa=FALSE)
```

CorMat

Correlation matrix for simulating plsR datasets

Description

A correlation matrix to simulate datasets

Format

A data frame with 17 observations on the following 17 variables.

y a numeric vector
x11 a numeric vector
x12 a numeric vector
x13 a numeric vector
x21 a numeric vector
x22 a numeric vector
x31 a numeric vector
x32 a numeric vector
x33 a numeric vector
x34 a numeric vector
x41 a numeric vector
x42 a numeric vector
x51 a numeric vector
x61 a numeric vector
x62 a numeric vector
x63 a numeric vector
x64 a numeric vector

Source

Handmade.

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

Examples

```
data(CorMat)
str(CorMat)
```

Cornell

Cornell dataset

Description

The famous Cornell dataset. A mixture experiment on X1, X2, X3, X4, X5, X6 and X7 to analyse octane degree (Y) in gasoline.

Format

A data frame with 12 observations on the following 8 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

Y response value: a numeric vector

Source

M. Tenenhaus. (1998). *La regression PLS, Theorie et pratique*. Editions Technip, Paris.

References

N. Kettaneh-Wold. Analysis of mixture data with partial least squares. (1992). *Chemometrics and Intelligent Laboratory Systems*, 14(1):57-69.

Examples

```
data(Cornell)
str(Cornell)
```

Description

This function implements k-fold cross-validation on complete or incomplete datasets for partial least squares regression models

Usage

```
cv.plsR(object, ...)
## Default S3 method:
cv.plsRmodel(object,dataX,nt=2,limQ2set=.0975,modele="pls",
K=5, NK=1, grouplist=NULL, random=TRUE, scaleX=TRUE,
scaleY=NULL, keepcoeffs=FALSE, keepfolds=FALSE, keepdataY=TRUE,
keepMclassified=FALSE, tol_Xi=10^(-12), weights, verbose=TRUE,...)
## S3 method for class 'formula'
cv.plsRmodel(object,data=NULL,nt=2,limQ2set=.0975,modele="pls",
K=5, NK=1, grouplist=NULL, random=TRUE, scaleX=TRUE,
scaleY=NULL, keepcoeffs=FALSE, keepfolds=FALSE, keepdataY=TRUE,
keepMclassified=FALSE, tol_Xi=10^(-12), weights,subset,contrasts=NULL, verbose=TRUE,...)
PLS_lm_kfoldcv(dataY, dataX, nt = 2, limQ2set = 0.0975, modele = "pls",
K = 5, NK = 1, grouplist = NULL, random = TRUE, scaleX = TRUE,
scaleY = NULL, keepcoeffs = FALSE, keepfolds = FALSE, keepdataY = TRUE,
keepMclassified=FALSE, tol_Xi = 10^(-12), weights, verbose=TRUE)
PLS_lm_kfoldcv_formula(formula,data=NULL,nt=2,limQ2set=.0975,modele="pls",
K=5, NK=1, grouplist=NULL, random=TRUE, scaleX=TRUE,
scaleY=NULL, keepcoeffs=FALSE, keepfolds=FALSE, keepdataY=TRUE,
keepMclassified=FALSE, tol_Xi=10^(-12), weights,subset,contrasts=NULL,verbose=TRUE)
```

Arguments

object	response (training) dataset or an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
dataY	response (training) dataset
dataX	predictor(s) (training) dataset
formula	an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
data	an optional data frame, list or environment (or object coercible by as.data.frame to a data frame) containing the variables in the model. If not found in data, the variables are taken from environment (formula), typically the environment from which plsRglm is called.
nt	number of components to be extracted

limQ2set	limit value for the Q2
modele	name of the PLS model to be fitted, only ("pls" available for this fonction.
K	number of groups. Defaults to 5.
NK	number of times the group division is made
grouplist	to specify the members of the K groups
random	should the K groups be made randomly. Defaults to TRUE
scaleX	scale the predictor(s) : must be set to TRUE for modele="pls" and should be for glms pls.
scaleY	scale the response : Yes/No. Ignored since non always possible for glm responses.
keepcoeffs	shall the coefficients for each model be returned
keepfolds	shall the groups' composition be returned
keepdataY	shall the observed value of the response for each one of the predicted value be returned
keepMclassed	shall the number of miss classed be returned
tol_Xi	minimal value for Norm2(Xi) and $\det(pp' \times pp)$ if there is any missing value in the dataX. It defaults to 10^{-12}
weights	an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
subset	an optional vector specifying a subset of observations to be used in the fitting process.
contrasts	an optional list. See the contrasts.arg of model.matrix.default.
verbose	should info messages be displayed ?
...	arguments to pass to cv.plsRmodel.default or to cv.plsRmodel.formula

Details

Predicts 1 group with the K-1 other groups. Leave one out cross validation is thus obtained for $K = nrow(\text{dataX})$.

A typical predictor has the form `response ~ terms` where `response` is the (numeric) response vector and `terms` is a series of terms which specifies a linear predictor for response. A terms specification of the form `first + second` indicates all the terms in `first` together with all the terms in `second` with any duplicates removed.

A specification of the form `first:second` indicates the the set of terms obtained by taking the interactions of all terms in `first` with all terms in `second`. The specification `first*second` indicates the cross of `first` and `second`. This is the same as `first + second + first:second`.

The terms in the formula will be re-ordered so that main effects come first, followed by the interactions, all second-order, all third-order and so on: to avoid this pass a terms object as the formula.

Non-NULL weights can be used to indicate that different observations have different dispersions (with the values in `weights` being inversely proportional to the dispersions); or equivalently, when the elements of `weights` are positive integers w_i , that each response y_i is the mean of w_i unit-weight observations.

Value

An object of class "cv.plsRmodel".

results_kfolds list of NK. Each element of the list sums up the results for a group division:
list of K matrices of size about $nrow(dataX)/K * nt$ with the predicted values for a growing number of components

list of K matrices of size about $nrow(dataX)/K * nt$ with the predicted values for a growing number of components

folds list of NK. Each element of the list sums up the results for a group division:
list of K vectors of length about $nrow(dataX)$ with the numbers of the rows of dataX that were used as a training set

list of K vectors of length about $nrow(dataX)$ with the numbers of the rows of dataX that were used as a training set

dataY_kfolds list of NK. Each element of the list sums up the results for a group division:
list of K matrices of size about $nrow(dataX)/K * 1$ with the observed values of the response

list of K matrices of size about $nrow(dataX)/K * 1$ with the observed values of the response

call the call of the function

Note

Work for complete and incomplete datasets.

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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frederic Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

Summary method summary.cv.plsRmodel. [kfolds2coeff](#), [kfolds2Pressind](#), [kfolds2Press](#), [kfolds2Mclassifiedind](#), [kfolds2Mclassified](#) and [kfolds2CVinfos_lm](#) to extract and transform results from k-fold cross-validation.

Examples

```

data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

#Leave one out CV (K=nrow(Cornell)) one time (NK=1)
bbb <- cv.plsR(object=yCornell,dataX=XCornell,nt=6,K=nrow(Cornell),NK=1)
bbb2 <- cv.plsR(Y~.,data=Cornell,nt=6,K=12,NK=1,verbose=FALSE)
(sum1<-summary(bbb2))

#6-fold CV (K=6) two times (NK=2)
#use random=TRUE to randomly create folds for repeated CV
bbb3 <- cv.plsR(object=yCornell,dataX=XCornell,nt=6,K=6,NK=2)
bbb4 <- cv.plsR(Y~.,data=Cornell,nt=6,K=6,NK=2,verbose=FALSE)
(sum3<-summary(bbb4))

cvtable(sum1)
cvtable(sum3)
rm(list=c("XCornell","yCornell","bbb","bbb2","bbb3","bbb4"))

```

cv.plsRglm

Partial least squares regression glm models with k-fold cross validation

Description

This function implements k-fold cross-validation on complete or incomplete datasets for partial least squares regression generalized linear models

Usage

```

cv.plsRglm(object, ...)
## Default S3 method:
cv.plsRglmmodel(object,dataX,nt=2,limQ2set=.0975,
modele="pls", family=NULL, K=5, NK=1, grouplist=NULL, random=TRUE,
scaleX=TRUE, scaleY=NULL, keepcoeffs=FALSE, keepfolds=FALSE,
keepdataY=TRUE, keepMclassed=FALSE, tol_Xi=10^(-12), weights, method,
fit_backend="stats",verbose=TRUE,...)
## S3 method for class 'formula'
cv.plsRglmmodel(object,data=NULL,nt=2,limQ2set=.0975,
modele="pls", family=NULL, K=5, NK=1, grouplist=NULL, random=TRUE,
scaleX=TRUE, scaleY=NULL, keepcoeffs=FALSE, keepfolds=FALSE,
keepdataY=TRUE, keepMclassed=FALSE, tol_Xi=10^(-12),weights,subset,
start=NULL,etastart,mustart,offset,method,control= list(),contrasts=NULL,
fit_backend="stats",verbose=TRUE,...)
PLS_glm_kfoldcv(dataY, dataX, nt = 2, limQ2set = 0.0975, modele = "pls",
family = NULL, K = 5, NK = 1, grouplist = NULL, random = TRUE,
scaleX = TRUE, scaleY = NULL, keepcoeffs = FALSE, keepfolds = FALSE,

```

```

keepdataY = TRUE, keepMclassified=FALSE, tol_Xi = 10^(-12), weights, method,
fit_backend="stats", verbose=TRUE)
PLS_glm_kfoldcv_formula(formula,data=NULL,nt=2,limQ2set=.0975,modele="pls",
family=NULL, K=5, NK=1, grouplist=NULL, random=TRUE,
scaleX=TRUE, scaleY=NULL, keepcoeffs=FALSE, keepfolds=FALSE, keepdataY=TRUE,
keepMclassified=FALSE, tol_Xi=10^(-12),weights,subset,start=NULL,etastart,
mustart,offset,method,control= list(),contrasts=NULL, fit_backend="stats",
verbose=TRUE)

```

Arguments

object	response (training) dataset or an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
dataY	response (training) dataset
dataX	predictor(s) (training) dataset
formula	an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
data	an optional data frame, list or environment (or object coercible by as.data.frame to a data frame) containing the variables in the model. If not found in data, the variables are taken from <code>environment(formula)</code> , typically the environment from which <code>plsRglm</code> is called.
nt	number of components to be extracted
limQ2set	limit value for the Q2
modele	name of the PLS glm model to be fitted (" pls ", " pls-glm-Gamma ", " pls-glm-gaussian ", " pls-glm-inverse.gaussian ", " pls-glm-logistic ", " pls-glm-poisson ", " pls-glm-polr "). Use " modele=pls-glm-family " to enable the family option.
family	a description of the error distribution and link function to be used in the model. This can be a character string naming a family function, a family function or the result of a call to a family function. (See family for details of family functions.) To use the family option, please set modele="pls-glm-family" . User defined families can also be defined. See details.
K	number of groups. Defaults to 5.
NK	number of times the group division is made
grouplist	to specify the members of the K groups
random	should the K groups be made randomly. Defaults to TRUE
scaleX	scale the predictor(s) : must be set to TRUE for modele="pls" and should be for glms pls.
scaleY	scale the response : Yes/No. Ignored since non always possible for glm responses.
keepcoeffs	shall the coefficients for each model be returned
keepfolds	shall the groups' composition be returned

keepdataY	shall the observed value of the response for each one of the predicted value be returned
keepMclassified	shall the number of miss classed be returned (unavailable)
tol_Xi	minimal value for Norm2(Xi) and $\det(pp' \times pp)$ if there is any missing value in the dataX. It defaults to 10^{-12}
weights	an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
fit_backend	backend used for repeated non-ordinal score-space GLM fits during cross-validation. Use "stats" for the compatibility path or "fastglm" to opt into the accelerated complete-data backend. Unsupported cases fall back to "stats" with a warning.
subset	an optional vector specifying a subset of observations to be used in the fitting process.
start	starting values for the parameters in the linear predictor.
etastart	starting values for the linear predictor.
mustart	starting values for the vector of means.
offset	this can be used to specify an <i>a priori</i> known component to be included in the linear predictor during fitting. This should be NULL or a numeric vector of length equal to the number of cases. One or more <code>offset</code> terms can be included in the formula instead or as well, and if more than one is specified their sum is used. See <code>model.offset</code> .
method	For non-ordinal GLM modes this argument is kept for backward compatibility; use <code>fit_backend</code> to choose the score-space fitting backend. For <code>pls-glm-polr</code> , use <code>logistic</code> , <code>probit</code> , <code>complementary log-log</code> or <code>cauchit</code> .
control	a list of parameters for controlling the fitting process. For <code>glm.fit</code> this is passed to <code>glm.control</code> .
contrasts	an optional list. See the <code>contrasts.arg</code> of <code>model.matrix.default</code> .
verbose	should info messages be displayed ?
...	arguments to pass to <code>cv.plsRglmmodel.default</code> or to <code>cv.plsRglmmodel.formula</code>

Details

Predicts 1 group with the K-1 other groups. Leave one out cross validation is thus obtained for $K = nrow(\text{dataX})$.

There are seven different predefined models with predefined link functions available :

"pls" ordinary pls models

"pls-glm-Gamma" glm gaussian with inverse link pls models

"pls-glm-gaussian" glm gaussian with identity link pls models

"pls-glm-inverse-gamma" glm binomial with square inverse link pls models

"pls-glm-logistic" glm binomial with logit link pls models

"pls-glm-poisson" glm poisson with log link pls models

"pls-glm-polr" glm polr with logit link pls models

Using the "family=" option and setting "modele=pls-glm-family" allows changing the family and link function the same way as for the `glm` function. As a consequence user-specified families can also be used.

The gaussian family accepts the links (as names) identity, log and inverse.

The binomial family accepts the links logit, probit, cauchit, (corresponding to logistic, normal and Cauchy CDFs respectively) log and cloglog (complementary log-log).

The Gamma family accepts the links inverse, identity and log.

The poisson family accepts the links log, identity, and sqrt.

The inverse.gaussian family accepts the links $1/\mu^2$, inverse, identity and log.

The quasi family accepts the links logit, probit, cloglog, identity, inverse, log, $1/\mu^2$ and sqrt.

The function power can be used to create a power link function.

... arguments to pass to `cv.plsRglmmodel.default` or to `cv.plsRglmmodel.formula`

A typical predictor has the form `response ~ terms` where `response` is the (numeric) response vector and `terms` is a series of terms which specifies a linear predictor for response. A terms specification of the form `first + second` indicates all the terms in `first` together with all the terms in `second` with any duplicates removed.

A specification of the form `first:second` indicates the the set of terms obtained by taking the interactions of all terms in `first` with all terms in `second`. The specification `first*second` indicates the cross of `first` and `second`. This is the same as `first + second + first:second`.

The terms in the formula will be re-ordered so that main effects come first, followed by the interactions, all second-order, all third-order and so on: to avoid this pass a terms object as the formula.

Non-NULL weights can be used to indicate that different observations have different dispersions (with the values in `weights` being inversely proportional to the dispersions); or equivalently, when the elements of `weights` are positive integers w_i , that each response y_i is the mean of w_i unit-weight observations.

Value

An object of class "cv.plsRglmmodel".

`results_kfolds` list of NK. Each element of the list sums up the results for a group division:

list of K matrices of size about $nrow(\text{dataX})/K * nt$ with the predicted values for a growing number of components

... ..

list of K matrices of size about $nrow(\text{dataX})/K * nt$ with the predicted values for a growing number of components

`folds` list of NK. Each element of the list sums up the informations for a group division:

list of K vectors of length about $nrow(\text{dataX})$ with the numbers of the rows of `dataX` that were used as a training set

... ..

	list of K vectors of length about <code>nrow(dataX)</code> with the numbers of the rows of <code>dataX</code> that were used as a training set
<code>dataY_kfolds</code>	list of NK. Each element of the list sums up the results for a group division: list of K matrices of size about <code>nrow(dataX)/K * 1</code> with the observed values of the response list of K matrices of size about <code>nrow(dataX)/K * 1</code> with the observed values of the response
<code>fit_backend</code>	backend used for repeated non-ordinal score-space GLM fits during cross-validation
<code>call</code>	the call of the function

Note

Work for complete and incomplete datasets.

Author(s)

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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frederic Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18.

See Also

Summary method `summary.cv.plsRglmmodel.kfolds2coeff`, `kfolds2Pressind`, `kfolds2Press`, `kfolds2Mclassifiedind`, `kfolds2Mclassified` and `summary` to extract and transform results from k-fold cross validation.

Examples

```
data(Cornell)
bbb <- cv.plsRglm(Y~.,data=Cornell,nt=10)
(sum1<-summary(bbb))
cvtable(sum1)

bbb2 <- cv.plsRglm(Y~.,data=Cornell,nt=3,
modele="pls-glm-family",family=gaussian(),K=12,verbose=FALSE)
(sum2<-summary(bbb2))
cvtable(sum2)

#random=TRUE is the default to randomly create folds for repeated CV
bbb3 <- cv.plsRglm(Y~.,data=Cornell,nt=3,
modele="pls-glm-family",family=gaussian(),K=6,NK=10, verbose=FALSE)
```

```

(sum3<-summary(bbb3))
plot(cvtable(sum3))

data(aze_compl)
bbb <- cv.plsRglm(y~.,data=aze_compl,nt=10,K=10,modele="pls",keepcoeffs=TRUE, verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb)
bbb2 <- cv.plsRglm(y~.,data=aze_compl,nt=10,K=10,modele="pls-glm-family",
family=binomial(probit),keepcoeffs=TRUE, verbose=FALSE)
bbb2 <- cv.plsRglm(y~.,data=aze_compl,nt=10,K=10,
modele="pls-glm-logistic",keepcoeffs=TRUE, verbose=FALSE)
summary(bbb,MClassed=TRUE)
summary(bbb2,MClassed=TRUE)
kfolds2coeff(bbb2)

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)
rm(list=c("bbb", "bbb2"))

data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
bbb <- cv.plsRglm(round(x11)~.,data=pine,nt=10,modele="pls-glm-family",
family=poisson(log),K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)
bbb <- cv.plsRglm(round(x11)~.,data=pine,nt=10,
modele="pls-glm-poisson",K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb)
boxplot(kfolds2coeff(bbb)[,1])

kfolds2Chisqind(bbb)
kfolds2Chisq(bbb)
summary(bbb)
PLS_lm(ypine,Xpine,10,typeVC="standard")$InfCrit

data(pineNAX21)
bbb2 <- cv.plsRglm(round(x11)~.,data=pineNAX21,nt=10,
modele="pls-glm-family",family=poisson(log),K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)
bbb2 <- cv.plsRglm(round(x11)~.,data=pineNAX21,nt=10,
modele="pls-glm-poisson",K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)

```

```

data(XpineNAX21)
PLS_lm(ypine,XpineNAX21,10,typeVC="standard")$InfCrit
rm(list=c("Xpine","XpineNAX21","ypine","bbb","bbb2"))

data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
bbb <- cv.plsRglm(x11~.,data=pine,nt=10,modele="pls-glm-family",
family=Gamma,K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)
bbb <- cv.plsRglm(x11~.,data=pine,nt=10,modele="pls-glm-Gamma",
K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb)
boxplot(kfolds2coeff(bbb)[,1])

kfolds2Chisqind(bbb)
kfolds2Chisq(bbb)
summary(bbb)
PLS_lm(ypine,Xpine,10,typeVC="standard")$InfCrit

data(pineNAX21)
bbb2 <- cv.plsRglm(x11~.,data=pineNAX21,nt=10,
modele="pls-glm-family",family=Gamma(),K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)
bbb2 <- cv.plsRglm(x11~.,data=pineNAX21,nt=10,
modele="pls-glm-Gamma",K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)
XpineNAX21 <- Xpine
XpineNAX21[1,2] <- NA
PLS_lm(ypine,XpineNAX21,10,typeVC="standard")$InfCrit
rm(list=c("Xpine","XpineNAX21","ypine","bbb","bbb2"))

data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
bbb <- cv.plsRglm(Y~.,data=Cornell,nt=10,NK=1,modele="pls",verbose=FALSE)
summary(bbb)

cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-inverse.gaussian",K=12,verbose=FALSE)
cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-family",
family=inverse.gaussian,K=12,verbose=FALSE)

```

```

cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-inverse.gaussian",K=6,
NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-family",family=inverse.gaussian(),
K=6,NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-inverse.gaussian",K=6,
NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-family",
family=inverse.gaussian(link = "1/mu^2"),K=6,NK=2,verbose=FALSE)$results_kfolds

bbb2 <- cv.plsRglm(Y~,data=Cornell,nt=10,
modele="pls-glm-inverse.gaussian",keepcoeffs=TRUE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)
PLS_lm(yCornell,XCornell,10,typeVC="standard")$InfCrit
rm(list=c("XCornell","yCornell","bbb","bbb2"))

data(Cornell)
bbb <- cv.plsRglm(Y~,data=Cornell,nt=10,NK=1,modele="pls")
summary(bbb)

cv.plsRglm(Y~,data=Cornell,nt=3,modele="pls-glm-family",family=gaussian(),K=12)

cv.plsRglm(Y~,data=Cornell,nt=3,modele="pls-glm-family",family=gaussian(),K=6,
NK=2,random=TRUE,keepfolds=TRUE,verbose=FALSE)$results_kfolds

