# Package: morepls (via r-universe)

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**Type** Package

**Title** Interpretation Tools for Partial Least Squares Regression

**Version** 0.1

**Imports** pls, ggplot2, ggrepel, rlang

**Suggests** plsVarSel, ggforce

**Description** Various kinds of plots (observations, variables, correlations, weights, regression coefficients and Variable Importance in the Projection) and aids to interpretation (coefficients, Q2, correlations, redundancies) for partial least squares regressions computed with the 'pls' package, following Tenenhaus (1998, ISBN:2-7108-0735-1).

**License** GPL (>= 2)

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**RoxygenNote** 7.2.3

**NeedsCompilation** no

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**Repository** CRAN

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`get_coef` *Standardized and raw coefficients*

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## Description

Computes the standardized and raw coefficients of a PLS regression, with p-values and confidence intervals from a jackknife procedure.

## Usage

```
get_coef(object, y = NULL, ncomp = NULL,
 ci = 0.95, raw = FALSE)
```

## Arguments

| | |
|---|---|
| `object` | an object of class `mvr` from `pls` package. It must be cross-validated with `jackknife = TRUE` |
| `y` | the name of the response variable whose coefficients are plotted. If `NULL` (default), the first response variable is used. |
| `ncomp` | the number of components to use for computing coefficients |
| `ci` | the confidence level of the confidence interval. Default is 0.95. |
| `raw` | logical. If `FALSE` (default), standardized coefficients are computed. If `TRUE`, raw coefficients are computed. |

## Value

A data frame with coefficients, standard deviation, t-values, p-values and confidence intervals.

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## See Also

`plo_coef`

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls",
           jackknife = TRUE)
res <- get_coef(pls)
head(res)
```

---

`get_cor` *Correlations between variables and scores*

---

## Description

Computes correlations between variables and scores from a PLS regression.

## Usage

```
get_cor(object)
```

## Arguments

| | |
|---|---|
| `object` | an object of class `mvr` from `pls` package. |

## Value

A list with the following elements :

| | |
|---|---|
| `Xt` | correlations between X variables and X scores |
| `Yt` | correlations between Y variables and X scores |
| `Xu` | correlations between X variables and Y scores |
| `Yu` | correlations between Y variables and Y scores |
| `XY` | correlations between X variables and Y variables |
| `tu` | correlations between X scores and Y scores |

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## See Also

get_red, plo_cor

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
res <- get_cor(pls)
str(res)
```

---

# get_Q2 *Q2 and cumulative Q2 indexes*

---

## Description

Computes Q2 and cumulative Q2 indexes from a PLS regression.

## Usage

```
get_Q2(object)
```

## Arguments

| | |
|---|---|
| object | an object of class mvr from pls package. It has to be cross-validated |

## Value

A list with the following elements :

| | |
|---|---|
| Q2kh | Q2 index by X variable and number of components |
| Q2h | Q2 index by number of components |
| Q2cumkh | cumulative Q2 index by X variable and number of components |
| Q2cumh | cumulative Q2 index by number of components |

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
res <- get_Q2(pls)
str(res)
```

---

`get_red` *R2 and redundancies*

---

## Description

Computes R2 and redundancies between variables and scores from a PLS regression.

## Usage

```
get_red(object)
```

## Arguments

| | |
|---|---|
| `object` | an object of class `mvr` from `pls` package. |

## Value

A list with the following elements :

| | |
|---|---|
| `Xt` | R2 and redundancies between X variables and X scores |
| `Yt` | R2 and redundancies between Y variables and X scores |
| `Xu` | R2 and redundancies between X variables and Y scores |
| `Yu` | R2 and redundancies between Y variables and Y scores |
| `Xtcum` | cumulative R2 and redundancies between X variables and X scores |
| `Ytcum` | cumulative R2 and redundancies between Y variables and X scores |
| `Xucum` | cumulative R2 and redundancies between X variables and Y scores |
| `Yucum` | cumulative R2 and redundancies between Y variables and Y scores |

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## See Also

get_cor

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
res <- get_red(pls)
str(res)
```

---

plo_coef *Plot of coefficients*

---

## Description

Plots the coefficients from a PLS regression.

## Usage

```
plo_coef(object, y = NULL, ncomp = NULL, sort = FALSE,
                     col = "darkgreen", repel = FALSE,
                     max.pval = NULL, whiskers = FALSE, ci = 0.95)
```

## Arguments

| | |
|---|---|
| object | an object of class mvr from pls package |
| y | the name of the response variable whose coefficients are plotted. If NULL (default), the first response variable is used. |
| ncomp | the number of components to use for computing coefficients |
| sort | logical. If TRUE, bars are sorted by decreasing coefficients. Default is FALSE. |
| col | color of the bars |
| repel | logical. If TRUE, the names of the variables are repelled with geom_text_repel. Default is FALSE |
| max.pval | coefficients with jack-knife p-values higher than max.pval have a more transparent color bar. If NULL (default), all bars have the same opacity. If not NULL, object must be cross-validated with jackknife = TRUE. |
| whiskers | logical. If TRUE, whiskers are added to represent the confidence interval of the coefficients. Default is FALSE. If TRUE, object must be cross-validated with jackknife = TRUE. |
| ci | the confidence level of the confidence interval. Only used if whiskers is TRUE. Default is 0.95. |

## Value

a ggplot2 object

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) *Multivariate calibration*. Chichester: Wiley.

Tenenhaus, M. (1998) *La Regression PLS. Theorie et Pratique*. Editions TECHNIP, Paris.

