Package ‘plspm.formula’

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Title Formula Based PLS Path Modeling
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Description The main objective is to make easy the PLS Path Modeling with R using the package 'plspm'. It compute automatically the inner matrix and the outer list the 'plspm' function need simply by specify the model using formulas.
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**plspm.formula-package**  
*Formula Based PLS Path Modeling*

**Description**

The main objective is to make easy the PLS Path Modeling with R using the package ‘plspm’. It compute automatically the inner matrix and the outer list the ‘plspm’ function need simply by specify the model using formulas.

**Details**

A formula based version of the package ‘plspm’. The main function is ‘plspm.formula’ based on the `plspm` function.

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**References**


**See Also**

`plspm.formula`

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**bkadulte**  
*Adult Resilience Dataset From Bouake (Ivory Coast)*

**Description**

This data set contains the variables from a resilience study of 117 adult people in the town of Bouake (Ivory Coast). A data frame with 117 observations on the following 22 variables.

**Usage**

`data("bkadulte")`
Details

In the context of the resilometric, the variables are all manifests variables and can be classify into five groups (five resilience dimensions):

- **SDH**  
  sens of humor (senshum, creativite)
- **APS**  
  pro-social attitude (communic, sociabilite, altruiste)
- **HRP**  
  hability to solving problems (planific, solution, autonome)
- **SCI**  
  sentiment of internal control (estime, confiance, favenir)
- **SPI**  
  spirituality (optimisme, persever, religion)

Source

UMI Resilience (CIRES-IRD), observatory of resilience in Bouake (Ivory Coast)

References


Examples

```r
## Load data
data(bkadulte)
str(bkadulte)
bkmodele <- "
  ## modele de mesure
  SDH =~ senshum+creativite
  APS =~ communic+sociabilite+altruiste+relation
  HRP =~ planific+solution+autonome
  SCI =~ estime+confiance+favenir
  SPI =~ optimisme+persever+religion
  ## interactions
  HRP ~~ SDH+SCI
  SCI ~~ SDH
  APS ~~ SDH
  SPI ~~ APS+SCI"

## PLSPM estimation based on formula
bkmodes <- rep("A",5)
bkres.plspm <- plspm.formula(Formula = bkmodele, Data = bkadulte, modes = bkmodes,
  plot.outer = TRUE, plot.inner = TRUE, scaled = FALSE)

## Computation plspm parameters only based on formula
bkres.param <- plspm.params(Formula = bkmodele, Data = bkadulte)
bkres.param$inner.mat
bkres.param$outer.list
```
plspm.formula  

PLS Path Modeling Based on Formula

Description

This function estimate PLS Path Models specified using formula. The formulas using for the inner models and the outer models must respect the forms describe in the details section.

Usage

plspm.formula(Formula, Data, modes=NULL, scaling=NULL, scheme="centroid", scaled=TRUE, tol=1e-06, maxiter=100, plscomp=NULL, boot.val=FALSE, br=NULL, dataset=TRUE, plot.outer=FALSE, plot.inner=TRUE)

Arguments

Formula  A string describe the the inner and outer model using formulas. The inner models are describe using "=" and "~~" for the inner model. (see details and example)

Data  matrix or data frame containing the manifest variables.

modes  character vector indicating the type of measurement for each block. Possible values are: "A", "B", "newA", "PLScore", "PLScow". The length of modes must be equal to the length of blocks.

scaling  optional argument for running the non-metric approach; it is a list of string vectors indicating the type of measurement scale for each manifest variable specified in blocks. scaling must be specified when working with non-metric variables. Possible values: "num" (linear transformation, suitable for numerical variables), "raw" (no transformation), "nom" (non-monotonic transformation, suitable for nominal variables), and "ord" (monotonic transformation, suitable for ordinal variables).

scheme  string indicating the type of inner weighting scheme. Possible values are "centroid", "factorial", or "path".

scaled  whether manifest variables should be standardized. Only used when scaling = NULL. When (TRUE, data is scaled to standardized values (mean=0 and variance=1). The variance is calculated dividing by N instead of N-1).

tol  decimal value indicating the tolerance criterion for the iterations (tol=0.000001). Can be specified between 0 and 0.001.

maxiter  integer indicating the maximum number of iterations (maxiter=100 by default). The minimum value of maxiter is 100.

plscomp  optional vector indicating the number of PLS components (for each block) to be used when handling non-metric data (only used if scaling is provided)

boot.val  whether bootstrap validation should be performed. (FALSE by default).

br  number bootstrap resamples. Used only when boot.val=TRUE. When boot.val=TRUE, the default number of re-samples is 100.
plspm.formula

- **dataset**: whether the data matrix used in the computations should be retrieved (TRUE by default).
- **plot.outer**: Boolean specify if yes (plot.outer=TRUE) or not (plot.outer=FALSE) the outer plot may be printed. (FALSE by default).
- **plot.inner**: Boolean specify if yes (plot.inner=TRUE) or not (plot.inner=FALSE) the outer plot may be printed. (TRUE by default).