#Different ways of model specifications
cv.plsRglm(Y~,data=Cornell,nt=3,modele="pls-glm-family",family=gaussian(),K=6,
NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(Y~,data=Cornell,nt=3,modele="pls-glm-family",family=gaussian,
K=6,NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(Y~,data=Cornell,nt=3,modele="pls-glm-family",family=gaussian(),
K=6,NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(Y~,data=Cornell,nt=3,modele="pls-glm-family",family=gaussian(link=log),
K=6,NK=2,verbose=FALSE)$results_kfolds

bbb2 <- cv.plsRglm(Y~,data=Cornell,nt=10,
modele="pls-glm-gaussian",keepcoeffs=TRUE,verbose=FALSE)
bbb2 <- cv.plsRglm(Y~,data=Cornell,nt=3,modele="pls-glm-family",
family=gaussian(link=log),K=6,keepcoeffs=TRUE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)

```

```

summary(bbb2)
PLS_lm_formula(Y~.,data=Cornell,10,typeVC="standard")$InfCrit
rm(list=c("bbb","bbb2"))

data(pine)
bbb <- cv.plsRglm(x11~.,data=pine,nt=10,modele="pls-glm-family",
family=gaussian(log),K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)
bbb <- cv.plsRglm(x11~.,data=pine,nt=10,modele="pls-glm-family",family=gaussian(),
K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb)
boxplot(kfolds2coeff(bbb)[,1])

kfolds2Chisqind(bbb)
kfolds2Chisq(bbb)
summary(bbb)
PLS_lm_formula(x11~.,data=pine,nt=10,typeVC="standard")$InfCrit

data(pineNAX21)
bbb2 <- cv.plsRglm(x11~.,data=pineNAX21,nt=10,
modele="pls-glm-family",family=gaussian(log),K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)
bbb2 <- cv.plsRglm(x11~.,data=pineNAX21,nt=10,
modele="pls-glm-gaussian",K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)
PLS_lm_formula(x11~.,data=pineNAX21,nt=10,typeVC="standard")$InfCrit
rm(list=c("bbb","bbb2"))

data(aze_compl)
bbb <- cv.plsRglm(y~.,data=aze_compl,nt=10,K=10,modele="pls",
keepcoeffs=TRUE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb)
bbb2 <- cv.plsRglm(y~.,data=aze_compl,nt=3,K=10,
modele="pls-glm-family",family=binomial(probit),keepcoeffs=TRUE,verbose=FALSE)
bbb2 <- cv.plsRglm(y~.,data=aze_compl,nt=3,K=10,
modele="pls-glm-logistic",keepcoeffs=TRUE,verbose=FALSE)
summary(bbb,MClassed=TRUE)
summary(bbb2,MClassed=TRUE)
kfolds2coeff(bbb2)

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)

```

```

summary(bbb2)
rm(list=c("bbb", "bbb2"))

data(pine)
bbb <- cv.plsRglm(round(x11)~., data=pine, nt=10,
modele="pls-glm-family", family=poisson(log), K=10, keepcoeffs=TRUE, keepfolds=FALSE, verbose=FALSE)
bbb <- cv.plsRglm(round(x11)~., data=pine, nt=10,
modele="pls-glm-poisson", K=10, keepcoeffs=TRUE, keepfolds=FALSE, verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb)
boxplot(kfolds2coeff(bbb)[, 1])

kfolds2Chisqind(bbb)
kfolds2Chisq(bbb)
summary(bbb)
PLS_lm_formula(x11~., data=pine, 10, typeVC="standard")$InfCrit

data(pineNAX21)
bbb2 <- cv.plsRglm(round(x11)~., data=pineNAX21, nt=10,
modele="pls-glm-family", family=poisson(log), K=10, keepcoeffs=TRUE, keepfolds=FALSE, verbose=FALSE)
bbb2 <- cv.plsRglm(round(x11)~., data=pineNAX21, nt=10,
modele="pls-glm-poisson", K=10, keepcoeffs=TRUE, keepfolds=FALSE, verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[, 1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)
PLS_lm_formula(x11~., data=pineNAX21, 10, typeVC="standard")$InfCrit
rm(list=c("bbb", "bbb2"))

data(pine)
bbb <- cv.plsRglm(x11~., data=pine, nt=10, modele="pls-glm-family",
family=Gamma, K=10, keepcoeffs=TRUE, keepfolds=FALSE, verbose=FALSE)
bbb <- cv.plsRglm(x11~., data=pine, nt=10, modele="pls-glm-Gamma",
K=10, keepcoeffs=TRUE, keepfolds=FALSE, verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb)
boxplot(kfolds2coeff(bbb)[, 1])

kfolds2Chisqind(bbb)
kfolds2Chisq(bbb)
summary(bbb)
PLS_lm_formula(x11~., data=pine, 10, typeVC="standard")$InfCrit

```

```

data(pineNAX21)
bbb2 <- cv.plsRglm(x11~.,data=pineNAX21,nt=10,
modele="pls-glm-family",family=Gamma(),K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)
bbb2 <- cv.plsRglm(x11~.,data=pineNAX21,nt=10,
modele="pls-glm-Gamma",K=10,keepcoeffs=TRUE,keepfolds=FALSE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)
PLS_lm_formula(x11~.,data=pineNAX21,10,typeVC="standard")$InfCrit
rm(list=c("bbb","bbb2"))

data(Cornell)
summary(cv.plsRglm(Y~.,data=Cornell,nt=10,NK=1,modele="pls",verbose=FALSE))

cv.plsRglm(Y~.,data=Cornell,nt=3,
modele="pls-glm-inverse.gaussian",K=12,verbose=FALSE)
cv.plsRglm(Y~.,data=Cornell,nt=3,modele="pls-glm-family",family=inverse.gaussian,K=12,verbose=FALSE)
cv.plsRglm(Y~.,data=Cornell,nt=3,modele="pls-glm-inverse.gaussian",K=6,
NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(Y~.,data=Cornell,nt=3,modele="pls-glm-family",
family=inverse.gaussian(),K=6,NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(Y~.,data=Cornell,nt=3,modele="pls-glm-inverse.gaussian",K=6,
NK=2,verbose=FALSE)$results_kfolds
cv.plsRglm(Y~.,data=Cornell,nt=3,modele="pls-glm-family",
family=inverse.gaussian(link = "1/mu^2"),K=6,NK=2,verbose=FALSE)$results_kfolds

bbb2 <- cv.plsRglm(Y~.,data=Cornell,nt=10,
modele="pls-glm-inverse.gaussian",keepcoeffs=TRUE,verbose=FALSE)

#For Jackknife computations
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])

kfolds2Chisqind(bbb2)
kfolds2Chisq(bbb2)
summary(bbb2)
PLS_lm_formula(Y~.,data=Cornell,10,typeVC="standard")$InfCrit
rm(list=c("bbb","bbb2"))

data(bordeaux)
summary(cv.plsRglm(Quality~.,data=bordeaux,10,
modele="pls-glm-polr",K=7))

data(bordeauxNA)
summary(cv.plsRglm(Quality~.,data=bordeauxNA,

```

```

10,modele="pls-glm-polr",K=10,verbose=FALSE))

summary(cv.plsRglm(Quality~.,data=bordeaux,nt=2,K=7,
modele="pls-glm-polr",method="logistic",verbose=FALSE))
summary(cv.plsRglm(Quality~.,data=bordeaux,nt=2,K=7,
modele="pls-glm-polr",method="probit",verbose=FALSE))
summary(cv.plsRglm(Quality~.,data=bordeaux,nt=2,K=7,
modele="pls-glm-polr",method="cloglog",verbose=FALSE))
suppressWarnings(summary(cv.plsRglm(Quality~.,data=bordeaux,nt=2,K=7,
modele="pls-glm-polr",method="cauchit",verbose=FALSE)))

```

cv.plsRmulti

Experimental k-fold cross-validation for multivariate-response PLS2

Description

cv.plsRmulti() performs repeated k-fold cross-validation for the experimental complete-case linear [plsRmulti](#) workflow.

Usage

```

cv.plsRmulti(object, ...)

## Default S3 method:
cv.plsRmultiModel(
  object,
  dataX,
  nt = 2,
  limQ2set = 0.0975,
  modele = "pls",
  family = NULL,
  K = 5,
  NK = 1,
  grouplist = NULL,
  random = TRUE,
  scaleX = TRUE,
  scaleY = NULL,
  keepcoeffs = FALSE,
  keepfolds = FALSE,
  keepdataY = TRUE,
  keepMclassed = FALSE,
  EstimXNA = FALSE,
  pvals.expli = FALSE,
  alpha.pvals.expli = 0.05,
  MClassed = FALSE,
  tol_Xi = 10^(-12),
  weights,

```

```

    sparse = FALSE,
    sparseStop = FALSE,
    naive = FALSE,
    verbose = TRUE,
    ...
)

## S3 method for class 'formula'
cv.plsRmultiModel(
  object,
  data = NULL,
  nt = 2,
  limQ2set = 0.0975,
  modele = "pls",
  family = NULL,
  K = 5,
  NK = 1,
  grouplist = NULL,
  random = TRUE,
  scaleX = TRUE,
  scaleY = NULL,
  keepcoeffs = FALSE,
  keepfolds = FALSE,
  keepdataY = TRUE,
  keepMclassed = FALSE,
  EstimXNA = FALSE,
  pvals.expli = FALSE,
  alpha.pvals.expli = 0.05,
  MClassed = FALSE,
  tol_Xi = 10^(-12),
  weights = NULL,
  subset = NULL,
  contrasts = NULL,
  sparse = FALSE,
  sparseStop = FALSE,
  naive = FALSE,
  verbose = TRUE,
  ...
)

```

Arguments

object	For the default method, a numeric multivariate response matrix or data frame with at least two columns. For the formula method, a formula of the form <code>cbind(y1, y2, ...) ~ ..</code>
...	Not used. Extra arguments are rejected in this experimental release.
dataX	Numeric predictor matrix or data frame.
nt	Number of components to extract in each fold fit.

limQ2set	Threshold used by <code>cvtable</code> for the aggregated Q2 criterion.
modele	Only "pls" is supported.
family	Not supported in this experimental release.
K	Number of groups for each partition.
NK	Number of repeated partitions.
grouplist	Optional user-supplied partitions.
random	Should the folds be generated randomly?
scaleX	Should predictors be scaled?
scaleY	Should responses be scaled? Defaults to TRUE.
keepcoeffs	Should standardized coefficient vectors be stored for each fold fit?
keepfolds	Should training indices be stored for each fold fit?
keepdataY	Kept for interface compatibility. Observed fold responses are stored so that summaries can be computed.
keepMclassified	Not supported in this experimental release.
EstimXNA	Not supported in this experimental release.
pvals.expli	Not supported in this experimental release.
alpha.pvals.expli	Not supported in this experimental release.
MClassed	Not supported in this experimental release.
tol_Xi	Tolerance used for degeneracy checks during component extraction.
weights	Not supported in this experimental release.
sparse	Not supported in this experimental release.
sparseStop	Not supported in this experimental release.
naive	Not supported in this experimental release.
verbose	Should informational messages be displayed?
data	An optional data frame for the formula method.
subset	An optional subset for the formula method.
contrasts	Optional contrasts for the formula method.

Details

Only the linear multivariate-response PLS2 mode is supported here. Missing values, weights, sparse extraction options, classification diagnostics, and GLM families remain out of scope for this experimental API.

Value

An object of class `"cv.plsRmultiModel"` with repeated fold predictions, observed fold responses, optional coefficient vectors and fold indices, and the reference full-data `"plsRmultiModel"` fit used for aggregated summary metrics.

See Also

[plsRmulti](#), [summary.cv.plsRmultiModel](#), [cvtable](#), [bootpls](#)

Examples

```
set.seed(123)
X <- matrix(rnorm(60 * 4), ncol = 4)
Y <- cbind(
  y1 = X[, 1] - 0.5 * X[, 2] + rnorm(60, sd = 0.1),
  y2 = 0.3 * X[, 2] + X[, 3] + rnorm(60, sd = 0.1)
)

cv_fit <- cv.plsRmulti(Y, X, nt = 2, K = 3, NK = 1, verbose = FALSE)
summary(cv_fit, verbose = FALSE)
```

cvtable	<i>Table method for summary of cross validated PLSR and PLSGLR models</i>
---------	---

Description

The function `cvtable` is wrapper of `cvtable.plsR` and `cvtable.plsRglm` that provides a table summary for the classes `"summary.cv.plsRmodel"` and `"summary.cv.plsRglmmodel"`

Usage

```
cvtable(x, verbose = TRUE, ...)
```

Arguments

`x` an object of the class `"summary.cv.plsRmodel"`
`verbose` should results be displayed ?
`...` further arguments to be passed to or from methods.

Value

`list`List of Information Criteria computed for each fold.

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[summary](#)

Examples

```
data(Cornell)
cv.modpls <- cv.plsR(Y~.,data=Cornell,nt=6,K=6,NK=5)
res.cv.modpls <- cvtable(summary(cv.modpls))
plot(res.cv.modpls) #defaults to type="CVQ2"
rm(list=c("cv.modpls","res.cv.modpls"))
```

```
data(Cornell)
cv.modpls <- cv.plsR(Y~.,data=Cornell,nt=6,K=6,NK=25,verbose=FALSE)
res.cv.modpls <- cvtable(summary(cv.modpls))
plot(res.cv.modpls) #defaults to type="CVQ2"
rm(list=c("cv.modpls","res.cv.modpls"))
```

```
data(Cornell)
cv.modpls <- cv.plsR(Y~.,data=Cornell,nt=6,K=6,NK=100,verbose=FALSE)
res.cv.modpls <- cvtable(summary(cv.modpls))
plot(res.cv.modpls) #defaults to type="CVQ2"
rm(list=c("cv.modpls","res.cv.modpls"))
```

```
data(Cornell)
cv.modplsglm <- cv.plsRglm(Y~.,data=Cornell,nt=6,K=6,
modele="pls-glm-gaussian",NK=100,verbose=FALSE)
res.cv.modplsglm <- cvtable(summary(cv.modplsglm))
plot(res.cv.modplsglm) #defaults to type="CVQ2Chi2"
rm(list=c("res.cv.modplsglm"))
```

dicho

Dichotomization

Description

This function takes a real value and converts it to 1 if it is positive and else to 0.

Usage

```
dicho(val)
```

Arguments

`val` A real value

Value

0 or 1.

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

See Also

[ifelse](#)

Examples

```
dimX <- 6
Astar <- 4
(dataAstar4 <- t(replicate(10,simul_data_YX(dimX,Astar))))

dicho(dataAstar4)

rm(list=c("dimX","Astar"))
```

fowlkes

Fowlkes dataset

Description

A classic dataset from Fowlkes.

Format

A data frame with 9949 observations on the following 13 variables.

Y binary response

MA a numeric vector

MW a numeric vector

NE a numeric vector

NW a numeric vector

PA a numeric vector

SO a numeric vector

SW a numeric vector
color a numeric vector
age1 a numeric vector
age2 a numeric vector
age3 a numeric vector
sexe a numeric vector

Examples

```
data(fowlkes)  
str(fowlkes)
```

infcrit.dof	<i>Information criteria</i>
-------------	-----------------------------

Description

This function computes information criteria for existing plsR model using Degrees of Freedom estimation.

Usage

```
infcrit.dof(modplsR, naive = FALSE)
```

Arguments

modplsR	A plsR model i.e. an object returned by one of the functions <code>plsR</code> , <code>plsRmodel.default</code> , <code>plsRmodel.formula</code> , <code>PLS_lm</code> or <code>PLS_lm.formula</code> .
naive	A boolean.

Details

If `naive=FALSE` returns AIC, BIC and `gmdl` values for estimated and naive degrees of freedom. If `naive=TRUE` returns NULL.

Value

matrix	AIC, BIC and <code>gmdl</code> values or NULL.
--------	--

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

- M. Hansen, B. Yu. (2001). Model Selection and Minimum Description Length Principle, *Journal of the American Statistical Association*, 96, 746-774.
- N. Kraemer, M. Sugiyama. (2011). The Degrees of Freedom of Partial Least Squares Regression. *Journal of the American Statistical Association*, 106(494), 697-705.
- N. Kraemer, M. Sugiyama, M.L. Braun. (2009). Lanczos Approximations for the Speedup of Kernel Partial Least Squares Regression, *Proceedings of the Twelfth International Conference on Artificial Intelligence and Statistics (AISTATS)*, 272-279.

See Also

[plsR.dof](#) for degrees of freedom computation and [infcrit.dof](#) for computing information criteria directly from a previously fitted plsR model.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsR(yCornell,XCornell,4)
infcrit.dof(modpls)
```

kfold2Chisq	<i>Computes Predicted Chisquare for k-fold cross-validated partial least squares regression models.</i>
-------------	---

Description

This function computes Predicted Chisquare for k-fold cross validated partial least squares regression models.

Usage

```
kfold2Chisq(pls_kfolds)
```

Arguments

`pls_kfolds` a k-fold cross validated partial least squares regression glm model

Value

`list` Total Predicted Chisquare vs number of components for the first group partition

`list()` ...

`list` Total Predicted Chisquare vs number of components for the last group partition

Note

Use `cv.plsRglm` to create k-fold cross validated partial least squares regression glm models.

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

`kfolds2coeff`, `kfolds2Press`, `kfolds2Pressind`, `kfolds2Chisqind`, `kfolds2Mclassifiedind` and `kfolds2Mclassified` to extract and transforms results from k-fold cross validation.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
bbb <- cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-gaussian",K=16,verbose=FALSE)
bbb2 <- cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-gaussian",K=5,verbose=FALSE)
kfolds2Chisq(bbb)
kfolds2Chisq(bbb2)
rm(list=c("XCornell","yCornell","bbb","bbb2"))
```

```
data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
bbb <- cv.plsRglm(object=ypine,dataX=Xpine,nt=4,modele="pls-glm-gaussian",verbose=FALSE)
bbb2 <- cv.plsRglm(object=ypine,dataX=Xpine,nt=10,modele="pls-glm-gaussian",K=10,verbose=FALSE)
kfolds2Chisq(bbb)
kfolds2Chisq(bbb2)
```

```
XpineNAX21 <- Xpine
XpineNAX21[1,2] <- NA
bbbNA <- cv.plsRglm(object=ypine,dataX=XpineNAX21,nt=10,modele="pls",K=10,verbose=FALSE)
kfolds2Press(bbbNA)
kfolds2Chisq(bbbNA)
bbbNA2 <- cv.plsRglm(object=ypine,dataX=XpineNAX21,nt=4,modele="pls-glm-gaussian",verbose=FALSE)
bbbNA3 <- cv.plsRglm(object=ypine,dataX=XpineNAX21,nt=10,modele="pls-glm-gaussian",K=10,
verbose=FALSE)
kfolds2Chisq(bbbNA2)
kfolds2Chisq(bbbNA3)
```

```

rm(list=c("Xpine", "XpineNAX21", "ypine", "bbb", "bbb2", "bbbNA", "bbbNA2", "bbbNA3"))

data(aze_compl)
Xaze_compl<-aze_compl[, 2:34]
yaze_compl<-aze_compl$y
kfold2Chisq(cv.plsRglm(object=yaze_compl, dataX=Xaze_compl, nt=4, modele="pls-glm-family",
family="binomial", verbose=FALSE))
kfold2Chisq(cv.plsRglm(object=yaze_compl, dataX=Xaze_compl, nt=4, modele="pls-glm-logistic",
verbose=FALSE))
kfold2Chisq(cv.plsRglm(object=yaze_compl, dataX=Xaze_compl, nt=10, modele="pls-glm-family",
family=binomial(), K=10, verbose=FALSE))
kfold2Chisq(cv.plsRglm(object=yaze_compl, dataX=Xaze_compl, nt=10, modele="pls-glm-logistic",
K=10, verbose=FALSE))
rm(list=c("Xaze_compl", "yaze_compl"))

```

kfold2Chisqind	<i>Computes individual Predicted Chisquare for k-fold cross validated partial least squares regression models.</i>
----------------	--

Description

This function computes individual Predicted Chisquare for k-fold cross validated partial least squares regression models.

Usage

```
kfold2Chisqind(pls_kfolds)
```

Arguments

pls_kfolds a k-fold cross validated partial least squares regression glm model

Value

list	Individual PChisq vs number of components for the first group partition
list()	...
list	Individual PChisq vs number of components for the last group partition

Note

Use `cv.plsRglm` to create k-fold cross validated partial least squares regression glm models.

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfold2coeff](#), [kfold2Press](#), [kfold2Pressind](#), [kfold2Chisq](#), [kfold2Mclassified](#) and [kfold2Mclassified](#) to extract and transforms results from k-fold cross-validation.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
bbb <- cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-gaussian",K=16,verbose=FALSE)
bbb2 <- cv.plsRglm(object=yCornell,dataX=XCornell,nt=3,modele="pls-glm-gaussian",K=5,verbose=FALSE)
kfold2Chisqind(bbb)
kfold2Chisqind(bbb2)
rm(list=c("XCornell","yCornell","bbb","bbb2"))
```

```
data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
bbb <- cv.plsRglm(object=ypine,dataX=Xpine,nt=4,modele="pls-glm-gaussian",verbose=FALSE)
bbb2 <- cv.plsRglm(object=ypine,dataX=Xpine,nt=10,modele="pls-glm-gaussian",K=10,verbose=FALSE)
kfold2Chisqind(bbb)
kfold2Chisqind(bbb2)
```

```
XpineNAX21 <- Xpine
XpineNAX21[1,2] <- NA
bbbNA <- cv.plsRglm(object=ypine,dataX=XpineNAX21,nt=10,modele="pls",K=10,verbose=FALSE)
kfold2Pressind(bbbNA)
kfold2Chisqind(bbbNA)
bbbNA2 <- cv.plsRglm(object=ypine,dataX=XpineNAX21,nt=4,modele="pls-glm-gaussian",verbose=FALSE)
bbbNA3 <- cv.plsRglm(object=ypine,dataX=XpineNAX21,nt=10,modele="pls-glm-gaussian",
K=10,verbose=FALSE)
kfold2Chisqind(bbbNA2)
kfold2Chisqind(bbbNA3)
rm(list=c("Xpine","XpineNAX21","ypine","bbb","bbb2","bbbNA","bbbNA2","bbbNA3"))
```

```
data(aze_compl)
Xaze_compl<-aze_compl[,2:34]
yaze_compl<-aze_compl$y
kfold2Chisqind(cv.plsRglm(object=yaze_compl,dataX=Xaze_compl,nt=4,modele="pls-glm-family",
family=binomial(),verbose=FALSE))
kfold2Chisqind(cv.plsRglm(object=yaze_compl,dataX=Xaze_compl,nt=4,modele="pls-glm-logistic",
verbose=FALSE))
kfold2Chisqind(cv.plsRglm(object=yaze_compl,dataX=Xaze_compl,nt=10,modele="pls-glm-family",
```

```
family=binomial(),K=10,verbose=FALSE))
kfold2Chisqind(cv.plsRglm(object=yaze_compl,dataX=Xaze_compl,nt=10,
modele="pls-glm-logistic",K=10,verbose=FALSE))
rm(list=c("Xaze_compl","yaze_compl"))
```

kfold2coeff	<i>Extracts coefficients from k-fold cross validated partial least squares regression models</i>
-------------	--

Description

This fonction extracts coefficients from k-fold cross validated partial least squares regression models

Usage

```
kfold2coeff(pls_kfolds)
```

Arguments

`pls_kfolds` an object that is a k-fold cross validated partial least squares regression models either `lm` or `glm`

Details

This fonctions works for `plsR` and `plsRglm` models.