## See Also

plo_ctr, plo_vip, jack.test,

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls",
           jackknife = TRUE)
plo_coef(pls)
plo_coef(pls, max.pval = 0.05)
plo_coef(pls, whiskers = TRUE)
```

---

# plo_cor *Plot of correlations*

---

## Description

Plots the correlations between (X and Y) variables and the components (X scores) of a PLS regression.

## Usage

```
plo_cor(object, comps = 1:2, which = "both", min.cor = NULL,
        lim = NULL, circles = NULL, col = NULL, size = 3.88)
```

## Arguments

| | |
|---|---|
| object | an object of class mvr from pls package |
| comps | the components to use. Default is c(1,2). |
| which | character string. If "both" (default), X and Y variables are plotted. If "X", only X variables are plotted. If "Y", only Y variables are plotted. |
| min.cor | numerical value. The minimal correlation with one or the other component for a variable to be plotted. If NULL (default), all the variables are plotted. |
| lim | numerical value. The limit of the scale (in absolute value). If NULL (default), the limits are automatically determined from the range of tha data. |
| circles | vector of numeric values. Circles are added to the plot at radiuses specified in circles. If NULL (default), no circle is plotted. |
| col | colors for the names of the variables. Only one value should be provided if which is "X" or "Y", a vector of two if which is "both". If NULL (default), colors are set automatically. |
| size | numerical value. The size of the names of the variables. |

## Value

a ggplot2 object

## Note

This is what Tenenhaus calls the univariate interpretation of the PLS components, as opposed to the multivariate interpretation (see plo_var).

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## See Also

get_cor, plo_var

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
```

```
plo_cor(pls)
# plot with circles corresponding to
# correlations of 0.5 and 1
plo_cor(pls, lim = 1, circles = c(0.5, 1), col = c("pink", "purple"))
```

---

plo_ctr *Plot of weights*

---

## Description

Plots the weights of X variables from a PLS regression.

## Usage

```
plo_ctr(object, comp = 1, sort = FALSE, col = "tomato4", repel = FALSE)
```

## Arguments

| | |
|---|---|
| object | an object of class mvr from pls package |
| comp | the component to use. Default is 1. |
| sort | logical. If TRUE, bars are sorted by decreasing VIPs. Default is FALSE. |
| col | color of the bars |
| repel | logical. If TRUE, the names of the variables are repelled with geom_text_repel. Default is FALSE |

## Details

According to Tenenhaus, the contribution of a variable to the construction of a component is measured by the squared loading weight. For a given component, the sum af the squared loading weights is equal to 1. This plot represents the loading weights, which keeps the information about their sign. Dashed lines are added at +/- sqrt(1/p), with p the number of X variables, which corresponds to the average contribution to the construction of the component.

## Value

a ggplot2 object

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## See Also

plo_coef, plo_vip

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
plo_ctr(pls)
```

---

plo_obs *Plot of scores*

---

## Description

Plots the scores of the observations of a PLS regression.

## Usage

```
plo_obs(object, comps = 1:2, col = "black", size = 1.5)
```

## Arguments

| | |
|---|---|
| object | an object of class mvr from pls package |
| comps | the components to use. Default is c(1,2). |
| col | the color of the points. |
| size | numerical value. The size of the points. |

## Value

a ggplot2 object

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
plo_obs(pls)
```

---

plo_var *Plot of loadings*

---

## Description

Plots the loadings of the variables of a PLS regression.

## Usage

```
plo_var(object, comps = 1:2, which = "both", col = NULL,
 size = 3.88, Yline = TRUE, col.Yline = "firebrick3")
```

## Arguments

| | |
|---|---|
| object | an object of class mvr from pls package |
| comps | the components to use. Default is c(1,2). |
| which | character string. If "both" (default), X and Y variables are plotted. If "X", only X variables are plotted. If "Y", only Y variables are plotted. |
| col | colors for the names of the variables. Only one value should be provided if which is "X" or "Y", a vector of two if which is "both". If NULL (default), colors are set automatically. |
| size | numerical value. The size of the names of the variables. |
| Yline | logical. If TRUE (default), a line is drawn through the origin and the coordinates of the response variable, and a second line orthogonal to the first one. This is aimed at facilitating the interpretation. |
| col.Yline | the color of the lines drawn if Yline is TRUE. Default is "firebrick3". |

## Value

a ggplot2 object

## Note

This is what Tenenhaus calls the multivariate interpretation of the PLS components, as opposed to the univariate interpretation provided by the correlations (see plo_cor). This superposes Y loadings (vectors from the C matrix) and projections, i.e. modified weights (vectors of the W* matrix).

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## See Also

plo_cor

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
plo_var(pls)
```

---

# plo_vip *Plot of VIPs*

---

## Description

Plots the Variable Importance in Projections (VIP) indexes of a PLS regression.

## Usage

```
plo_vip(object, ncomp = NULL, sort = FALSE,
col = "steelblue4", repel = FALSE)
```

## Arguments

| | |
|---|---|
| object | an object of class mvr from pls package |
| ncomp | the number of components to use for computing VIPs |
| sort | logical. If TRUE, bars are sorted by decreasing VIPs. Default is FALSE. |
| col | color of the bars |
| repel | logical. If TRUE, the names of the variables are repelled with geom_text_repel. Default is FALSE |

## Value

a ggplot2 object

## Author(s)

Nicolas Robette

## References

Martens, H., Næs, T. (1989) Multivariate calibration. Chichester: Wiley.

Tenenhaus, M. (1998) La Regression PLS. Theorie et Pratique. Editions TECHNIP, Paris.

## See Also

VIP

## Examples

```
library(pls)
data(yarn)
pls <- mvr(density ~ NIR,
           ncomp = 5,
           data = yarn,
           validation = "CV",
           method = "oscorespls")
plo_vip(pls)
```

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