Value

`coef.all` matrix with the values of the coefficients for each leave one out step or NULL if another type of cross validation was used.

Note

Only for $NK=1$ and leave one out CV

Author(s)

Frédéric Bertrand
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References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfolds2Pressind](#), [kfolds2Press](#), [kfolds2Mclassifiedind](#), [kfolds2Mclassified](#) and [summary](#) to extract and transform results from k-fold cross validation.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
bbb <- PLS_lm_kfoldcv(dataY=yCornell,dataX=XCornell,nt=3,K=nrow(XCornell),keepcoeffs=TRUE,
verbose=FALSE)
kfolds2coeff(bbb)
boxplot(kfolds2coeff(bbb)[,2])
rm(list=c("XCornell","yCornell","bbb"))

data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
bbb2 <- cv.plsR(object=ypine,dataX=Xpine,nt=4,K=nrow(Xpine),keepcoeffs=TRUE,verbose=FALSE)
kfolds2coeff(bbb2)
boxplot(kfolds2coeff(bbb2)[,1])
rm(list=c("Xpine","ypine","bbb2"))
```

kfolds2CVinfos_glm	<i>Extracts and computes information criteria and fits statistics for k-fold cross validated partial least squares glm models</i>
--------------------	---

Description

This function extracts and computes information criteria and fits statistics for k-fold cross validated partial least squares glm models for both formula or classic specifications of the model.

Usage

```
kfolds2CVinfos_glm(pls_kfolds, MClassed = FALSE, verbose = TRUE)
```

Arguments

pls_kfolds	an object computed using cv.plsRglm
MClassed	should number of miss classed be computed ?
verbose	should infos be displayed ?

Details

The MClassed option should only set to TRUE if the response is binary.

Value

list	table of fit statistics for first group partition
list()	...
list	table of fit statistics for last group partition

Note

Use [summary](#) and [cv.plsRglm](#) instead.

Author(s)

Frédéric Bertrand
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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfold2coeff](#), [kfold2Pressind](#), [kfold2Press](#), [kfold2Mclassifiedind](#) and [kfold2Mclassified](#) to extract and transforms results from k-fold cross-validation.

Examples

```
data(Cornell)
summary(cv.plsRglm(Y~., data=Cornell,
nt=6, K=12, NK=1, keepfolds=FALSE, keepdataY=TRUE, modele="pls", verbose=FALSE), MClassed=TRUE)
```

```
data(aze_compl)
summary(cv.plsR(y~., data=aze_compl, nt=10, K=8, modele="pls", verbose=FALSE),
MClassed=TRUE, verbose=FALSE)
summary(cv.plsRglm(y~., data=aze_compl, nt=10, K=8, modele="pls", verbose=FALSE),
MClassed=TRUE, verbose=FALSE)
summary(cv.plsRglm(y~., data=aze_compl, nt=10, K=8,
modele="pls-glm-family",
family=gaussian(), verbose=FALSE),
MClassed=TRUE, verbose=FALSE)
summary(cv.plsRglm(y~., data=aze_compl, nt=10, K=8,
modele="pls-glm-logistic",
verbose=FALSE), MClassed=TRUE, verbose=FALSE)
summary(cv.plsRglm(y~., data=aze_compl, nt=10, K=8,
modele="pls-glm-family",
family=binomial(), verbose=FALSE),
```

```

MClassed=TRUE,verbose=FALSE)

if(require(chemometrics)){
  data(hyptis)
  hyptis
  yhyptis <- factor(hyptis$Group,ordered=TRUE)
  Xhyptis <- as.data.frame(hyptis[,c(1:6)])
  options(contrasts = c("contr.treatment", "contr.poly"))
  modpls2 <- plsRglm(yhyptis,Xhyptis,6,modele="pls-glm-polr")
  modpls2$Coeffsmodel_vals
  modpls2$InfCrit
  modpls2$Coeffs
  modpls2$std.coeffs

  table(yhyptis,predict(modpls2$FinalModel,type="class"))

  modpls3 <- PLS_glm(yhyptis[-c(1,2,3)],Xhyptis[-c(1,2,3)],3,modele="pls-glm-polr",
  dataPredictY=Xhyptis[c(1,2,3)],verbose=FALSE)

  summary(cv.plsRglm(factor(Group,ordered=TRUE)~.,data=hyptis[-c(7,8)],nt=4,K=10,
  random=TRUE,modele="pls-glm-polr",keepcoeffs=TRUE,verbose=FALSE),
  MClassed=TRUE,verbose=FALSE)
}

```

kfold2CVinfos_lm	<i>Extracts and computes information criteria and fits statistics for k-fold cross validated partial least squares models</i>
------------------	---

Description

This function extracts and computes information criteria and fits statistics for k-fold cross validated partial least squares models for both formula or classic specifications of the model.

Usage

```
kfold2CVinfos_lm(pls_kfolds, MClassed = FALSE, verbose = TRUE)
```

Arguments

pls_kfolds	an object computed using PLS_lm_kfoldcv
MClassed	should number of miss classed be computed
verbose	should infos be displayed ?

Details

The Mclassed option should only set to TRUE if the response is binary.

Value

list	table of fit statistics for first group partition
list()	...
list	table of fit statistics for last group partition

Note

Use [summary](#) and [cv.plsR](#) instead.

Author(s)

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 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfolds2coeff](#), [kfolds2Pressind](#), [kfolds2Press](#), [kfolds2Mclassifiedind](#) and [kfolds2Mclassified](#) to extract and transforms results from k-fold cross-validation.

Examples

```
data(Cornell)
summary(cv.plsR(Y~., data=Cornell, nt=10, K=6, verbose=FALSE))
```

```
data(pine)
summary(cv.plsR(x11~., data=pine, nt=10, NK=3, verbose=FALSE), verbose=FALSE)
data(pineNAX21)
summary(cv.plsR(x11~., data=pineNAX21, nt=10, NK=3,
  verbose=FALSE), verbose=FALSE)
```

```
data(aze_compl)
summary(cv.plsR(y~., data=aze_compl, nt=10, K=8, NK=3,
  verbose=FALSE), MClassed=TRUE, verbose=FALSE)
```

kfoldsmclassified	<i>Number of missclassified individuals for k-fold cross validated partial least squares regression models.</i>
-------------------	---

Description

This function indicates the total number of missclassified individuals for k-fold cross validated partial least squares regression models.

Usage

```
kfoldsmclassified(pls_kfolds)
```

Arguments

pls_kfolds	a k-fold cross validated partial least squares regression model used on binary data
------------	---

Value

list	Total number of missclassified individuals vs number of components for the first group partition
list()	...
list	Total number of missclassified individuals vs number of components for the last group partition

Note

Use `cv.plsR` to create k-fold cross validated partial least squares regression models.

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfoldsmcoeff](#), [kfoldsm2Press](#), [kfoldsm2Pressind](#) and [kfoldsmclassifiedind](#) to extract and transform results from k-fold cross validation.

Examples

```

data(aze_compl)
Xaze_compl<-aze_compl[,2:34]
yaze_compl<-aze_compl$y
kfold2Mclassified(cv.plsR(object=yaze_compl,dataX=Xaze_compl,nt=10,K=8,NK=1,verbose=FALSE))
kfold2Mclassified(cv.plsR(object=yaze_compl,dataX=Xaze_compl,nt=10,K=8,NK=2,verbose=FALSE))
rm(list=c("Xaze_compl","yaze_compl"))

```

kfold2Mclassifiedind	<i>Number of missclassified individuals per group for k-fold cross validated partial least squares regression models.</i>
----------------------	---

Description

This function indicates the number of missclassified individuals per group for k-fold cross validated partial least squares regression models.

Usage

```
kfold2Mclassifiedind(pls_kfolds)
```

Arguments

pls_kfolds	a k-fold cross validated partial least squares regression model used on binary data
------------	---

Value

list	Number of missclassified individuals per group vs number of components for the first group partition
list()	...
list	Number of missclassified individuals per group vs number of components for the last group partition

Note

Use `cv.plsR` or `cv.plsRglm` to create k-fold cross validated partial least squares regression models or generalized linear ones.

Author(s)

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References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfold2coeff](#), [kfold2Press](#), [kfold2Pressind](#) and [kfold2Mclassified](#) to extract and transform results from k-fold cross-validation.

Examples

```
data(aze_comp1)
Xaze_comp1<-aze_comp1[,2:34]
yaze_comp1<-aze_comp1$y
kfold2Mclassifiedind(cv.plsR(object=yaze_comp1,dataX=Xaze_comp1,nt=10,K=8,NK=1,verbose=FALSE))
kfold2Mclassifiedind(cv.plsR(object=yaze_comp1,dataX=Xaze_comp1,nt=10,K=8,NK=2,verbose=FALSE))
rm(list=c("Xaze_comp1","yaze_comp1"))
```

kfold2Press	<i>Computes PRESS for k-fold cross validated partial least squares regression models.</i>
-------------	---

Description

This function computes PRESS for k-fold cross validated partial least squares regression models.

Usage

```
kfold2Press(pls_kfolds)
```

Arguments

`pls_kfolds` a k-fold cross validated partial least squares regression model

Value

<code>list</code>	Press vs number of components for the first group partition
<code>list()</code>	...
<code>list</code>	Press vs number of components for the last group partition

Note

Use [cv.plsR](#) to create k-fold cross validated partial least squares regression models.

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfolds2coeff](#), [kfolds2Pressind](#), [kfolds2Mclassifiedind](#) and [kfolds2Mclassified](#) to extract and transforms results from k-fold cross validation.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
kfolds2Press(cv.plsR(object=yCornell,dataX=data.frame(scale(as.matrix(XCornell)))[,]),
nt=6,K=12,NK=1,verbose=FALSE))
kfolds2Press(cv.plsR(object=yCornell,dataX=data.frame(scale(as.matrix(XCornell)))[,]),
nt=6,K=6,NK=1,verbose=FALSE))
rm(list=c("XCornell","yCornell"))
```

```
data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
kfolds2Press(cv.plsR(object=ypine,dataX=Xpine,nt=10,NK=1,verbose=FALSE))
kfolds2Press(cv.plsR(object=ypine,dataX=Xpine,nt=10,NK=2,verbose=FALSE))
```

```
XpineNAX21 <- Xpine
XpineNAX21[1,2] <- NA
kfolds2Press(cv.plsR(object=ypine,dataX=XpineNAX21,nt=10,NK=1,verbose=FALSE))
kfolds2Press(cv.plsR(object=ypine,dataX=XpineNAX21,nt=10,NK=2,verbose=FALSE))
rm(list=c("Xpine","XpineNAX21","ypine"))
```

kfolds2Pressind

Computes individual PRESS for k-fold cross validated partial least squares regression models.

Description

This function computes individual PRESS for k-fold cross validated partial least squares regression models.

Usage

```
kfold2Pressind(pls_kfolds)
```

Arguments

pls_kfolds a k-fold cross validated partial least squares regression model

Value

list Individual Press vs number of components for the first group partition
list() ...
list Individual Press vs number of components for the last group partition

Note

Use [cv.plsR](#) to create k-fold cross validated partial least squares regression models.

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[kfold2coeff](#), [kfold2Press](#), [kfold2Mclassifiedind](#) and [kfold2Mclassified](#) to extract and transform results from k-fold cross validation.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
kfold2Pressind(cv.plsR(object=yCornell,dataX=data.frame(scale(as.matrix(XCornell))[, ]),
nt=6,K=12,NK=1))
kfold2Pressind(cv.plsR(object=yCornell,dataX=data.frame(scale(as.matrix(XCornell))[, ]),
nt=6,K=6,NK=1))
rm(list=c("XCornell","yCornell"))
```

```
data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
kfold2Pressind(cv.plsR(object=ypine,dataX=Xpine,nt=10,NK=1,verbose=FALSE))
kfold2Pressind(cv.plsR(object=ypine,dataX=Xpine,nt=10,NK=2,verbose=FALSE))

XpineNAX21 <- Xpine
XpineNAX21[1,2] <- NA
kfold2Pressind(cv.plsR(object=ypine,dataX=XpineNAX21,nt=10,NK=1,verbose=FALSE))
kfold2Pressind(cv.plsR(object=ypine,dataX=XpineNAX21,nt=10,NK=2,verbose=FALSE))
rm(list=c("Xpine","XpineNAX21","ypine"))
```

loglikpls

loglikelihood function for plsR models

Description

This function provides loglikelihood computation for an univariate plsR model.

Usage

```
loglikpls(residpls, weights = rep.int(1, length(residpls)))
```

Arguments

residpls	Residuals of a fitted univariate plsR model
weights	Weights of observations

Details

Loglikelihood functions for plsR models with univariate response.

Value

real	Loglikelihood value
------	---------------------

Author(s)

Frédéric Bertrand
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<https://fbertran.github.io/homepage/>

References

Baibing Li, Julian Morris, Elaine B. Martin, Model selection for partial least squares regression, *Chemometrics and Intelligent Laboratory Systems* 64 (2002) 79-89, doi:10.1016/S01697439(02)00051-5.

See Also

[AICpls](#) for AIC computation and [logLik](#) for loglikelihood computations for linear models

Examples

```
data(pine)
ypine <- pine[,11]
Xpine <- pine[,1:10]
(Pinscaled <- as.data.frame(cbind(scale(ypine),scale(as.matrix(Xpine))))))
colnames(Pinscaled)[1] <- "yy"

lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)

modpls <- plsR(ypine,Xpine,10)
modpls$Std.Coeffs
lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)

AIC(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled))
print(logLik(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)))

sum(dnorm(modpls$RepY, modpls$Std.ValsPredictY, sqrt(mean(modpls$residY^2)), log=TRUE))
sum(dnorm(Pinscaled$yy,fitted(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)),
sqrt(mean(residuals(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled))^2)), log=TRUE))
loglikpls(modpls$residY)
loglikpls(residuals(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)))
AICpls(10,residuals(lm(yy~x1+x2+x3+x4+x5+x6+x7+x8+x9+x10,data=Pinscaled)))
AICpls(10,modpls$residY)
```

permcoefs.plsR

Coefficients for permutation bootstrap computations of PLSR models

Description

A function passed to boot to perform bootstrap.

Usage

```
permcoefs.plsR(dataset, ind, nt, modele, maxcoefvalues, ifbootfail, verbose)
```

Arguments

dataset	dataset to resample
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsR
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
ifbootfail	value to return if the estimation fails on a bootstrap sample
verbose	should info messages be displayed ?

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Author(s)

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<https://fbertran.github.io/homepage/>

See Also

See also [bootpls](#).

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

# Lazraq-Cleroux PLS (Y,X) bootstrap
# statistic=permcoefs.plsR is the default for (Y,X) permutation resampling of PLSR models.
set.seed(250)
modpls <- plsR(yCornell,XCornell,1)
Cornell.bootYX <- bootpls(modpls, sim="permutation", R=250, statistic=permcoefs.plsR, verbose=FALSE)
```

permcoefs.plsR.raw	<i>Raw coefficients for permutation bootstrap computations of PLSR models</i>
--------------------	---

Description

A function passed to boot to perform bootstrap.

Usage

```
permcoefs.plsR.raw(  
  dataset,  
  ind,  
  nt,  
  modele,  
  maxcoefvalues,  
  ifbootfail,  
  verbose  
)
```

Arguments

dataset	dataset to resample
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsR
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
ifbootfail	value to return if the estimation fails on a bootstrap sample
verbose	should info messages be displayed ?

Value

estimates on a bootstrap sample or `ifbootfail` value if the bootstrap computation fails.

Author(s)

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<https://fbertran.github.io/homepage/>

See Also

See also [bootpls](#).

Examples

```
data(Cornell)  
XCornell<-Cornell[,1:7]  
yCornell<-Cornell[,8]  
  
# Lazraq-Cleroux PLS (Y,X) bootstrap  
set.seed(250)  
modpls <- permcoefs.plsR.raw(Cornell[,-8],1:nrow(Cornell),nt=3,  
maxcoefvalues=1e5,ifbootfail=rep(0,3),verbose=FALSE)
```

permcoefs.plsRglm	<i>Coefficients for permutation bootstrap computations of PLSGLR models</i>
-------------------	---

Description

A function passed to boot to perform bootstrap.

Usage

```
permcoefs.plsRglm(  
  dataset,  
  ind,  
  nt,  
  modele,  
  family = NULL,  
  fit_backend = "stats",  
  maxcoefvalues,  
  ifbootfail,  
  verbose  
)
```

Arguments

dataset	dataset to resample
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsRglm
family	glm family to use, see plsRglm
fit_backend	backend used for repeated non-ordinal score-space GLM fits. Use "stats" or "fastglm".
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
ifbootfail	value to return if the estimation fails on a bootstrap sample
verbose	should info messages be displayed ?

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

See Also

See also [bootplsglm](#).

Examples

```
data(Cornell)

# (Y,X) bootstrap of a PLSGLR model
# statistic=coefs.plsRglm is the default for (Y,X) bootstrap of a PLSGLR models.
set.seed(250)
modplsglm <- plsRglm(Y~.,data=Cornell,1,modele="pls-glm-family",family=gaussian)
Cornell.bootYX <- bootplsglm(modplsglm, R=250, typeboot="plsmodel",
sim="permutation", statistic=permcoefs.plsRglm, verbose=FALSE)
```

permcoefs.plsRglm.raw *Raw coefficients for permutation bootstrap computations of PLSGLR models*

Description

A function passed to boot to perform bootstrap.

Usage

```
permcoefs.plsRglm.raw(
  dataset,
  ind,
  nt,
  modele,
  family = NULL,
  fit_backend = "stats",
  maxcoefvalues,
  ifbootfail,
  verbose
)
```

Arguments

dataset	dataset to resample
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsRglm
family	glm family to use, see plsRglm
fit_backend	backend used for repeated non-ordinal score-space GLM fits. Use "stats" or "fastglm".

maxcoefvalues maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples

ifbootfail value to return if the estimation fails on a bootstrap sample

verbose should info messages be displayed ?

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Author(s)

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<https://fbertran.github.io/homepage/>

See Also

See also [bootplsglm](#).

Examples

```
data(Cornell)

# (Y,X) bootstrap of a PLSGLR model
set.seed(250)
modplsglm <- permcoefs.plsRglm.raw(Cornell[,-8],1:nrow(Cornell),nt=3,
modele="pls-glm-family",family=gaussian,maxcoefvalues=1e5,
ifbootfail=rep(0,3),verbose=FALSE)
```

permcoefs.plsRglmnp *Coefficients for permutation bootstrap computations of PLSGLR models*

Description

A function passed to boot to perform bootstrap.

Usage

```
permcoefs.plsRglmnp(
  dataRepYtt,
  ind,
  nt,
  modele,
  family = NULL,
  maxcoefvalues,
  wwetoile,
  ifbootfail
)
```

Arguments

dataRepYtt	components' coordinates to bootstrap
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsRglm
family	glm family to use, see plsRglm
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
wwetoile	values of the Wstar matrix in the original fit
ifbootfail	value to return if the estimation fails on a bootstrap sample

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Note

~~some notes~~

Author(s)

Frédéric Bertrand
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<https://fbertran.github.io/homepage/>

See Also

See also [bootplsglm](#)

Examples

```
data(Cornell)

# (Y,X) bootstrap of a PLSGLR model
# statistic=coefs.plsRglm is the default for (Y,X) bootstrap of a PLSGLR models.
set.seed(250)
modplsglm <- plsRglm(Y~.,data=Cornell,1,modele="pls-glm-family",family=gaussian)
Cornell.bootYT <- bootplsglm(modplsglm, R=250, statistic=permcoefs.plsRglmnp, verbose=FALSE)
```

permcoefs.plsRnp *Coefficients computation for permutation bootstrap*

Description

A function passed to boot to perform bootstrap.

Usage

```
permcoefs.plsRnp(  
  dataRepYtt,  
  ind,  
  nt,  
  modele,  
  maxcoefvalues,  
  wwetoile,  
  ifbootfail  
)
```

Arguments

dataRepYtt	components' coordinates to bootstrap
ind	indices for resampling
nt	number of components to use
modele	type of modele to use, see plsRglm
maxcoefvalues	maximum values allowed for the estimates of the coefficients to discard those coming from singular bootstrap samples
wwetoile	values of the Wstar matrix in the original fit
ifbootfail	value to return if the estimation fails on a bootstrap sample

Value

estimates on a bootstrap sample or ifbootfail value if the bootstrap computation fails.

Author(s)

Frédéric Bertrand
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<https://fbertran.github.io/homepage/>

See Also

See also [bootpls](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

# Lazraq-Cleroux PLS (Y,X) bootstrap
# statistic=coefs.plsR is the default for (Y,X) resampling of PLSR models.
set.seed(250)
modpls <- plsR(yCornell,XCornell,1)
Cornell.bootYT <- bootpls(modpls, R=250, typeboot="fmodel_np", sim="permutation",
statistic=permcoefs.plsRnp, verbose=FALSE)
```

pine

Pine dataset

Description

The caterpillar dataset was extracted from a 1973 study on pine processionary caterpillars. It assesses the influence of some forest settlement characteristics on the development of caterpillar colonies. The response variable is the logarithmic transform of the average number of nests of caterpillars per tree in an area of 500 square meters (x11). There are k=10 potentially explanatory variables defined on n=33 areas.

Format

A data frame with 33 observations on the following 11 variables.

- x1** altitude (in meters)
- x2** slope (en degrees)
- x3** number of pines in the area
- x4** height (in meters) of the tree sampled at the center of the area
- x5** diameter (in meters) of the tree sampled at the center of the area
- x6** index of the settlement density
- x7** orientation of the area (from 1 if southbound to 2 otherwise)
- x8** height (in meters) of the dominant tree
- x9** number of vegetation strata
- x10** mix settlement index (from 1 if not mixed to 2 if mixed)
- x11** logarithmic transform of the average number of nests of caterpillars per tree

Details

These caterpillars got their names from their habit of moving over the ground in incredibly long head-to-tail processions when leaving their nest to create a new colony.

The pine_sup dataset can be used as a test set to assess model prediction error of a model trained on the pine dataset.

Source

Tomassone R., Audrain S., Lesquoy-de Turckheim E., Millier C. (1992), “La régression, nouveaux regards sur une ancienne méthode statistique”, INRA, *Actualités Scientifiques et Agronomiques*, Masson, Paris.

References

J.-M. Marin, C. Robert. (2007). *Bayesian Core: A Practical Approach to Computational Bayesian Statistics*. Springer, New-York, pages 48-49.

Examples

```
data(pine)
str(pine)
```

pineNAX21

Incomplete dataset from the pine caterpillars example

Description

The caterpillar dataset was extracted from a 1973 study on pine processionary caterpillars. It assesses the influence of some forest settlement characteristics on the development of caterpillar colonies. There are $k=10$ potentially explanatory variables defined on $n=33$ areas.

The value of x_2 for the first observation was removed from the matrix of predictors on purpose.

Format

A data frame with 33 observations on the following 11 variables and one missing value.

x1 altitude (in meters)

x2 slope (en degrees)

x3 number of pines in the area

x4 height (in meters) of the tree sampled at the center of the area

x5 diameter (in meters) of the tree sampled at the center of the area

x6 index of the settlement density

x7 orientation of the area (from 1 if southbound to 2 otherwise)

x8 height (in meters) of the dominant tree

x9 number of vegetation strata

x10 mix settlement index (from 1 if not mixed to 2 if mixed)

x11 logarithmic transform of the average number of nests of caterpillars per tree

Details

These caterpillars got their names from their habit of moving over the ground in incredibly long head-to-tail processions when leaving their nest to create a new colony.
The pineNAX21 is a dataset with a missing value for testing purpose.

Source

Tomassone R., Audrain S., Lesquoy-de Turekeim E., Millier C. (1992). “La régression, nouveaux regards sur une ancienne méthode statistique”, INRA, *Actualités Scientifiques et Agronomiques*, Masson, Paris.

Examples

```
data(pineNAX21)
str(pineNAX21)
```

pine_full

Complete Pine dataset

Description

This is the complete caterpillar dataset from a 1973 study on pine_full processionary caterpillars. It assesses the influence of some forest settlement characteristics on the development of caterpillar colonies. The response variable is the logarithmic transform of the average number of nests of caterpillars per tree in an area of 500 square meters (x11). There are k=10 potentially explanatory variables defined on n=55 areas.

Format

A data frame with 55 observations on the following 11 variables.

- x1** altitude (in meters)
- x2** slope (en degrees)
- x3** number of pine_falls in the area
- x4** height (in meters) of the tree sampled at the center of the area
- x5** diameter (in meters) of the tree sampled at the center of the area
- x6** index of the settlement density
- x7** orientation of the area (from 1 if southbound to 2 otherwise)
- x8** height (in meters) of the dominant tree
- x9** number of vegetation strata
- x10** mix settlement index (from 1 if not mixed to 2 if mixed)
- x11** logarithmic transform of the average number of nests of caterpillars per tree

Details

These caterpillars got their names from their habit of moving over the ground in incredibly long head-to-tail processions when leaving their nest to create a new colony.

Source

Tomassone R., Audrain S., Lesquoy-de Turckheim E., Millier C. (1992), “La régression, nouveaux regards sur une ancienne méthode statistique”, INRA, *Actualités Scientifiques et Agronomiques*, Masson, Paris.

References

J.-M. Marin, C. Robert. (2007). *Bayesian Core: A Practical Approach to Computational Bayesian Statistics*. Springer, New-York, pages 48-49.

Examples

```
data(pine_full)
str(pine_full)
```

pine_sup

Complete Pine dataset

Description

This is a supplementary dataset (used as a test set for the pine dataset) that was extracted from a 1973 study on pine_sup processionary caterpillars. It assesses the influence of some forest settlement characteristics on the development of caterpillar colonies. The response variable is the logarithmic transform of the average number of nests of caterpillars per tree in an area of 500 square meters (x11). There are k=10 potentially explanatory variables defined on n=22 areas.

Format

A data frame with 22 observations on the following 11 variables.

- x1** altitude (in meters)
- x2** slope (en degrees)
- x3** number of pine_sups in the area
- x4** height (in meters) of the tree sampled at the center of the area
- x5** diameter (in meters) of the tree sampled at the center of the area
- x6** index of the settlement density
- x7** orientation of the area (from 1 if southbound to 2 otherwise)
- x8** height (in meters) of the dominant tree
- x9** number of vegetation strata
- x10** mix settlement index (from 1 if not mixed to 2 if mixed)
- x11** logarithmic transform of the average number of nests of caterpillars per tree

Details

These caterpillars got their names from their habit of moving over the ground in incredibly long head-to-tail processions when leaving their nest to create a new colony.

The pine_sup dataset can be used as a test set to assess model prediction error of a model trained on the pine dataset.

Source

Tomassone R., Audrain S., Lesquoy-de Turckheim E., Millier C. (1992), “La régression, nouveaux regards sur une ancienne méthode statistique”, INRA, *Actualités Scientifiques et Agronomiques*, Masson, Paris.

References

J.-M. Marin, C. Robert. (2007). *Bayesian Core: A Practical Approach to Computational Bayesian Statistics*. Springer, New-York, pages 48-49.

Examples

```
data(pine_sup)
str(pine_sup)
```

```
plot.table.summary.cv.plsRglmmodel
```

Plot method for table of summary of cross validated plsRglm models

Description

This function provides a table method for the class "summary.cv.plsRglmmodel"

Usage

```
## S3 method for class 'table.summary.cv.plsRglmmodel'
plot(x, type = c("CVMC", "CVQ2Chi2", "CVPreChi2"), ...)
```

Arguments

x	an object of the class "table.summary.cv.plsRglmmodel"
type	the type of cross validation criterion to plot.
...	further arguments to be passed to or from methods.

Value

NULL

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[summary](#)

Examples

```
data(Cornell)
bbb <- cv.plsRglm(Y~.,data=Cornell,nt=10,NK=1,
modele="pls-glm-family",family=gaussian(), verbose=FALSE)
plot(cvtable(summary(bbb,verbose=FALSE)),type="CVQ2Chi2")
rm(list=c("bbb"))
```

```
data(Cornell)
plot(cvtable(summary(cv.plsRglm(Y~.,data=Cornell,nt=10,NK=100,
modele="pls-glm-family",family=gaussian(), verbose=FALSE),
verbose=FALSE)),type="CVQ2Chi2")
```

plot.table.summary.cv.plsRmodel

Plot method for table of summary of cross validated plsR models

Description

This function provides a table method for the class "summary.cv.plsRmodel"

Usage

```
## S3 method for class 'table.summary.cv.plsRmodel'
plot(x, type = c("CVMC", "CVQ2", "CVPress"), ...)
```

Arguments

x an object of the class "table.summary.cv.plsRmodel"
type the type of cross validation criterion to plot.
... further arguments to be passed to or from methods.

Value

NULL

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[summary](#)

Examples

```
data(Cornell)
bbb <- cv.plsR(Y~., data=Cornell, nt=6, K=6, NK=5, verbose=FALSE)
plot(cvtable(summary(bbb)), type="CVQ2")
rm(list=c("bbb"))
```

```
data(Cornell)
plot(cvtable(summary(cv.plsR(Y~., data=Cornell, nt=6, K=6, NK=100, verbose=FALSE))), type="CVQ2")
```

plots.confints.bootpls

Plot bootstrap confidence intervals

Description

This function plots the confidence intervals derived using the function `confints.bootpls` from from a `bootpls` based object.

Usage

```
plots.confints.bootpls(
  ic_bootobject,
  indices = NULL,
  legendpos = "topleft",
  prednames = TRUE,
  articlestyle = TRUE,
  xaxisticks = TRUE,
  ltyIC = c(2, 4, 5, 1),
  colIC = c("darkgreen", "blue", "red", "black"),
  typeIC,
  las = par("las"),
  mar,
  mgp,
  ...
)
```

Arguments

<code>ic_bootobject</code>	an object created with the <code>confints.bootpls</code> function.
<code>indices</code>	vector of indices of the variables to plot. Defaults to <code>NULL</code> : all the predictors will be used.
<code>legendpos</code>	position of the legend as in legend , defaults to <code>"topleft"</code>
<code>prednames</code>	do the original names of the predictors shall be plotted ? Defaults to <code>TRUE</code> : the names are plotted.
<code>articlestyle</code>	do the extra blank zones of the margin shall be removed from the plot ? Defaults to <code>TRUE</code> : the margins are removed.
<code>xaxisticks</code>	do ticks for the x axis shall be plotted ? Defaults to <code>TRUE</code> : the ticks are plotted.
<code>ltyIC</code>	lty as in plot
<code>colIC</code>	col as in plot
<code>typeIC</code>	type of CI to plot. Defaults to <code>typeIC=c("Normal", "Basic", "Percentile", "BCa")</code> if BCa intervals limits were computed and to <code>typeIC=c("Normal", "Basic", "Percentile")</code> otherwise.
<code>las</code>	numeric in 0,1,2,3; the style of axis labels. 0: always parallel to the axis [default], 1: always horizontal, 2: always perpendicular to the axis, 3: always vertical.
<code>mar</code>	A numerical vector of the form <code>c(bottom, left, top, right)</code> which gives the number of lines of margin to be specified on the four sides of the plot. The default is <code>c(5, 4, 4, 2) + 0.1</code> .
<code>mgp</code>	The margin line (in mex units) for the axis title, axis labels and axis line. Note that <code>mgp[1]</code> affects title whereas <code>mgp[2:3]</code> affect axis. The default is <code>c(3, 1, 0)</code> .
<code>...</code>	further options to pass to the plot function.

Value

NULL

Author(s)

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See Also

[confints.bootpls](#)

Examples

```
data(Cornell)
modpls <- plsR(Y~.,data=Cornell,3)

# Lazraq-Cleroux PLS (Y,X) bootstrap
set.seed(250)
Cornell.bootYX <- bootpls(modpls, R=250, verbose=FALSE)
temp.ci <- confints.bootpls(Cornell.bootYX,2:8)

plots.confints.bootpls(temp.ci)
plots.confints.bootpls(temp.ci,prednames=FALSE)
plots.confints.bootpls(temp.ci,prednames=FALSE,articlestyle=FALSE,
  main="Bootstrap confidence intervals for the bj")
plots.confints.bootpls(temp.ci,indices=1:3,prednames=FALSE)
plots.confints.bootpls(temp.ci,c(2,4,6),"bottomright")
plots.confints.bootpls(temp.ci,c(2,4,6),articlestyle=FALSE,
  main="Bootstrap confidence intervals for some of the bj")

temp.ci <- confints.bootpls(Cornell.bootYX,typeBCa=FALSE)
plots.confints.bootpls(temp.ci)
plots.confints.bootpls(temp.ci,2:8)
plots.confints.bootpls(temp.ci,prednames=FALSE)

# Bastien CSDA 2005 (Y,T) bootstrap
Cornell.boot <- bootpls(modpls, typeboot="fmodel_np", R=250, verbose=FALSE)
temp.ci <- confints.bootpls(Cornell.boot,2:8)

plots.confints.bootpls(temp.ci)
plots.confints.bootpls(temp.ci,prednames=FALSE)
plots.confints.bootpls(temp.ci,prednames=FALSE,articlestyle=FALSE,
  main="Bootstrap confidence intervals for the bj")
plots.confints.bootpls(temp.ci,indices=1:3,prednames=FALSE)
plots.confints.bootpls(temp.ci,c(2,4,6),"bottomright")
plots.confints.bootpls(temp.ci,c(2,4,6),articlestyle=FALSE,
  main="Bootstrap confidence intervals for some of the bj")

temp.ci <- confints.bootpls(Cornell.boot,typeBCa=FALSE)
```

```

plots.confints.bootpls(temp.ci)
plots.confints.bootpls(temp.ci,2:8)
plots.confints.bootpls(temp.ci,prednames=FALSE)

data(aze_compl)
modplsglm <- plsRglm(y~.,data=aze_compl,3,modele="pls-glm-logistic")

# Lazraq-Cleroux PLS (Y,X) bootstrap
# should be run with R=1000 but takes much longer time
aze_compl.bootYX3 <- bootplsglm(modplsglm, typeboot="plsmodel", R=250, verbose=FALSE)
temp.ci <- confints.bootpls(aze_compl.bootYX3)

plots.confints.bootpls(temp.ci)
plots.confints.bootpls(temp.ci,prednames=FALSE)
plots.confints.bootpls(temp.ci,prednames=FALSE,articlestyle=FALSE,
main="Bootstrap confidence intervals for the bj")
plots.confints.bootpls(temp.ci,indices=1:33,prednames=FALSE)
plots.confints.bootpls(temp.ci,c(2,4,6),"bottomleft")
plots.confints.bootpls(temp.ci,c(2,4,6),articlestyle=FALSE,
main="Bootstrap confidence intervals for some of the bj")
plots.confints.bootpls(temp.ci,indices=1:34,prednames=FALSE)
plots.confints.bootpls(temp.ci,indices=1:33,prednames=FALSE,ltyIC=1,colIC=c(1,2))

temp.ci <- confints.bootpls(aze_compl.bootYX3,1:34,typeBCa=FALSE)
plots.confints.bootpls(temp.ci,indices=1:33,prednames=FALSE)

# Bastien CSDA 2005 (Y,T) Bootstrap
# much faster
aze_compl.bootYT3 <- bootplsglm(modplsglm, R=1000, verbose=FALSE)
temp.ci <- confints.bootpls(aze_compl.bootYT3)

plots.confints.bootpls(temp.ci)
plots.confints.bootpls(temp.ci,typeIC="Normal")
plots.confints.bootpls(temp.ci,typeIC=c("Normal","Basic"))
plots.confints.bootpls(temp.ci,typeIC="BCa",legendpos="bottomleft")
plots.confints.bootpls(temp.ci,prednames=FALSE)
plots.confints.bootpls(temp.ci,prednames=FALSE,articlestyle=FALSE,
main="Bootstrap confidence intervals for the bj")
plots.confints.bootpls(temp.ci,indices=1:33,prednames=FALSE)
plots.confints.bootpls(temp.ci,c(2,4,6),"bottomleft")
plots.confints.bootpls(temp.ci,c(2,4,6),articlestyle=FALSE,
main="Bootstrap confidence intervals for some of the bj")
plots.confints.bootpls(temp.ci,prednames=FALSE,ltyIC=c(2,1),colIC=c(1,2))

temp.ci <- confints.bootpls(aze_compl.bootYT3,1:33,typeBCa=FALSE)
plots.confints.bootpls(temp.ci,prednames=FALSE)

```

plsR *Partial least squares Regression models with leave one out cross validation*

Description

This function implements Partial least squares Regression models with leave one out cross validation for complete or incomplete datasets.

Usage

```
plsR(object, ...)
## Default S3 method:
plsRmodel(object, dataX, nt = 2, limQ2set = 0.0975,
dataPredictY = dataX, modele = "pls", family = NULL, typeVC = "none",
EstimXNA = FALSE, scaleX = TRUE, scaleY = NULL, pvals.expli = FALSE,
alpha.pvals.expli = 0.05, MClassed = FALSE, tol_Xi = 10^(-12), weights,
sparse = FALSE, sparseStop = TRUE, naive = FALSE, verbose=TRUE,...)
## S3 method for class 'formula'
plsRmodel(object, data, nt = 2, limQ2set = 0.0975,
dataPredictY, modele = "pls", family = NULL, typeVC = "none",
EstimXNA = FALSE, scaleX = TRUE, scaleY = NULL, pvals.expli = FALSE,
alpha.pvals.expli = 0.05, MClassed = FALSE, tol_Xi = 10^(-12), weights,
subset, contrasts = NULL, sparse = FALSE, sparseStop = TRUE, naive = FALSE,
verbose=TRUE,...)
PLS_lm(dataY, dataX, nt = 2, limQ2set = 0.0975, dataPredictY = dataX,
modele = "pls", family = NULL, typeVC = "none", EstimXNA = FALSE,
scaleX = TRUE, scaleY = NULL, pvals.expli = FALSE,
alpha.pvals.expli = 0.05, MClassed = FALSE, tol_Xi = 10^(-12),
weights, sparse=FALSE, sparseStop=FALSE, naive=FALSE, verbose=TRUE)
PLS_lm_formula(formula, data=NULL, nt=2, limQ2set=.0975, dataPredictY=dataX,
modele="pls", family=NULL, typeVC="none", EstimXNA=FALSE, scaleX=TRUE,
scaleY=NULL, pvals.expli=FALSE, alpha.pvals.expli=.05, MClassed=FALSE,
tol_Xi=10^(-12), weights, subset, contrasts=NULL, sparse=FALSE,
sparseStop=FALSE, naive=FALSE, verbose=TRUE)
```

Arguments

object	response (training) dataset or an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
dataY	response (training) dataset
dataX	predictor(s) (training) dataset
formula	an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.

data	an optional data frame, list or environment (or object coercible by <code>as.data.frame</code> to a data frame) containing the variables in the model. If not found in data, the variables are taken from <code>environment(formula)</code> , typically the environment from which <code>plsR</code> is called.
nt	number of components to be extracted
limQ2set	limit value for the Q2
dataPredictY	predictor(s) (testing) dataset
modele	name of the PLS model to be fitted, only ("pls" available for this fonction.
family	for the present moment the family argument is ignored and set thanks to the value of <code>modele</code> .
typeVC	<p>type of leave one out cross validation. Several procedures are available. If cross validation is required, one needs to select the way of predicting the response for left out observations. For complete rows, without any missing value, there are two different ways of computing these predictions. As a consequence, for mixed datasets, with complete and incomplete rows, there are two ways of computing prediction : either predicts any row as if there were missing values in it (<code>missingdata</code>) or selects the prediction method accordingly to the completeness of the row (<code>adaptative</code>).</p> <p>none no cross validation</p> <p>standard as in SIMCA for datasets without any missing value. For datasets with any missing value, it is the as using <code>missingdata</code></p> <p><code>missingdata</code> all values predicted as those with missing values for datasets with any missing values</p> <p><code>adaptative</code> predict a response value for an x with any missing value as those with missing values and for an x without any missing value as those without missing values.</p>
EstimXNA	only for <code>modele="pls"</code> . Set whether the missing X values have to be estimated.
scaleX	scale the predictor(s) : must be set to TRUE for <code>modele="pls"</code> and should be for <code>glms pls</code> .
scaleY	scale the response : Yes/No. Ignored since non always possible for <code>glm</code> responses.
<code>pvals.expli</code>	should individual p-values be reported to tune model selection ?
<code>alpha.pvals.expli</code>	level of significance for predictors when <code>pvals.expli=TRUE</code>
MClassed	number of missclassified cases, should only be used for binary responses
tol_Xi	minimal value for $\text{Norm2}(X_i)$ and $\det(pp' \times pp)$ if there is any missing value in the <code>dataX</code> . It defaults to 10^{-12}
weights	an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
subset	an optional vector specifying a subset of observations to be used in the fitting process.
contrasts	an optional list. See the <code>contrasts.arg</code> of <code>model.matrix.default</code> .

sparse	should the coefficients of non-significant predictors (<code><alpha.pvals.expli</code>) be set to 0
sparseStop	should component extraction stop when no significant predictors (<code><alpha.pvals.expli</code>) are found
naive	Use the naive estimates for the Degrees of Freedom in plsR? Default is FALSE.
verbose	should info messages be displayed ?
...	arguments to pass to <code>plsRmodel.default</code> or to <code>plsRmodel.formula</code>

Details

There are several ways to deal with missing values that leads to different computations of leave one out cross validation criteria.

A typical predictor has the form `response ~ terms` where `response` is the (numeric) response vector and `terms` is a series of terms which specifies a linear predictor for response. A terms specification of the form `first + second` indicates all the terms in `first` together with all the terms in `second` with any duplicates removed.

A specification of the form `first:second` indicates the the set of terms obtained by taking the interactions of all terms in `first` with all terms in `second`. The specification `first*second` indicates the cross of `first` and `second`. This is the same as `first + second + first:second`.

The terms in the formula will be re-ordered so that main effects come first, followed by the interactions, all second-order, all third-order and so on: to avoid this pass a terms object as the formula.

Non-NULL weights can be used to indicate that different observations have different dispersions (with the values in weights being inversely proportional to the dispersions); or equivalently, when the elements of weights are positive integers w_i , that each response y_i is the mean of w_i unit-weight observations.

The default estimator for Degrees of Freedom is the Kramer and Sugiyama's one. Information criteria are computed accordingly to these estimations. Naive Degrees of Freedom and Information Criteria are also provided for comparison purposes. For more details, see N. Kraemer and M. Sugiyama. (2011). The Degrees of Freedom of Partial Least Squares Regression. *Journal of the American Statistical Association*, 106(494), 697-705, 2011.

Value

nr	Number of observations
nc	Number of predictors
nt	Number of requested components
ww	raw weights (before L2-normalization)
wwnorm	L2 normed weights (to be used with deflated matrices of predictor variables)
wwetoile	modified weights (to be used with original matrix of predictor variables)
tt	PLS components
pp	loadings of the predictor variables
CoefFC	coefficients of the PLS components
uscores	scores of the response variable

YChapeau	predicted response values for the dataX set
residYChapeau	residuals of the deflated response on the standardized scale
RepY	scaled response vector
na.miss.Y	is there any NA value in the response vector
YNA	indicator vector of missing values in RepY
residY	deflated scaled response vector
ExpliX	scaled matrix of predictors
na.miss.X	is there any NA value in the predictor matrix
XXNA	indicator of non-NA values in the predictor matrix
residXX	deflated predictor matrix
PredictY	response values with NA replaced with 0
press.ind	individual PRESS value for each observation (scaled scale)
press.tot	total PRESS value for all observations (scaled scale)
family	glm family used to fit PLSGLR model
ttPredictY	PLS components for the dataset on which prediction was requested
typeVC	type of leave one out cross-validation used
dataX	predictor values
dataY	response values
computed_nt	number of components that were computed
CoeffCFull	matrix of the coefficients of the predictors
CoeffConstante	value of the intercept (scaled scale)
Std.Coeffs	Vector of standardized regression coefficients
press.ind2	individual PRESS value for each observation (original scale)
RSSresidY	residual sum of squares (scaled scale)
Coeffs	Vector of regression coefficients (used with the original data scale)
Yresidus	residuals of the PLS model
RSS	residual sum of squares (original scale)
residusY	residuals of the deflated response on the standardized scale
AIC.std	AIC.std vs number of components (AIC computed for the standardized model)
AIC	AIC vs number of components
optional	If the response is assumed to be binary: i.e. MClassed=TRUE. MissClassed Number of miss classed results Probs "Probability" predicted by the model. These are not true probabilities since they may lay outside of [0,1] Probs.trc Probability predicted by the model and constrained to belong to [0,1]
ttPredictFittedMissingY	Description of 'comp2'

optional	If cross validation was requested: i.e. typeVC="standard", typeVC="missingdata" or typeVC="adapative". R2residY R2 coefficient value on the standardized scale R2 R2 coefficient value on the original scale press.tot2 total PRESS value for all observations (original scale) Q2 Q2 value (standardized scale) limQ2 limit of the Q2 value Q2_2 Q2 value (original scale) Q2cum cumulated Q2 (standardized scale) Q2cum_2 cumulated Q2 (original scale)
InfCrit	table of Information Criteria
Std.ValsPredictY	predicted response values for supplementary dataset (standardized scale)
ValsPredictY	predicted response values for supplementary dataset (original scale)
Std.XChapeau	estimated values for missing values in the predictor matrix (standardized scale)
XXwotNA	predictor matrix with missing values replaced with 0

Note

Use `cv.plsR` to cross-validate the `plsRglm` models and `bootpls` to bootstrap them.

Author(s)

Frederic Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frederic Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

See also `plsRglm` to fit PLSGLR models.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

#maximum 6 components could be extracted from this dataset
#trying 10 to trigger automatic stopping criterion
modpls10<-plsR(yCornell,XCornell,10)
modpls10
```

```

#With iterated leave one out CV PRESS
modpls6cv<-plsR(Y~.,data=Cornell,6,typeVC="standard")
modpls6cv
cv.modpls<-cv.plsR(Y~.,data=Cornell,6,NK=100, verbose=FALSE)
res.cv.modpls<-cvtable(summary(cv.modpls))
plot(res.cv.modpls)

rm(list=c("XCornell","yCornell","modpls10","modpls6cv"))

#A binary response example
data(aze_compl)
Xaze_compl<-aze_compl[,2:34]
yaze_compl<-aze_compl$y
modpls.aze <- plsR(yaze_compl,Xaze_compl,10,MClassed=TRUE,typeVC="standard")
modpls.aze

#Direct access to not cross-validated values
modpls.aze$AIC
modpls.aze$AIC.std
modpls.aze$MissClassed

#Raw predicted values (not really probably since not constrained in [0,1])
modpls.aze$Probs
#Truncated to [0;1] predicted values (true probabilities)
modpls.aze$Probs.trc
modpls.aze$Probs-modpls.aze$Probs.trc

#Repeated cross validation of the model (NK=100 times)
cv.modpls.aze<-cv.plsR(y~.,data=aze_compl,10,NK=100, verbose=FALSE)
res.cv.modpls.aze<-cvtable(summary(cv.modpls.aze,MClassed=TRUE))
#High discrepancy in the number of component choice using repeated cross validation
#and missclassified criterion
plot(res.cv.modpls.aze)

rm(list=c("Xaze_compl","yaze_compl","modpls.aze","cv.modpls.aze","res.cv.modpls.aze"))

#24 predictors
dimX <- 24
#2 components
Astar <- 2
simul_data_UniYX(dimX,Astar)
dataAstar2 <- data.frame(t(replicate(250,simul_data_UniYX(dimX,Astar))))
modpls.A2<- plsR(Y~.,data=dataAstar2,10,typeVC="standard")
modpls.A2
cv.modpls.A2<-cv.plsR(Y~.,data=dataAstar2,10,NK=100, verbose=FALSE)
res.cv.modpls.A2<-cvtable(summary(cv.modpls.A2,verbose=FALSE))
#Perfect choice for the Q2 criterion in PLSR
plot(res.cv.modpls.A2)

#Binarized data.frame
simbin1 <- data.frame(dicho(dataAstar2))

```

```

modpls.B2 <- plsR(Y~.,data=simbin1,10,typeVC="standard",MClassed=TRUE, verbose=FALSE)
modpls.B2
modpls.B2$Probs
modpls.B2$Probs.trc
modpls.B2$MissClassed
plsR(simbin1$Y,dataAstar2[,-1],10,typeVC="standard",MClassed=TRUE,verbose=FALSE)$InfCrit
cv.modpls.B2<-cv.plsR(Y~.,data=simbin1,2,NK=100,verbose=FALSE)
res.cv.modpls.B2<-cvtable(summary(cv.modpls.B2,MClassed=TRUE))
#Only one component found by repeated CV missclassified criterion
plot(res.cv.modpls.B2)

rm(list=c("dimX","Astar","dataAstar2","modpls.A2","cv.modpls.A2",
"res.cv.modpls.A2","simbin1","modpls.B2","cv.modpls.B2","res.cv.modpls.B2"))

```

plsR.dof

*Computation of the Degrees of Freedom***Description**

This function computes the Degrees of Freedom using the Krylov representation of PLS and other quantities that are used to get information criteria values. For the time present, it only works with complete datasets.

Usage

```

## S3 method for class 'dof'
plsR(modplsR, naive = FALSE)

```

Arguments

modplsR	A plsR model i.e. an object returned by one of the functions <code>plsR</code> , <code>plsRmodel.default</code> , <code>plsRmodel.formula</code> , <code>PLS_lm</code> or <code>PLS_lm.formula</code> .
naive	A boolean.

Details

If `naive=FALSE` returns values for estimated degrees of freedom and error dispersion. If `naive=TRUE` returns returns values for naive degrees of freedom and error dispersion. The original code from Nicole Kraemer and Mikio L. Braun was unable to handle models with only one component.

Value

DoF	Degrees of Freedom
sigmahat	Estimates of dispersion
Yhat	Predicted values
yhat	Square Euclidean norms of the predicted values
RSS	Residual Sums of Squares

Author(s)

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 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

N. Kraemer, M. Sugiyama. (2011). The Degrees of Freedom of Partial Least Squares Regression. *Journal of the American Statistical Association*, 106(494), 697-705.
 N. Kraemer, M. Sugiyama, M.L. Braun. (2009). Lanczos Approximations for the Speedup of Kernel Partial Least Squares Regression, *Proceedings of the Twelfth International Conference on Artificial Intelligence and Statistics (AISTATS)*, 272-279.

See Also

[aic.dof](#) and [infcrit.dof](#) for computing information criteria directly from a previously fitted plsR model.

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsR(yCornell,XCornell,4)
plsR.dof(modpls)
plsR.dof(modpls,naive=TRUE)
```

 plsRglm

Partial least squares Regression generalized linear models

Description

This function implements Partial least squares Regression generalized linear models complete or incomplete datasets.

Usage

```
plsRglm(object, ...)
## Default S3 method:
plsRglmmodel(object,dataX,nt=2,limQ2set=.0975,
dataPredictY=dataX,modele="pls",family=NULL,typeVC="none",
EstimXNA=FALSE,scaleX=TRUE,scaleY=NULL,pvals.expli=FALSE,
alpha.pvals.expli=.05,MClassed=FALSE,tol_Xi=10^(-12),weights,
sparse=FALSE,sparseStop=TRUE,naive=FALSE,fit_backend="stats",
verbose=TRUE,...)
## S3 method for class 'formula'
plsRglmmodel(object,data=NULL,nt=2,limQ2set=.0975,
```

```

dataPredictY,modele="pls",family=NULL,typeVC="none",
EstimXNA=FALSE,scaleX=TRUE,scaleY=NULL,pvals.expli=FALSE,
alpha.pvals.expli=.05,MClassed=FALSE,tol_Xi=10^(-12),weights,subset,
start=NULL,etastart,mustart,offset,method="glm.fit",control= list(),
contrasts=NULL,sparse=FALSE,sparseStop=TRUE,naive=FALSE,
fit_backend="stats",verbose=TRUE,...)
PLS_glm(dataY, dataX, nt = 2, limQ2set = 0.0975, dataPredictY = dataX,
modele = "pls", family = NULL, typeVC = "none", EstimXNA = FALSE,
scaleX = TRUE, scaleY = NULL, pvals.expli = FALSE,
alpha.pvals.expli = 0.05, MClassed = FALSE, tol_Xi = 10^(-12), weights,
method, sparse = FALSE, sparseStop=FALSE, naive=FALSE,
fit_backend="stats",verbose=TRUE)
PLS_glm_formula(formula,data=NULL,nt=2,limQ2set=.0975,dataPredictY=dataX,
modele="pls",family=NULL,typeVC="none",EstimXNA=FALSE,scaleX=TRUE,
scaleY=NULL,pvals.expli=FALSE,alpha.pvals.expli=.05,MClassed=FALSE,
tol_Xi=10^(-12),weights,subset,start=NULL,etastart,mustart,offset,method,
control= list(),contrasts=NULL,sparse=FALSE,sparseStop=FALSE,naive=FALSE,
fit_backend="stats",verbose=TRUE)

```

Arguments

object	response (training) dataset or an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
dataY	response (training) dataset
dataX	predictor(s) (training) dataset
formula	an object of class " formula " (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
data	an optional data frame, list or environment (or object coercible by as.data.frame to a data frame) containing the variables in the model. If not found in data, the variables are taken from <code>environment(formula)</code> , typically the environment from which <code>plsRglm</code> is called.
nt	number of components to be extracted
limQ2set	limit value for the Q2
dataPredictY	predictor(s) (testing) dataset
modele	name of the PLS glm model to be fitted ("pls", "pls-glm-Gamma", "pls-glm-gaussian", "pls-glm-inverse.gaussian", "pls-glm-logistic", "pls-glm-poisson", "pls-glm-polr"). Use "modele=pls-glm-family" to enable the family option.
family	a description of the error distribution and link function to be used in the model. This can be a character string naming a family function, a family function or the result of a call to a family function. (See family for details of family functions.) To use the family option, please set <code>modele="pls-glm-family"</code> . User defined families can also be defined. See details.
typeVC	type of leave one out cross validation. For back compatibility purpose.

	none no cross validation
EstimXNA	only for <code>modele="pls"</code> . Set whether the missing X values have to be estimated.
scaleX	scale the predictor(s) : must be set to TRUE for <code>modele="pls"</code> and should be for glms pls.
scaleY	scale the response : Yes/No. Ignored since non always possible for glm responses.
pvals.expli	should individual p-values be reported to tune model selection ?
alpha.pvals.expli	level of significance for predictors when <code>pvals.expli=TRUE</code>
MClassed	number of missclassified cases, should only be used for binary responses
tol_Xi	minimal value for $\text{Norm2}(X_i)$ and $\det(pp' \times pp)$ if there is any missing value in the dataX. It defaults to 10^{-12}
weights	an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
fit_backend	backend used for repeated non-ordinal score-space GLM fits. Use "stats" for the compatibility path or "fastglm" to opt into the accelerated complete-data backend. Unsupported cases fall back to "stats" with a warning.
subset	an optional vector specifying a subset of observations to be used in the fitting process.
start	starting values for the parameters in the linear predictor.
etastart	starting values for the linear predictor.
mustart	starting values for the vector of means.
offset	this can be used to specify an <i>a priori</i> known component to be included in the linear predictor during fitting. This should be NULL or a numeric vector of length equal to the number of cases. One or more <code>offset</code> terms can be included in the formula instead or as well, and if more than one is specified their sum is used. See <code>model.offset</code> .
method	For non-ordinal GLM modes this argument is kept for backward compatibility; use <code>fit_backend</code> to choose the score-space fitting backend. For a polr model (<code>modele="pls-glm-polr"</code>), logistic or probit or (complementary) log-log (<code>loglog</code> or <code>cloglog</code>) or <code>cauchit</code> (corresponding to a Cauchy latent variable).
control	a list of parameters for controlling the fitting process. For <code>glm.fit</code> this is passed to <code>glm.control</code> .
contrasts	an optional list. See the <code>contrasts.arg</code> of <code>model.matrix.default</code> .
sparse	should the coefficients of non-significant predictors (<code><alpha.pvals.expli</code>) be set to 0
sparseStop	should component extraction stop when no significant predictors (<code><alpha.pvals.expli</code>) are found
naive	Use the naive estimates for the Degrees of Freedom in plsR? Default is FALSE.
verbose	Should details be displayed ?
...	arguments to pass to <code>plsRmodel.default</code> or to <code>plsRmodel.formula</code>

Details

There are seven different predefined models with predefined link functions available :

"pls" ordinary pls models

"pls-glm-Gamma" glm gaussian with inverse link pls models

"pls-glm-gaussian" glm gaussian with identity link pls models

"pls-glm-inverse-gamma" glm binomial with square inverse link pls models

"pls-glm-logistic" glm binomial with logit link pls models

"pls-glm-poisson" glm poisson with log link pls models

"pls-glm-polr" glm polr with logit link pls models

Using the "family=" option and setting "modele=pls-glm-family" allows changing the family and link function the same way as for the `glm` function. As a consequence user-specified families can also be used.

The gaussian family accepts the links (as names) identity, log and inverse.

The binomial family accepts the links logit, probit, cauchit, (corresponding to logistic, normal and Cauchy CDFs respectively) log and cloglog (complementary log-log).

The Gamma family accepts the links inverse, identity and log.

The poisson family accepts the links log, identity, and sqrt.

The inverse.gaussian family accepts the links $1/\mu^2$, inverse, identity and log.

The quasi family accepts the links logit, probit, cloglog, identity, inverse, log, $1/\mu^2$ and sqrt.

The function power can be used to create a power link function.

A typical predictor has the form `response ~ terms` where response is the (numeric) response vector and terms is a series of terms which specifies a linear predictor for response. A terms specification of the form `first + second` indicates all the terms in first together with all the terms in second with any duplicates removed.

A specification of the form `first:second` indicates the the set of terms obtained by taking the interactions of all terms in first with all terms in second. The specification `first*second` indicates the cross of first and second. This is the same as `first + second + first:second`.

The terms in the formula will be re-ordered so that main effects come first, followed by the interactions, all second-order, all third-order and so on: to avoid this pass a terms object as the formula.

Non-NULL weights can be used to indicate that different observations have different dispersions (with the values in weights being inversely proportional to the dispersions); or equivalently, when the elements of weights are positive integers w_i , that each response y_i is the mean of w_i unit-weight observations.

The default estimator for Degrees of Freedom is the Kramer and Sugiyama's one which only works for classical plsR models. For these models, Information criteria are computed accordingly to these estimations. Naive Degrees of Freedom and Information Criteria are also provided for comparison purposes. For more details, see N. Kraemer and M. Sugiyama. (2011). The Degrees of Freedom of Partial Least Squares Regression. *Journal of the American Statistical Association*, 106(494), 697-705, 2011.

Value

Depends on the model that was used to fit the model. You can generally at least find these items.

nr	Number of observations
nc	Number of predictors
nt	Number of requested components
ww	raw weights (before L2-normalization)
wwnorm	L2 normed weights (to be used with deflated matrices of predictor variables)
wwetoile	modified weights (to be used with original matrix of predictor variables)
tt	PLS components
pp	loadings of the predictor variables
Coeffc	coefficients of the PLS components
uscores	scores of the response variable
YChapeau	predicted response values for the dataX set
residYChapeau	residuals of the deflated response on the standardized scale
RepY	scaled response vector
na.miss.Y	is there any NA value in the response vector
YNA	indicator vector of missing values in RepY
residY	deflated scaled response vector
ExpliX	scaled matrix of predictors
na.miss.X	is there any NA value in the predictor matrix
XXNA	indicator of non-NA values in the predictor matrix
residXX	deflated predictor matrix
PredictY	response values with NA replaced with 0
RSS	residual sum of squares (original scale)
RSSresidY	residual sum of squares (scaled scale)
R2residY	R2 coefficient value on the standardized scale
R2	R2 coefficient value on the original scale
press.ind	individual PRESS value for each observation (scaled scale)
press.tot	total PRESS value for all observations (scaled scale)
Q2cum	cumulated Q2 (standardized scale)
family	glm family used to fit PLSGLR model
ttPredictY	PLS components for the dataset on which prediction was requested
typeVC	type of leave one out cross-validation used
dataX	predictor values
dataY	response values
weights	weights of the observations

fit_backend	backend used for repeated non-ordinal score-space GLM fits
computed_nt	number of components that were computed
AIC	AIC vs number of components
BIC	BIC vs number of components
Coeffsmodel_vals	
ChisqPearson	
CoeffCFull	matrix of the coefficients of the predictors
CoeffConstante	value of the intercept (scaled scale)
Std.Coeffs	Vector of standardized regression coefficients
Coeffs	Vector of regression coefficients (used with the original data scale)
Yresidus	residuals of the PLS model
residusY	residuals of the deflated response on the standardized scale
InfCrit	table of Information Criteria:
	AIC AIC vs number of components
	BIC BIC vs number of components
	MissClassed Number of miss classed results
	Chi2_Pearson_Y Q2 value (standardized scale)
	RSS residual sum of squares (original scale)
	R2 R2 coefficient value on the original scale
	R2residY R2 coefficient value on the standardized scale
	RSSresidY residual sum of squares (scaled scale)
Std.ValsPredictY	predicted response values for supplementary dataset (standardized scale)
ValsPredictY	predicted response values for supplementary dataset (original scale)
Std.XChapeau	estimated values for missing values in the predictor matrix (standardized scale)
FinalModel	final GLR model on the PLS components
XXwotNA	predictor matrix with missing values replaced with 0
call	call
AIC.std	AIC.std vs number of components (AIC computed for the standardized model)

Note

Use `cv.plsRglm` to cross-validate the `plsRglm` models and `bootplsglm` to bootstrap them.

Author(s)

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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frederic Bertrand (2010). Comparaison de la regression PLS et de la regression logistique PLS : application aux donnees d'allelotypage. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

See also [plsR](#).

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

modplsglm <- plsRglm(yCornell,XCornell,10,modele="pls-glm-gaussian")

#To retrieve the final GLR model on the PLS components
finalmod <- modplsglm$FinalModel
#It is a glm object.
plot(finalmod)

#Cross validation
cv.modplsglm<-cv.plsRglm(Y~.,data=Cornell,6,NK=100,modele="pls-glm-gaussian", verbose=FALSE)
res.cv.modplsglm<-cvtable(summary(cv.modplsglm))
plot(res.cv.modplsglm)

#If no model specified, classic PLSR model
modpls <- plsRglm(Y~.,data=Cornell,6)
modpls
modpls$tt
modpls$uscores
modpls$pp
modpls$Coeffs

#rm(list=c("XCornell", "yCornell", modpls, cv.modplsglm, res.cv.modplsglm))

data(aze_compl)
Xaze_compl<-aze_compl[,2:34]
yaze_compl<-aze_compl$y
plsRglm(yaze_compl,Xaze_compl,nt=10,modele="pls",MClassed=TRUE, verbose=FALSE)$InfCrit
modpls <- plsRglm(yaze_compl,Xaze_compl,nt=10,modele="pls-glm-logistic",
MClassed=TRUE,pvals.expli=TRUE, verbose=FALSE)
modpls
colSums(modpls$pvalstep)
modpls$Coeffsmodel_vals

plot(plsRglm(yaze_compl,Xaze_compl,4,modele="pls-glm-logistic")$FinalModel)
plsRglm(yaze_compl[-c(99,72)],Xaze_compl[-c(99,72)],,4,
```

```

modele="pls-glm-logistic",pvals.expli=TRUE)$pvalstep
plot(plsRglm(yaze_compl[-c(99,72)],Xaze_compl[-c(99,72)],,4,
modele="pls-glm-logistic",pvals.expli=TRUE)$FinalModel)
rm(list=c("Xaze_compl","yaze_compl","modpls"))

data(bordeaux)
Xbordeaux<-bordeaux[,1:4]
ybordeaux<-factor(bordeaux$Quality,ordered=TRUE)
modpls <- plsRglm(ybordeaux,Xbordeaux,10,modele="pls-glm-polr",pvals.expli=TRUE)
modpls
colSums(modpls$pvalstep)

XbordeauxNA<-Xbordeaux
XbordeauxNA[1,1] <- NA
modplsNA <- plsRglm(ybordeaux,XbordeauxNA,10,modele="pls-glm-polr",pvals.expli=TRUE)
modpls
colSums(modpls$pvalstep)
rm(list=c("Xbordeaux","XbordeauxNA","ybordeaux","modplsNA"))

data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
modpls1 <- plsRglm(ypine,Xpine,1)
modpls1$Std.Coeffs
modpls1$Coeffs
modpls4 <- plsRglm(ypine,Xpine,4)
modpls4$Std.Coeffs
modpls4$Coeffs
modpls4$PredictY[1,]
plsRglm(ypine,Xpine,4,dataPredictY=Xpine[1,])$PredictY[1,]

XpineNAX21 <- Xpine
XpineNAX21[1,2] <- NA
modpls4NA <- plsRglm(ypine,XpineNAX21,4)
modpls4NA$Std.Coeffs
modpls4NA$YChapeau[1,]
modpls4$YChapeau[1,]
modpls4NA$CoeffC
plsRglm(ypine,XpineNAX21,4,EstimXNA=TRUE)$XChapeau
plsRglm(ypine,XpineNAX21,4,EstimXNA=TRUE)$XChapeauNA

# compare pls-glm-gaussian with classic plsR
modpls4 <- plsRglm(ypine,Xpine,4,modele="pls-glm-gaussian")
cbind(modpls4$Std.Coeffs,modpls4$Std.Coeffs)

# without missing data
cbind(ypine,modpls4$ValsPredictY,modpls4$ValsPredictY)

# with missing data
modpls4NA <- plsRglm(ypine,XpineNAX21,4,modele="pls-glm-gaussian")

```

```

cbind((ypine), modpls4NA$ValsPredictY, modplsglm4NA$ValsPredictY)
rm(list=c("Xpine", "ypine", "modpls4", "modpls4NA", "modplsglm4", "modplsglm4NA"))

data(fowlkes)
Xfowlkes <- fowlkes[,2:13]
yfowlkes <- fowlkes[,1]
modpls <- plsRglm(yfowlkes, Xfowlkes, 4, modele="pls-glm-logistic", pvals.expli=TRUE)
modpls
colSums(modpls$pvalstep)
rm(list=c("Xfowlkes", "yfowlkes", "modpls"))

if(require(chemometrics)){
data(hyptis)
hyptis <- factor(hyptis$Group, ordered=TRUE)
Xhyptis <- as.data.frame(hyptis[,c(1:6)])
options(contrasts = c("contr.treatment", "contr.poly"))
modpls2 <- plsRglm(hyptis, Xhyptis, 6, modele="pls-glm-polr")
modpls2$Coeffsmodel_vals
modpls2$InfCrit
modpls2$Coeffs
modpls2$Std.Coeffs

table(hyptis, predict(modpls2$FinalModel, type="class"))
rm(list=c("hyptis", "Xhyptis", "modpls2"))
}

dimX <- 24
Astar <- 6
dataAstar6 <- t(replicate(250, simul_data_UniYX(dimX, Astar)))
ysimbin1 <- dicho(dataAstar6)[,1]
Xsimbin1 <- dicho(dataAstar6)[,2:(dimX+1)]
modplsglm <- plsRglm(ysimbin1, Xsimbin1, 10, modele="pls-glm-logistic")
modplsglm

simbin=data.frame(dicho(dataAstar6))
cv.modplsglm <- suppressWarnings(cv.plsRglm(Y~, data=simbin, nt=10,
modele="pls-glm-logistic", NK=100, verbose=FALSE))
res.cv.modplsglm <- cvtable(summary(cv.modplsglm, MClassed=TRUE,
verbose=FALSE))
plot(res.cv.modplsglm) #defaults to type="CVMC"

rm(list=c("dimX", "Astar", "dataAstar6", "ysimbin1", "Xsimbin1", "modplsglm", "cv.modplsglm",
"res.cv.modplsglm"))

```

Description

plsRmulti() implements an experimental complete-case linear PLS2 fit for multivariate numeric responses. It is intentionally separate from [plsR](#) so the current PLS1 API remains unchanged.

Usage

```
plsRmulti(object, ...)  
  
## Default S3 method:  
plsRmultiModel(  
  object,  
  dataX,  
  nt = 2,  
  limQ2set = 0.0975,  
  dataPredictY,  
  modele = "pls",  
  family = NULL,  
  typeVC = "none",  
  EstimXNA = FALSE,  
  scaleX = TRUE,  
  scaleY = NULL,  
  pvals.expli = FALSE,  
  alpha.pvals.expli = 0.05,  
  MClassed = FALSE,  
  tol_Xi = 10^(-12),  
  weights,  
  sparse = FALSE,  
  sparseStop = FALSE,  
  naive = FALSE,  
  verbose = TRUE,  
  ...  
)  
  
## S3 method for class 'formula'  
plsRmultiModel(  
  object,  
  data,  
  nt = 2,  
  limQ2set = 0.0975,  
  modele = "pls",  
  family = NULL,  
  typeVC = "none",  
  EstimXNA = FALSE,  
  scaleX = TRUE,  
  scaleY = NULL,  
  pvals.expli = FALSE,  
  alpha.pvals.expli = 0.05,  
  MClassed = FALSE,
```

```

    tol_Xi = 10^(-12),
    weights,
    subset,
    contrasts = NULL,
    sparse = FALSE,
    sparseStop = FALSE,
    naive = FALSE,
    verbose = TRUE,
    ...
)

```

Arguments

object	For the default method, a numeric multivariate response matrix or data frame with at least two columns. For the formula method, a formula of the form <code>cbind(y1, y2, ...) ~ ..</code>
...	Not used. Extra arguments are rejected in this experimental release.
dataX	Numeric predictor matrix or data frame.
nt	Number of components to extract.
limQ2set	Kept for interface compatibility. Not supported by <code>plsRmulti</code> .
dataPredictY	Kept for interface compatibility. Not supported by <code>plsRmulti</code> ; fit first and then use <code>predict</code> .
modele	Only "pls" is supported.
family	Not supported in this experimental release.
typeVC	Only "none" is supported.
EstimXNA	Not supported in this experimental release.
scaleX	Should predictors be scaled?
scaleY	Should responses be scaled? Defaults to TRUE.
pvals.expli	Not supported in this experimental release.
alpha.pvals.expli	Not supported in this experimental release.
MClassed	Not supported in this experimental release.
tol_Xi	Tolerance used for degeneracy checks during component extraction.
weights	Not supported in this experimental release.
sparse	Not supported in this experimental release.
sparseStop	Not supported in this experimental release.
naive	Not supported in this experimental release.
verbose	Should informational messages be displayed?
data	An optional data frame for the formula method.
subset	An optional subset for the formula method.
contrasts	Optional contrasts for the formula method.

Details

This experimental release supports complete-case linear PLS2 fitting, prediction, repeated k-fold cross-validation via `cv.plsRmulti`, and bootstrap resampling via `bootpls`. It still does not support missing values, weights, sparse extraction, classification diagnostics, or GLM families.

Value

An object of class "plsRmultiModel" with multivariate analogues of the linear plsR outputs, including the extracted scores `tt`, X loadings `pp`, response score coefficients `CoeffC`, coefficient matrix `Coeffs`, intercept vector `CoeffConstante`, scaled response matrix `RepY`, and fitted response matrices `YChapeau`, `Std.ValsPredictY`, and `ValsPredictY`.

See Also

[predict.plsRmultiModel](#), [cv.plsRmulti](#), [bootpls](#), [plsR](#)

Examples

```
set.seed(123)
X <- matrix(rnorm(60 * 4), ncol = 4)
Y <- cbind(
  y1 = X[, 1] - 0.5 * X[, 2] + rnorm(60, sd = 0.1),
  y2 = 0.3 * X[, 2] + X[, 3] + rnorm(60, sd = 0.1)
)

fit <- plsRmulti(Y, X, nt = 2, verbose = FALSE)
fit
head(predict(fit))
```

PLS_glm_wvc

Light version of PLS_glm for cross validation purposes

Description

Light version of PLS_glm for cross validation purposes either on complete or incomplete datasets.

Usage

```
PLS_glm_wvc(
  dataY,
  dataX,
  nt = 2,
  dataPredictY = dataX,
  modele = "pls",
  family = NULL,
  scaleX = TRUE,
  scaleY = NULL,
  keepcoeffs = FALSE,
```

```

keepstd.coeffs = FALSE,
tol_Xi = 10^(-12),
weights,
method = "logistic",
fit_backend = "stats",
verbose = TRUE
)

```

Arguments

dataY	response (training) dataset
dataX	predictor(s) (training) dataset
nt	number of components to be extracted
dataPredictY	predictor(s) (testing) dataset
modele	name of the PLS glm model to be fitted ("pls", "pls-glm-Gamma", "pls-glm-gaussian", "pls-glm-inverse.gaussian", "pls-glm-logistic", "pls-glm-poisson", "pls-glm-polr"). Use "modele=pls-glm-family" to enable the family option.
family	a description of the error distribution and link function to be used in the model. This can be a character string naming a family function, a family function or the result of a call to a family function. (See family for details of family functions.) To use the family option, please set modele="pls-glm-family". User defined families can also be defined. See details.
scaleX	scale the predictor(s) : must be set to TRUE for modele="pls" and should be for glms pls.
scaleY	scale the response : Yes/No. Ignored since non always possible for glm responses.
keepcoeffs	whether the coefficients of the linear fit on link scale of unstandardized eXplanatory variables should be returned or not.
keepstd.coeffs	whether the coefficients of the linear fit on link scale of standardized eXplanatory variables should be returned or not.
tol_Xi	minimal value for Norm2(Xi) and $\det(pp' \times pp)$ if there is any missing value in the dataX. It defaults to 10^{-12}
weights	an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
method	logistic, probit, complementary log-log or cauchit (corresponding to a Cauchy latent variable).
fit_backend	backend used for repeated non-ordinal score-space GLM fits. Use "stats" for the compatibility path or "fastglm" to opt into the accelerated complete-data backend. Unsupported cases fall back to "stats" with a warning.
verbose	should info messages be displayed ?

Details

This function is called by [PLS_glm_kfoldcv_formula](#) in order to perform cross-validation either on complete or incomplete datasets.

There are seven different predefined models with predefined link functions available :

list("\pls\") ordinary pls models

list("\pls-glm-Gamma\") glm gaussian with inverse link pls models

list("\pls-glm-gaussian\") glm gaussian with identity link pls models

list("\pls-glm-inverse-gamma\") glm binomial with square inverse link pls models

list("\pls-glm-logistic\") glm binomial with logit link pls models

list("\pls-glm-poisson\") glm poisson with log link pls models

list("\pls-glm-polr\") glm polr with logit link pls models

Using the "family=" option and setting "modele=pls-glm-family" allows changing the family and link function the same way as for the [glm](#) function. As a consequence user-specified families can also be used.

The accepts the links (as names) identity, log and inverse.

list("gaussian") accepts the links (as names) identity, log and inverse.

family accepts the links (as names) identity, log and inverse.

The accepts the links logit, probit, cauchit, (corresponding to logistic, normal and Cauchy CDFs respectively) log and cloglog (complementary log-log).

list("binomial") accepts the links logit, probit, cauchit, (corresponding to logistic, normal and Cauchy CDFs respectively) log and cloglog (complementary log-log).

family accepts the links logit, probit, cauchit, (corresponding to logistic, normal and Cauchy CDFs respectively) log and cloglog (complementary log-log).

The accepts the links inverse, identity and log.

list("Gamma") accepts the links inverse, identity and log.

family accepts the links inverse, identity and log.

The accepts the links log, identity, and sqrt.

list("poisson") accepts the links log, identity, and sqrt.

family accepts the links log, identity, and sqrt.

The accepts the links $1/\mu^2$, inverse, identity and log.

list("inverse.gaussian") accepts the links $1/\mu^2$, inverse, identity and log.

family accepts the links $1/\mu^2$, inverse, identity and log.

The accepts the links logit, probit, cloglog, identity, inverse, log, $1/\mu^2$ and sqrt.

list("quasi") accepts the links logit, probit, cloglog, identity, inverse, log, $1/\mu^2$ and sqrt.

family accepts the links logit, probit, cloglog, identity, inverse, log, $1/\mu^2$ and sqrt.

The function can be used to create a power link function.

list("power") can be used to create a power link function.

Non-NULL weights can be used to indicate that different observations have different dispersions (with the values in weights being inversely proportional to the dispersions); or equivalently, when the elements of weights are positive integers w_i , that each response y_i is the mean of w_i unit-weight observations.

Value

`valsPredict` `nrow(dataPredictY) * nt` matrix of the predicted values
`list("coeffs")` If the coefficients of the explanatory variables were requested:
 i.e. `keepcoeffs=TRUE`.
 `ncol(dataX) * 1` matrix of the coefficients of the the explanatory variables

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[PLS_glm](#) for more detailed results, [PLS_glm_kfoldcv](#) for cross-validating models and [PLS_lm_wvc](#) for the same function dedicated to plsR models

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
PLS_glm_wvc(dataY=yCornell,dataX=XCornell,nt=3,modele="pls-glm-gaussian",
dataPredictY=XCornell[,1,])
PLS_glm_wvc(dataY=yCornell,dataX=XCornell,nt=3,modele="pls-glm-family",
family=gaussian(),dataPredictY=XCornell[,1,], verbose=FALSE)
PLS_glm_wvc(dataY=yCornell[-1],dataX=XCornell[-1,],nt=3,modele="pls-glm-gaussian",
dataPredictY=XCornell[,1,], verbose=FALSE)
PLS_glm_wvc(dataY=yCornell[-1],dataX=XCornell[-1,],nt=3,modele="pls-glm-family",
family=gaussian(),dataPredictY=XCornell[,1,], verbose=FALSE)
rm("XCornell","yCornell")

## With an incomplete dataset (X[1,2] is NA)
data(pine)
ypine <- pine[,11]
data(XpineNAX21)
PLS_glm_wvc(dataY=ypine,dataX=XpineNAX21,nt=10,modele="pls-glm-gaussian")
```

```

rm("XpineNAX21", "ypine")

data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
PLS_glm_wvc(ypine,Xpine,10,modele="pls", verbose=FALSE)
PLS_glm_wvc(ypine,Xpine,10,modele="pls-glm-Gamma", verbose=FALSE)
PLS_glm_wvc(ypine,Xpine,10,modele="pls-glm-family", family=Gamma(), verbose=FALSE)
PLS_glm_wvc(ypine,Xpine,10,modele="pls-glm-gaussian", verbose=FALSE)
PLS_glm_wvc(ypine,Xpine,10,modele="pls-glm-family", family=gaussian(log), verbose=FALSE)
PLS_glm_wvc(round(ypine),Xpine,10,modele="pls-glm-poisson", verbose=FALSE)
PLS_glm_wvc(round(ypine),Xpine,10,modele="pls-glm-family", family=poisson(log), verbose=FALSE)
rm(list=c("pine", "ypine", "Xpine"))

data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
PLS_glm_wvc(yCornell,XCornell,10,modele="pls-glm-inverse.gaussian", verbose=FALSE)
PLS_glm_wvc(yCornell,XCornell,10,modele="pls-glm-family",
family=inverse.gaussian(), verbose=FALSE)
rm(list=c("XCornell", "yCornell"))

data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
PLS_glm_wvc(dataY=yCornell, dataX=XCornell, nt=3, modele="pls-glm-gaussian",
dataPredictY=XCornell[1,], verbose=FALSE)
PLS_glm_wvc(dataY=yCornell[-1], dataX=XCornell[-1,], nt=3, modele="pls-glm-gaussian",
dataPredictY=XCornell[1,], verbose=FALSE)
rm("XCornell", "yCornell")

data(aze_compl)
Xaze_compl<-aze_compl[,2:34]
yaze_compl<-aze_compl$y
PLS_glm(yaze_compl, Xaze_compl, 10, modele="pls-glm-logistic", typeVC="none", verbose=FALSE)$InfCrit
PLS_glm_wvc(yaze_compl, Xaze_compl, 10, modele="pls-glm-logistic", keepcoeffs=TRUE, verbose=FALSE)
rm("Xaze_compl", "yaze_compl")

```

PLS_lm_wvc

Light version of PLS_lm for cross validation purposes

Description

Light version of PLS_lm for cross validation purposes either on complete or incomplete datasets.

Usage

```

PLS_lm_wvc(
  dataY,
  dataX,
  nt = 2,
  dataPredictY = dataX,
  modele = "pls",
  scaleX = TRUE,
  scaleY = NULL,
  keepcoeffs = FALSE,
  keepstd.coeffs = FALSE,
  tol_Xi = 10^(-12),
  weights,
  verbose = TRUE
)

```

Arguments

dataY	response (training) dataset
dataX	predictor(s) (training) dataset
nt	number of components to be extracted
dataPredictY	predictor(s) (testing) dataset
modele	name of the PLS model to be fitted, only ("pls" available for this fonction.
scaleX	scale the predictor(s) : must be set to TRUE for modele="pls" and should be for glms pls.
scaleY	scale the response : Yes/No. Ignored since non always possible for glm responses.
keepcoeffs	whether the coefficients of unstandardized eXplanatory variables should be returned or not.
keepstd.coeffs	whether the coefficients of standardized eXplanatory variables should be returned or not.
tol_Xi	minimal value for Norm2(Xi) and $\det(pp' \times pp)$ if there is any missing value in the dataX. It defaults to 10^{-12}
weights	an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
verbose	should info messages be displayed ?

Details

This function is called by [PLS_lm_kfoldcv](#) in order to perform cross-validation either on complete or incomplete datasets.

Non-NULL weights can be used to indicate that different observations have different dispersions (with the values in weights being inversely proportional to the dispersions); or equivalently, when the elements of weights are positive integers w_i , that each response y_i is the mean of w_i unit-weight observations.

Value

valsPredict nrow(dataPredictY) * nt matrix of the predicted values

list("coeffs") If the coefficients of the eXplanatory variables were requested:
i.e. keepcoeffs=TRUE.
ncol(dataX) * 1 matrix of the coefficients of the the eXplanatory variables

Note

Use [PLS_lm_kfoldcv](#) for a wrapper in view of cross-validation.

Author(s)

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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[PLS_lm](#) for more detailed results, [PLS_lm_kfoldcv](#) for cross-validating models and [PLS_glm_wvc](#) for the same function dedicated to plsRglm models

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
PLS_lm_wvc(dataY=yCornell,dataX=XCornell,nt=3,dataPredictY=XCornell[1,])
PLS_lm_wvc(dataY=yCornell[-c(1,2)],dataX=XCornell[-c(1,2),],nt=3,dataPredictY=XCornell[c(1,2),],
verbose=FALSE)
PLS_lm_wvc(dataY=yCornell[-c(1,2)],dataX=XCornell[-c(1,2),],nt=3,dataPredictY=XCornell[c(1,2),],
keepcoeffs=TRUE, verbose=FALSE)
rm("XCornell","yCornell")

## With an incomplete dataset (X[1,2] is NA)
data(pine)
ypine <- pine[,11]
data(XpineNAX21)
PLS_lm_wvc(dataY=ypine[-1],dataX=XpineNAX21[-1,],nt=3, verbose=FALSE)
PLS_lm_wvc(dataY=ypine[-1],dataX=XpineNAX21[-1,],nt=3,dataPredictY=XpineNAX21[1,], verbose=FALSE)
PLS_lm_wvc(dataY=ypine[-2],dataX=XpineNAX21[-2,],nt=3,dataPredictY=XpineNAX21[2,], verbose=FALSE)
PLS_lm_wvc(dataY=ypine,dataX=XpineNAX21,nt=3, verbose=FALSE)
rm("ypine")
```

predict.plsRglmmodel *Print method for plsRglm models*

Description

This function provides a predict method for the class "plsRglmmodel"

Usage

```
## S3 method for class 'plsRglmmodel'
predict(
  object,
  newdata,
  comps = object$computed_nt,
  type = c("link", "response", "terms", "scores", "class", "probs"),
  se.fit = FALSE,
  weights,
  dispersion = NULL,
  methodNA = "adaptative",
  verbose = TRUE,
  ...
)
```

Arguments

object	An object of the class "plsRmodel".
newdata	An optional data frame in which to look for variables with which to predict. If omitted, the fitted values are used.
comps	A value with a single value of component to use for prediction.
type	Type of predicted value. Available choices are the glms ones ("link", "response", "terms"), the polr ones ("class", "probs") or the scores ("scores").
se.fit	If TRUE, pointwise standard errors are produced for the predictions using the Cox model.
weights	Vector of case weights. If weights is a vector of integers, then the estimated coefficients are equivalent to estimating the model from data with the individual cases replicated as many times as indicated by weights.
dispersion	the dispersion of the GLM fit to be assumed in computing the standard errors. If omitted, that returned by summary applied to the object is used.
methodNA	Selects the way of predicting the response or the scores of the new data. For complete rows, without any missing value, there are two different ways of computing the prediction. As a consequence, for mixed datasets, with complete and incomplete rows, there are two ways of computing prediction : either predicts any row as if there were missing values in it (missingdata) or selects the prediction method accordingly to the completeness of the row (adaptative).
verbose	should info messages be displayed ?
...	Arguments to be passed on to stats::glm and plsRglm::plsRglm.

Value

When type is "response", a matrix of predicted response values is returned.
When type is "scores", a score matrix is returned.

Author(s)

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References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

See Also [predict.glm](#)

Examples

```
data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
data(pine_sup)
Xpine_sup<-pine_sup[,1:10]
Xpine_supNA<-Xpine_sup
Xpine_supNA[1,1]<-NA

modpls=plsRglm(object=ypine,dataX=Xpine,nt=6,modele="pls-glm-family",family="gaussian",
verbose=FALSE)
modplsform=plsRglm(x11~.,data=pine,nt=6,modele="pls-glm-family",family="gaussian",verbose=FALSE)
modpls2=plsRglm(object=ypine,dataX=Xpine,nt=6,modele="pls-glm-family",
dataPredictY=Xpine_sup,family="gaussian",verbose=FALSE)
modpls2NA=plsRglm(object=ypine,dataX=Xpine,nt=6,modele="pls-glm-family",
dataPredictY=Xpine_supNA,family="gaussian",verbose=FALSE)

#Identical to predict(modpls,type="link") or modpls$Std.ValsPredictY
cbind(modpls$Std.ValsPredictY,modplsform$Std.ValsPredictY,
predict(modpls),predict(modplsform))

#Identical to predict(modpls,type="response") or modpls$ValsPredictY
cbind(modpls$ValsPredictY,modplsform$ValsPredictY,
predict(modpls,type="response"),predict(modplsform,type="response"))

#Identical to modpls$ttPredictY
predict(modpls,type="scores")
predict(modplsform,type="scores")
```

```

#Identical to modpls2$ValsPredictY
cbind(predict(modpls,newdata=Xpine_sup,type="response"),
predict(modplsform,newdata=Xpine_sup,type="response"))

#Select the number of components to use to derive the prediction
predict(modpls,newdata=Xpine_sup,type="response",comps=1)
predict(modpls,newdata=Xpine_sup,type="response",comps=3)
predict(modpls,newdata=Xpine_sup,type="response",comps=6)
try(predict(modpls,newdata=Xpine_sup,type="response",comps=8))

#Identical to modpls2$ttValsPredictY
predict(modpls,newdata=Xpine_sup,type="scores")

#Select the number of components in the scores matrix
predict(modpls,newdata=Xpine_sup,type="scores",comps=1)
predict(modpls,newdata=Xpine_sup,type="scores",comps=3)
predict(modpls,newdata=Xpine_sup,type="scores",comps=6)
try(predict(modpls,newdata=Xpine_sup,type="scores",comps=8))

#Identical to modpls2NA$ValsPredictY
predict(modpls,newdata=Xpine_supNA,type="response",methodNA="missingdata")

cbind(predict(modpls,newdata=Xpine_supNA,type="response"),
predict(modplsform,newdata=Xpine_supNA,type="response"))

predict(modpls,newdata=Xpine_supNA,type="response",comps=1)
predict(modpls,newdata=Xpine_supNA,type="response",comps=3)
predict(modpls,newdata=Xpine_supNA,type="response",comps=6)
try(predict(modpls,newdata=Xpine_supNA,type="response",comps=8))

#Identical to modpls2NA$ttPredictY
predict(modpls,newdata=Xpine_supNA,type="scores",methodNA="missingdata")
predict(modplsform,newdata=Xpine_supNA,type="scores",methodNA="missingdata")

predict(modpls,newdata=Xpine_supNA,type="scores")
predict(modplsform,newdata=Xpine_supNA,type="scores")
predict(modpls,newdata=Xpine_supNA,type="scores",comps=1)
predict(modpls,newdata=Xpine_supNA,type="scores",comps=3)
predict(modpls,newdata=Xpine_supNA,type="scores",comps=6)
try(predict(modpls,newdata=Xpine_supNA,type="scores",comps=8))

```

predict.plsRmodel

Print method for plsR models

Description

This function provides a predict method for the class "plsRmodel"

Usage

```
## S3 method for class 'plsRmodel'
predict(
  object,
  newdata,
  comps = object$computed_nt,
  type = c("response", "scores"),
  weights,
  methodNA = "adaptative",
  verbose = TRUE,
  ...
)
```

Arguments

object	An object of the class "plsRmodel".
newdata	An optional data frame in which to look for variables with which to predict. If omitted, the fitted values are used.
comps	A value with a single value of component to use for prediction.
type	Type of predicted value. Available choices are the response values ("response") or the scores ("scores").
weights	Vector of case weights. If weights is a vector of integers, then the estimated coefficients are equivalent to estimating the model from data with the individual cases replicated as many times as indicated by weights.
methodNA	Selects the way of predicting the response or the scores of the new data. For complete rows, without any missing value, there are two different ways of computing the prediction. As a consequence, for mixed datasets, with complete and incomplete rows, there are two ways of computing prediction : either predicts any row as if there were missing values in it (missingdata) or selects the prediction method accordingly to the completeness of the row (adaptative).
verbose	should info messages be displayed ?
...	Arguments to be passed on to plsRglm::plsR.

Value

When type is "response", a matrix of predicted response values is returned.
When type is "scores", a score matrix is returned.

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

Examples

```

data(pine)
Xpine<-pine[,1:10]
ypine<-pine[,11]
data(pine_sup)
Xpine_sup<-pine_sup[,1:10]
Xpine_supNA<-Xpine_sup
Xpine_supNA[1,1]<-NA

modpls=plsR(object=ypine,dataX=Xpine,nt=6,modele="pls", verbose=FALSE)
modplsform=plsR(x11~.,data=pine,nt=6,modele="pls", verbose=FALSE)
modpls2=plsR(object=ypine,dataX=Xpine,nt=6,modele="pls",dataPredictY=Xpine_sup, verbose=FALSE)
modpls2NA=plsR(object=ypine,dataX=Xpine,nt=6,modele="pls",dataPredictY=Xpine_supNA, verbose=FALSE)

#Identical to predict(modpls,type="response") or modpls$ValsPredictY
cbind(predict(modpls),predict(modplsform))

#Identical to modpls$ttPredictY
predict(modpls,type="scores")
predict(modplsform,type="scores")

#Identical to modpls2$ValsPredictY
cbind(predict(modpls,newdata=Xpine_sup,type="response"),
predict(modplsform,newdata=Xpine_sup,type="response"))

#Select the number of components to use to derive the prediction
predict(modpls,newdata=Xpine_sup,type="response",comps=1)
predict(modpls,newdata=Xpine_sup,type="response",comps=3)
predict(modpls,newdata=Xpine_sup,type="response",comps=6)
try(predict(modpls,newdata=Xpine_sup,type="response",comps=8))

#Identical to modpls2$ttValsPredictY
predict(modpls,newdata=Xpine_sup,type="scores")

#Select the number of components in the scores matrix
predict(modpls,newdata=Xpine_sup,type="scores",comps=1)
predict(modpls,newdata=Xpine_sup,type="scores",comps=3)
predict(modpls,newdata=Xpine_sup,type="scores",comps=6)
try(predict(modpls,newdata=Xpine_sup,type="scores",comps=8))

#Identical to modpls2NA$ValsPredictY
predict(modpls,newdata=Xpine_supNA,type="response",methodNA="missingdata")

cbind(predict(modpls,newdata=Xpine_supNA,type="response"),

```

```

predict(modplsform,newdata=Xpine_supNA,type="response"))

predict(modpls,newdata=Xpine_supNA,type="response",comps=1)
predict(modpls,newdata=Xpine_supNA,type="response",comps=3)
predict(modpls,newdata=Xpine_supNA,type="response",comps=6)
try(predict(modpls,newdata=Xpine_supNA,type="response",comps=8))

#Identical to modpls2NA$ttPredictY
predict(modpls,newdata=Xpine_supNA,type="scores",methodNA="missingdata")
predict(modplsform,newdata=Xpine_supNA,type="scores",methodNA="missingdata")

predict(modpls,newdata=Xpine_supNA,type="scores")
predict(modplsform,newdata=Xpine_supNA,type="scores")
predict(modpls,newdata=Xpine_supNA,type="scores",comps=1)
predict(modpls,newdata=Xpine_supNA,type="scores",comps=3)
predict(modpls,newdata=Xpine_supNA,type="scores",comps=6)
try(predict(modpls,newdata=Xpine_supNA,type="scores",comps=8))

```

predict.plsRmultiModel

Predict method for experimental plsRmulti models

Description

Prediction method for "plsRmultiModel" objects.

Usage

```

## S3 method for class 'plsRmultiModel'
predict(
  object,
  newdata,
  comps = object$computed_nt,
  type = c("response", "scores"),
  verbose = TRUE,
  ...
)

```

Arguments

object	An object of class "plsRmultiModel".
newdata	Optional predictor matrix or data frame. For formula-fitted models, a data frame with the predictor variables used at fit time.
comps	Number of extracted components to use.
type	Either "response" or "scores".
verbose	Should informational messages be displayed?
...	Not used.

Value

If `type = "response"`, a matrix of predicted responses. If `type = "scores"`, a matrix of latent score coordinates.

See Also

[plsRmulti](#)

Examples

```
set.seed(123)
X <- matrix(rnorm(40 * 3), ncol = 3)
Y <- cbind(
  y1 = X[, 1] + rnorm(40, sd = 0.1),
  y2 = X[, 2] - X[, 3] + rnorm(40, sd = 0.1)
)
fit <- plsRmulti(Y, X, nt = 2, verbose = FALSE)

predict(fit, type = "response")
predict(fit, type = "scores")
```

```
print.coef.plsRglmmodel
```

Print method for plsRglm models

Description

This function provides a print method for the class `"coef.plsRglmmodel"`

Usage

```
## S3 method for class 'coef.plsRglmmodel'
print(x, ...)
```

Arguments

<code>x</code>	an object of the class <code>"coef.plsRglmmodel"</code>
<code>...</code>	not used

Value

NULL

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modplsglm <- plsRglm(yCornell,XCornell,3,modele="pls-glm-family",family=gaussian())
class(modplsglm)
print(coef(modplsglm))
rm(list=c("XCornell","yCornell","modplsglm"))
```

print.coef.plsRmodel *Print method for plsR models*

Description

This function provides a print method for the class "coef.plsRmodel"

Usage

```
## S3 method for class 'coef.plsRmodel'
print(x, ...)
```

Arguments

x	an object of the class "coef.plsRmodel"
...	not used

Value

NULL

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsRglm(yCornell,XCornell,3,modele="pls")
class(modpls)
print(coef(modpls))
rm(list=c("XCornell","yCornell","modpls"))
```

print.cv.plsRglmmodel *Print method for plsRglm models*

Description

This function provides a print method for the class "cv.plsRglmmodel"

Usage

```
## S3 method for class 'cv.plsRglmmodel'
print(x, ...)
```

Arguments

x	an object of the class "cv.plsRglmmodel"
...	not used

Value

NULL

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparaison de la régression PLS et de la régression logistique PLS : application aux données d'allélotypage. *Journal de la Société Française de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
print(cv.plsRglm(object=yCornell,dataX=XCornell,nt=10,NK=1,
modele="pls-glm-family",family=gaussian(), verbose=FALSE))
rm(list=c("XCornell","yCornell","bbb"))
```

print.cv.plsRmodel *Print method for plsR models*

Description

This function provides a print method for the class "cv.plsRmodel"

Usage

```
## S3 method for class 'cv.plsRmodel'
print(x, ...)
```

Arguments

x	an object of the class "cv.plsRmodel"
...	not used

Value

NULL

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
print(cv.plsR(object=yCornell,dataX=XCornell,nt=10,K=6, verbose=FALSE))
rm(list=c("XCornell","yCornell","bbb"))
```

print.plsRglmmodel *Print method for plsRglm models*

Description

This function provides a print method for the class "plsRglmmodel"

Usage

```
## S3 method for class 'plsRglmmodel'
print(x, ...)
```

Arguments

x	an object of the class "plsRglmmodel"
...	not used

Value

NULL

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparaison de la régression PLS et de la régression logistique PLS : application aux données d'allélotypage. *Journal de la Société Française de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modplsglm <- plsRglm(yCornell,XCornell,3,modele="pls-glm-gaussian")
class(modplsglm)
print(modplsglm)
rm(list=c("XCornell","yCornell","modplsglm"))
```

print.plsRmodel	<i>Print method for plsR models</i>
-----------------	-------------------------------------

Description

This function provides a print method for the class "plsRmodel"

Usage

```
## S3 method for class 'plsRmodel'
print(x, ...)
```

Arguments

x	an object of the class "plsRmodel"
...	not used

Value

NULL

Author(s)

Frédéric Bertrand
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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparaison de la régression PLS et de la régression logistique PLS : application aux données d'allélotypage. *Journal de la Société Française de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsRglm(yCornell,XCornell,3,modele="pls")
class(modpls)
print(modpls)
rm(list=c("XCornell","yCornell","modpls"))
```

```
print.summary.plsRglmmodel
```

Print method for summaries of plsRglm models

Description

This function provides a print method for the class "summary.plsRglmmodel"

Usage

```
## S3 method for class 'summary.plsRglmmodel'
print(x, ...)
```

Arguments

x	an object of the class "summary.plsRglmmodel"
...	not used

Value

language	call of the model
----------	-------------------

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparaison de la régression PLS et de la régression logistique PLS : application aux données d'allélotypage. *Journal de la Société Française de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#) and [summary](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modplsglm <- plsRglm(yCornell,XCornell,3,modele="pls-glm-gaussian")
class(modplsglm)
print(summary(modplsglm))
rm(list=c("XCornell","yCornell","modplsglm"))
```

```
print.summary.plsRmodel
```

Print method for summaries of plsR models

Description

This function provides a print method for the class "summary.plsRmodel"

Usage

```
## S3 method for class 'summary.plsRmodel'
print(x, ...)
```

Arguments

x	an object of the class "summary.plsRmodel"
...	not used

Value

language	call of the model
----------	-------------------

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparaison de la régression PLS et de la régression logistique PLS : application aux données d'allélotypage. *Journal de la Société Française de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[print](#) and [summary](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsRglm(yCornell,XCornell,3,modele="pls")
class(modpls)
print(summary(modpls))
rm(list=c("XCornell","yCornell","modpls"))
```

signpred

Graphical assessment of the stability of selected variables

Description

This fonctions plots, for each of the model, the

Usage

```
signpred(
  matbin,
  pred.lablenght = max(sapply(rownames(matbin), nchar)),
  labsize = 1,
  plotsize = 12
)
```

Arguments

matbin	Matrix with 0 or 1 entries. Each row per predictor and a column for every model. 0 means the predictor is not significant in the model and 1 that, on the contrary, it is significant.
pred.lablenght	Maximum length of the predictors labels. Defaults to full label length.
labsize	Size of the predictors labels.
plotsize	Global size of the graph.

Details

This function is based on the [visweb](#) function from the bipartite package.

Value

A plot window.

Author(s)

Bernd Gruber with minor modifications from Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

Vazquez, P.D., Chacoff, N.,P. and Cagnolo, L. (2009) Evaluating multiple determinants of the structure of plant-animal mutualistic networks. *Ecology*, 90:2039-2046.

See Also

See Also [visweb](#)

Examples

```
signedpred(matrix(rbinom(160,1,.2),ncol=8,dimnames=list(as.character(1:20),as.character(1:8))))
```

simul_data_complete *Data generating detailed process for multivariate plsR models*

Description

This function generates a single multivariate response value \mathbf{Y} and a vector of explanatory variables (X_1, \dots, X_{totdim}) drawn from a model with a given number of latent components.

Usage

```
simul_data_complete(totdim, ncomp)
```

Arguments

totdim	Number of columns of the X vector (from ncomp to hardware limits)
ncomp	Number of latent components in the model (from 2 to 6)

Details

This function should be combined with the replicate function to give rise to a larger dataset. The algorithm used is a part of the one described in the article of Li which is a multivariate generalization of the algorithm of Naes and Martens.

Value

simX	Vector of explanatory variables
HH	Dimension of the response Y
eta	See Li et al.
r	See Li et al.
epsilon	See Li et al.
ksi	See Li et al.
f	See Li et al.
z	See Li et al.
Y	See Li et al.

Note

The value of r depends on the value of ncomp :

ncomp	r
2	3
3	3
4	4

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

T. Naes, H. Martens, Comparison of prediction methods for multicollinear data, Commun. Stat., Simul. 14 (1985) 545-576.
 Morris, Elaine B. Martin, Model selection for partial least squares regression, Chemometrics and Intelligent Laboratory Systems 64 (2002) 79-89, doi:10.1016/S01697439(02)000515.

See Also

[simul_data_YX](#) for data simulation purpose

Examples

```
simul_data_complete(20,6)

dimX <- 6
Astar <- 2
simul_data_complete(dimX,Astar)
```

```
dimX <- 6
Astar <- 3
simul_data_complete(dimX,Astar)
```

```
dimX <- 6
Astar <- 4
simul_data_complete(dimX,Astar)
```

```
rm(list=c("dimX","Astar"))
```

simul_data_UniYX *Data generating function for univariate plsR models*

Description

This function generates a single univariate response value Y and a vector of explanatory variables (X_1, \dots, X_{totdim}) drawn from a model with a given number of latent components.

Usage

```
simul_data_UniYX(totdim, ncomp)
```

Arguments

totdim	Number of columns of the X vector (from ncomp to hardware limits)
ncomp	Number of latent components in the model (from 2 to 6)

Details

This function should be combined with the replicate function to give rise to a larger dataset. The algorithm used is a part of the one described in the article of Li which is a multivariate generalization of the algorithm of Naes and Martens.

Value

vector $(Y, X_1, \dots, X_{totdim})$

Author(s)

Frédéric Bertrand
<frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

- T. Naes, H. Martens, Comparison of prediction methods for multicollinear data, *Commun. Stat., Simul.* 14 (1985) 545-576.
- Morris, Elaine B. Martin, Model selection for partial least squares regression, *Chemometrics and Intelligent Laboratory Systems* 64 (2002) 79-89, doi:10.1016/S01697439(02)000515.

See Also

[simul_data_YX](#) and [simul_data_complete](#) for generating multivariate data

Examples

```
simul_data_UniYX(20,6)

dimX <- 6
Astar <- 2
simul_data_UniYX(dimX,Astar)
(dataAstar2 <- data.frame(t(replicate(50,simul_data_UniYX(dimX,Astar))))))
cvtable(summary(cv.plsR(Y~.,data=dataAstar2,5,NK=100, verbose=FALSE)))

dimX <- 6
Astar <- 3
simul_data_UniYX(dimX,Astar)
(dataAstar3 <- data.frame(t(replicate(50,simul_data_UniYX(dimX,Astar))))))
cvtable(summary(cv.plsR(Y~.,data=dataAstar3,5,NK=100, verbose=FALSE)))

dimX <- 6
Astar <- 4
simul_data_UniYX(dimX,Astar)
(dataAstar4 <- data.frame(t(replicate(50,simul_data_UniYX(dimX,Astar))))))
cvtable(summary(cv.plsR(Y~.,data=dataAstar4,5,NK=100, verbose=FALSE)))

rm(list=c("dimX","Astar","dataAstar2","dataAstar3","dataAstar4"))
```

simul_data_UniYX_binom

Data generating function for univariate binomial plsR models

Description

This function generates a single univariate binomial response value Y and a vector of explanatory variables (X_1, \dots, X_{totdim}) drawn from a model with a given number of latent components.

Usage

```
simul_data_UniYX_binom(totdim, ncomp, link = "logit", offset = 0)
```

Arguments

totdim	Number of columns of the X vector (from ncomp to hardware limits)
ncomp	Number of latent components in the model (from 2 to 6)
link	Character specification of the link function in the mean model (μ). Currently, "logit", "probit", "cloglog", "cauchit", "log", "loglog" are supported. Alternatively, an object of class "link-glm" can be supplied.
offset	Offset on the linear scale

Details

This function should be combined with the replicate function to give rise to a larger dataset. The algorithm used is a modification of a part of the one described in the article of Li which is a multivariate generalization of the algorithm of Naes and Martens.

Value

vector $(Y, X_1, \dots, X_{totdim})$

Author(s)

Frédéric Bertrand
 <frederic.bertrand@lecnam.net>
<https://fbertran.github.io/homepage/>

References

T. Naes, H. Martens, Comparison of prediction methods for multicollinear data, Commun. Stat., Simul. 14 (1985) 545-576.
 Morris, Elaine B. Martin, Model selection for partial least squares regression, Chemometrics and Intelligent Laboratory Systems 64 (2002), 79-89, doi:10.1016/S01697439(02)000515.

See Also

[simul_data_UniYX](#)

Examples

```
layout(matrix(1:6,nrow=2))
# logit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4)))[,1])
# probit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="probit")))[,1])
# cloglog link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="cloglog")))[,1])
# cauchit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="cauchit")))[,1])
# loglog link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="loglog")))[,1])
```

```

# log link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="log")))[,1])
layout(1)

layout(matrix(1:6,nrow=2))
# logit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,offset=5)))[,1])
# probit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="probit",offset=5)))[,1])
# cloglog link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="cloglog",offset=5)))[,1])
# cauchit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="cauchit",offset=5)))[,1])
# loglog link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="loglog",offset=5)))[,1])
# log link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="log",offset=5)))[,1])
layout(1)

layout(matrix(1:6,nrow=2))
# logit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,offset=-5)))[,1])
# probit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="probit",offset=-5)))[,1])
# cloglog link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="cloglog",offset=-5)))[,1])
# cauchit link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="cauchit",offset=-5)))[,1])
# loglog link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="loglog",offset=-5)))[,1])
# log link
hist(t(replicate(100,simul_data_UniYX_binom(4,4,link="log",offset=-5)))[,1])
layout(1)

```

simul_data_YX

Data generating function for multivariate plsR models

Description

This function generates a single multivariate response value Y and a vector of explanatory variables (X_1, \dots, X_{totdim}) drawn from a model with a given number of latent components.

Usage

```
simul_data_YX(totdim, ncomp)
```

Arguments

totdim	Number of column of the X vector (from ncomp to hardware limits)
ncomp	Number of latent components in the model (from 2 to 6)

Details

This function should be combined with the replicate function to give rise to a larger dataset. The algorithm used is a port of the one described in the article of Li which is a multivariate generalization of the algorithm of Naes and Martens.

Value

vector $(Y_1, \dots, Y_r, X_1, \dots, X_{totdim})$

Note

The value of r depends on the value of ncomp :

ncomp	r
2	3
3	3
4	4

Author(s)

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<https://fbertran.github.io/homepage/>

References

T. Naes, H. Martens, Comparison of prediction methods for multicollinear data, Commun. Stat., Simul. 14 (1985) 545-576.
 Morris, Elaine B. Martin, Model selection for partial least squares regression, Chemometrics and Intelligent Laboratory Systems 64 (2002) 79-89, doi:10.1016/S01697439(02)000515.

See Also

[simul_data_complete](#) for highlighting the simulations parameters

Examples

```
simul_data_YX(20,6)

if(require(plsdepot)){
dimX <- 6
Astar <- 2
(dataAstar2 <- t(replicate(50,simul_data_YX(dimX,Astar))))
```

```

library(plsdepot)
resAstar2 <- plsreg2(dataAstar2[,4:9],dataAstar2[,1:3],comps=5)
resAstar2$Q2
resAstar2$Q2[,4]>0.0975

dimX <- 6
Astar <- 3
(dataAstar3 <- t(replicate(50,simul_data_YX(dimX,Astar))))
library(plsdepot)
resAstar3 <- plsreg2(dataAstar3[,4:9],dataAstar3[,1:3],comps=5)
resAstar3$Q2
resAstar3$Q2[,4]>0.0975

dimX <- 6
Astar <- 4
(dataAstar4 <- t(replicate(50,simul_data_YX(dimX,Astar))))
library(plsdepot)
resAstar4 <- plsreg2(dataAstar4[,5:10],dataAstar4[,1:4],comps=5)
resAstar4$Q2
resAstar4$Q2[,5]>0.0975

rm(list=c("dimX","Astar"))
}

```

```
summary.cv.plsRglmmodel
```

Summary method for plsRglm models

Description

This function provides a summary method for the class "cv.plsRglmmodel"

Usage

```
## S3 method for class 'cv.plsRglmmodel'
summary(object, ...)
```

Arguments

object	an object of the class "cv.plsRglmmodel"
...	further arguments to be passed to or from methods.

Value

An object of class "summary.cv.plsRmodel" if model is missing or model="pls". Otherwise an object of class "summary.cv.plsRglmmodel".

Author(s)

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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[summary](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
summary(cv.plsRglm(Y~.,data=Cornell,nt=10,NK=1,
modele="pls-glm-family",family=gaussian(), verbose=FALSE))
rm(list=c("XCornell","yCornell","bbb"))
```

summary.cv.plsRmodel *Summary method for plsR models*

Description

This function provides a summary method for the class "cv.plsRmodel"

Usage

```
## S3 method for class 'cv.plsRmodel'
summary(object, ...)
```

Arguments

object an object of the class "cv.plsRmodel"
... further arguments to be passed to or from methods.

Value

An object of class "summary.cv.plsRglmmodel".

Author(s)

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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[summary](#)

Examples

```
data(Cornell)
summary(cv.plsR(Y~,data=Cornell,nt=10,K=6, verbose=FALSE), verbose=FALSE)
```

summary.cv.plsRmultiModel

Summary method for experimental multivariate PLS2 CV models

Description

Summarizes repeated k-fold cross-validation results from [cv.plsRmulti](#).

Usage

```
## S3 method for class 'cv.plsRmultiModel'
summary(object, verbose = TRUE, ...)
```

Arguments

object	An object of class "cv.plsRmultiModel".
verbose	Should progress information be displayed?
...	Further arguments passed to methods.

Details

The returned object inherits from "summary.cv.plsRmodel" so that [cvtable](#) and the existing plot method can be reused for the aggregated multivariate criteria.

Value

A list of per-partition summary matrices with the same aggregate columns used by `summary.cv.plsRmodel` for Q2, PRESS, and RSS, plus response-specific PRESS, RSS, Q2, and R2 columns.

See Also

[cv.plsRmulti](#), [cvtable](#)

Examples

```
set.seed(123)
X <- matrix(rnorm(60 * 4), ncol = 4)
Y <- cbind(
  y1 = X[, 1] - 0.5 * X[, 2] + rnorm(60, sd = 0.1),
  y2 = 0.3 * X[, 2] + X[, 3] + rnorm(60, sd = 0.1)
)

cv_fit <- cv.plsRmulti(Y, X, nt = 2, K = 3, NK = 1, verbose = FALSE)
summary(cv_fit, verbose = FALSE)
```

summary.plsRglmmodel *Summary method for plsRglm models*

Description

This function provides a summary method for the class "plsRglmmodel"

Usage

```
## S3 method for class 'plsRglmmodel'
summary(object, ...)
```

Arguments

object	an object of the class "plsRglmmodel"
...	further arguments to be passed to or from methods.

Value

call	function call of plsRglmmodel
------	-------------------------------

Author(s)

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References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[summary](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modplsglm <- plsRglm(yCornell,XCornell,3,modele="pls-glm-gaussian")
class(modplsglm)
summary(modplsglm)
rm(list=c("XCornell","yCornell","modplsglm"))
```

summary.plsRmodel	<i>Summary method for plsR models</i>
-------------------	---------------------------------------

Description

This function provides a summary method for the class "plsRmodel"

Usage

```
## S3 method for class 'plsRmodel'
summary(object, ...)
```

Arguments

object	an object of the class "plsRmodel"
...	further arguments to be passed to or from methods.

Value

call	function call of plsRmodel
------	----------------------------

Author(s)

Frédéric Bertrand
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<https://fbertran.github.io/homepage/>

References

Nicolas Meyer, Myriam Maumy-Bertrand et Frédéric Bertrand (2010). Comparing the linear and the logistic PLS regression with qualitative predictors: application to allelotyping data. *Journal de la Societe Francaise de Statistique*, 151(2), pages 1-18. https://www.numdam.org/item/JSFS_2010__151_2_1_0/

See Also

[summary](#)

Examples

```
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]
modpls <- plsR(yCornell,XCornell,3,modele="pls")
class(modpls)
summary(modpls)
rm(list=c("XCornell","yCornell","modpls"))
```

tilt.bootpls

Non-parametric tilted bootstrap for PLS regression models

Description

Provides a wrapper for the bootstrap function `tilt.boot` from the `boot` R package. Implements non-parametric tilted bootstrap for PLS regression models by case resampling : the `tilt.boot` function will run an initial bootstrap with equal resampling probabilities (if required) and will use the output of the initial run to find resampling probabilities which put the value of the statistic at required values. It then runs an importance resampling bootstrap using the calculated probabilities as the resampling distribution.

Usage

```
tilt.bootpls(  
  object,  
  typeboot = "plsmodel",  
  statistic = coefs.plsR,  
  R = c(499, 250, 250),  
  alpha = c(0.025, 0.975),  
  sim = "ordinary",  
  stype = "i",  
  index = 1,  
  stabvalue = 1e+06,  
  ...  
)
```

Arguments

object	An object of class <code>plsRmodel</code> to bootstrap
typeboot	The type of bootstrap. Either (Y,X) bootstrap (<code>typeboot="plsmodel"</code>) or (Y,T) bootstrap (<code>typeboot="fmodel_np"</code>). Defaults to (Y,T) resampling.
statistic	A function which when applied to data returns a vector containing the statistic(s) of interest. <code>statistic</code> must take at least two arguments. The first argument passed will always be the original data. The second will be a vector of indices, frequencies or weights which define the bootstrap sample. Further, if predictions are required, then a third argument is required which would be a vector of the random indices used to generate the bootstrap predictions. Any further arguments can be passed to <code>statistic</code> through the <code>...</code> argument.
R	The number of bootstrap replicates. Usually this will be a single positive integer. For importance resampling, some resamples may use one set of weights and others use a different set of weights. In this case R would be a vector of integers where each component gives the number of resamples from each of the rows of weights.
alpha	The alpha level to which tilting is required. This parameter is ignored if <code>R[1]</code> is 0 or if <code>theta</code> is supplied, otherwise it is used to find the values of <code>theta</code> as quantiles of the initial uniform bootstrap. In this case <code>R[1]</code> should be large enough that $\min(c(\alpha, 1-\alpha)) * R[1] > 5$, if this is not the case then a warning is generated to the effect that the <code>theta</code> are extreme values and so the tilted output may be unreliable.
sim	A character string indicating the type of simulation required. Possible values are "ordinary" (the default), "balanced", "permutation", or "antithetic".
stype	A character string indicating what the second argument of <code>statistic</code> represents. Possible values of <code>stype</code> are "i" (indices - the default), "f" (frequencies), or "w" (weights).
index	The index of the statistic of interest in the output from <code>statistic</code> . By default the first element of the output of <code>statistic</code> is used.
stabvalue	Upper bound for the absolute value of the coefficients.
...	ny further arguments can be passed to <code>statistic</code> .

Value

An object of class "boot".

Author(s)

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<https://fbertran.github.io/homepage/>

See Also

[tilt.boot](#)

Examples

```
## Not run:
data(Cornell)
XCornell<-Cornell[,1:7]
yCornell<-Cornell[,8]

set.seed(1385)
Cornell.tilt.boot <- tilt.bootpls(plsR(yCornell,XCornell,1), statistic=coefs.plsR,
typeboot="fmodel_np", R=c(499, 100, 100), alpha=c(0.025, 0.975), sim="ordinary",
stype="i", index=1)
Cornell.tilt.boot
str(Cornell.tilt.boot)

boxplots.bootpls(Cornell.tilt.boot,indices=2:7)

rm(Cornell.tilt.boot)

## End(Not run)
```

tilt.bootplsglm	<i>Non-parametric tilted bootstrap for PLS generalized linear regression models</i>
-----------------	---

Description

Provides a wrapper for the bootstrap function `tilt.boot` from the `boot` R package. Implements non-parametric tilted bootstrap for PLS generalized linear regression models by case resampling : the `tilt.boot` function will run an initial bootstrap with equal resampling probabilities (if required) and will use the output of the initial run to find resampling probabilities which put the value of the statistic at required values. It then runs an importance resampling bootstrap using the calculated probabilities as the resampling distribution.

Usage

```
tilt.bootplsglm(
  object,
  typeboot = "fmodel_np",
  statistic = coefs.plsRglm,
  R = c(499, 250, 250),
  alpha = c(0.025, 0.975),
  sim = "ordinary",
  stype = "i",
  index = 1,
  stabvalue = 1e+06,
  ...
)
```

Arguments

object	An object of class <code>plsRbetamodel</code> to bootstrap
typeboot	The type of bootstrap. Either (Y,X) bootstrap (<code>typeboot="plsmode1"</code>) or (Y,T) bootstrap (<code>typeboot="fmodel_np"</code>). Defaults to (Y,T) resampling.
statistic	A function which when applied to data returns a vector containing the statistic(s) of interest. <code>statistic</code> must take at least two arguments. The first argument passed will always be the original data. The second will be a vector of indices, frequencies or weights which define the bootstrap sample. Further, if predictions are required, then a third argument is required which would be a vector of the random indices used to generate the bootstrap predictions. Any further arguments can be passed to <code>statistic</code> through the <code>...</code> argument.
R	The number of bootstrap replicates. Usually this will be a single positive integer. For importance resampling, some resamples may use one set of weights and others use a different set of weights. In this case R would be a vector of integers where each component gives the number of resamples from each of the rows of weights.
alpha	The alpha level to which tilting is required. This parameter is ignored if <code>R[1]</code> is 0 or if <code>theta</code> is supplied, otherwise it is used to find the values of <code>theta</code> as quantiles of the initial uniform bootstrap. In this case <code>R[1]</code> should be large enough that $\min(c(\alpha, 1-\alpha)) * R[1] > 5$, if this is not the case then a warning is generated to the effect that the <code>theta</code> are extreme values and so the tilted output may be unreliable.
sim	A character string indicating the type of simulation required. Possible values are "ordinary" (the default), "balanced", "permutation", or "antithetic".
stype	A character string indicating what the second argument of <code>statistic</code> represents. Possible values of <code>stype</code> are "i" (indices - the default), "f" (frequencies), or "w" (weights).
index	The index of the statistic of interest in the output from <code>statistic</code> . By default the first element of the output of <code>statistic</code> is used.
stabvalue	Upper bound for the absolute value of the coefficients.
...	ny further arguments can be passed to <code>statistic</code> .

Value

An object of class "boot".

Author(s)

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<https://fbertran.github.io/homepage/>

See Also

[tilt.boot](#)

Examples

```

data(aze_compl)
Xaze_compl<-aze_compl[,2:34]
yaze_compl<-aze_compl$y

dataset <- cbind(y=yaze_compl,Xaze_compl)

# Lazraq-Cleroux PLS bootstrap Classic

aze_compl.tilt.boot <- tilt.bootplsglm(plsRglm(yaze_compl,Xaze_compl,3,
modele="pls-glm-logistic", family=NULL), statistic=coefs.plsRglm, R=c(499, 100, 100),
alpha=c(0.025, 0.975), sim="ordinary", stype="i", index=1)
boxplots.bootpls(aze_compl.tilt.boot,1:2)

aze_compl.tilt.boot2 <- tilt.bootplsglm(plsRglm(yaze_compl,Xaze_compl,3,
modele="pls-glm-logistic"), statistic=coefs.plsRglm, R=c(499, 100, 100),
alpha=c(0.025, 0.975), sim="ordinary", stype="i", index=1)
boxplots.bootpls(aze_compl.tilt.boot2,1:2)

aze_compl.tilt.boot3 <- tilt.bootplsglm(plsRglm(yaze_compl,Xaze_compl,3,
modele="pls-glm-family", family=binomial), statistic=coefs.plsRglm, R=c(499, 100, 100),
alpha=c(0.025, 0.975), sim="ordinary", stype="i", index=1)
boxplots.bootpls(aze_compl.tilt.boot3,1:2)

# PLS bootstrap balanced

aze_compl.tilt.boot4 <- tilt.bootplsglm(plsRglm(yaze_compl,Xaze_compl,3,
modele="pls-glm-logistic"), statistic=coefs.plsRglm, R=c(499, 100, 100),
alpha=c(0.025, 0.975), sim="balanced", stype="i", index=1)
boxplots.bootpls(aze_compl.tilt.boot4,1:2)

```

XbordeauxNA

Incomplete dataset for the quality of wine dataset

Description

Quality of Bordeaux wines (Quality) and four potentially predictive variables (Temperature, Sunshine, Heat and Rain).

The value of Temperature for the first observation was remove from the matrix of predictors on purpose.

Format

A data frame with 34 observations on the following 4 variables.

Temperature a numeric vector

Sunshine a numeric vector

Heat a numeric vector

Rain a numeric vector

Source

P. Bastien, V. Esposito-Vinzi, and M. Tenenhaus. (2005). PLS generalised linear regression. *Computational Statistics & Data Analysis*, 48(1):17-46.

References

M. Tenenhaus. (2005). La regression logistique PLS. In J.-J. Dreesbeke, M. Lejeune, and G. Saporta, editors, *Modeles statistiques pour donnees qualitatives*. Editions Technip, Paris.

Examples

```
data(XbordeauxNA)
str(XbordeauxNA)
```

XpineNAX21

Incomplete dataset from the pine caterpillars example

Description

The caterpillar dataset was extracted from a 1973 study on pine processionary caterpillars. It assesses the influence of some forest settlement characteristics on the development of caterpillar colonies. There are $k=10$ potentially explanatory variables defined on $n=33$ areas.

The value of x_2 for the first observation was removed from the matrix of predictors on purpose.

Format

A data frame with 33 observations on the following 10 variables and one missing value.

x1 altitude (in meters)

x2 slope (en degrees)

x3 number of pines in the area

x4 height (in meters) of the tree sampled at the center of the area

x5 diameter (in meters) of the tree sampled at the center of the area

x6 index of the settlement density

x7 orientation of the area (from 1 if southbound to 2 otherwise)

x8 height (in meters) of the dominant tree

x9 number of vegetation strata

x10 mix settlement index (from 1 if not mixed to 2 if mixed)

Details

These caterpillars got their names from their habit of moving over the ground in incredibly long head-to-tail processions when leaving their nest to create a new colony.

The XpineNAX21 is a dataset with a missing value for testing purpose.

Source

Tomassone R., Audrain S., Lesquoy-de Turckheim E., Millier C. (1992). “La régression, nouveaux regards sur une ancienne méthode statistique”, INRA, *Actualités Scientifiques et Agronomiques*, Masson, Paris.

Examples

```
data(XpineNAX21)
str(XpineNAX21)
```

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