**Details**

The function plspm.formula estimates a path model by partial least squares approach providing the full set of results as the `plspm` function of the 'plspm' package. The algorithm compute itself the path matrix and the blocks list. To do that, the model must be specify using the two rules below:

- \( \text{LatVar1} \sim \text{ManVar1+ManVar2+ManVar3} \)  
  Description of the relation between the latent variable (LatVar1) and its manifests variables (ManVar1, ManVar2 and ManVar3)
- \( \text{LatVar3} \sim \text{LatVar1+LatVar2} \)  
  Description of the relation between the latent variable (LatVar3) and the other latents variables (LatVar1 and ManVar2) linked to that variable. All the formulars must be in a single string with a newline as separator. Phisical new lines are generally used (see example).

**Value**

The result of the 'plspm.formula' is an objet of class 'plspm'. The return values are the same of the `plspm` fonction in the 'plspm' package.

**Note**

The formula approach of the PLS Path Modeling is need for the developement of the resilometric. Resilometrics is a new discipline under development for computational modeling of the resilience processes.

**Author(s)**

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**References**


**See Also**

plspm.params
Examples

```r
## Load data (satisfaction data in plspm package)
data("plspmsat")
## Model specification by formulas
satmodele <- "
  ## measure model specification
  EXPE =~ expe1+expe2+expe3+expe4+expe5
  IMAG =~ imag1+imag2+imag3+imag4+imag5
  LOY =~ loy1+loy2+loy3+loy4
  SAT =~ sat1+sat2+sat3+sat4
  VAL =~ val1+val2+val3+val4
  QUAL =~ qual1+qual2+qual3+qual4+qual5
  ## outer model specification
  EXPE ~~ IMAG
  LOY ~~ IMAG+SAT
  SAT ~~ IMAG+EXPE+QUAL+VAL
  VAL ~~ EXPE+QUAL
  QUAL ~~ EXPE
"

## estimation modes of latent's blocks
satmodes <- rep("A", 6)
## PLSM model estimation using formula
satres.plspm <- plspm.formula(Formula = satmodele, Data = plspmsat,
                              modes = satmodes, plot.outer = TRUE,
                              plot.inner = TRUE, scaled = FALSE)
```

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**plspm.params**

**Formula Based PLS Path Modeling Parameters Calculus**

**Description**

This function computes the inner matrix and the outer list needed for specifying the PLS Path Models in the package `plspm` (function `plspm`). The parameters are computed using a formula specification of the PLSPM model.

**Usage**

`plspm.params(Formula, Data)`

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>A string describing the inner and outer model using formulas. The inner models are described using &quot;=~&quot; and &quot;~~&quot; for the inner model. (see details)</td>
</tr>
<tr>
<td>Data</td>
<td>matrix or data frame containing the manifest variables.</td>
</tr>
</tbody>
</table>
The function `plspm.formula` estimates a path model by partial least squares approach providing the full set of results as the `plspm` function of the `plspm` package. The algorithm compute itself the path matrix and the blocks list. To do that, the model must be specify using the two rules below:

LatVar1 =~ ManVar1+ManVar2+ManVar3  
Description of the relation between the latent variable (LatVar1) and its manifests variables (ManVar1, ManVar2 and ManVar3)

LatVar3 =~ LatVar1+LatVar2  
Description of the relation between the latent variable (LatVar3) and the other latents variables (LatVar1 and ManVar2) linked to that variable All the formulars must be in a single string with a newline as separator. Phisical new lines are generally used (see example).

Value

A list containing two objects:

- `innerNmat` inner matrix specify the structural relations between latents variables
- `outerNlist` outer list specify the indexes of the manifests variables in the dataset for each latent variable

Author(s)

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Examples

```r
# Load data (satisfaction data in plspm package)
data("plspmsat")
## Model specification by formulas
satmodele <- "
## measure model specification
EXPE =~ expel+expe2+expe3+expe4+expe5
IMAG =~ imag1+imag2+imag3+imag4+imag5
LOY =~ loy1+loy2+loy3+loy4
SAT =~ sat1+sat2+sat3+sat4
VAL =~ val1+val2+val3+val4
QUAL =~ qual1+qual2+qual3+qual4+qual5
## outer model specification
EXPE ~~ IMAG
LOY ~~ IMAG+SAT
SAT ~~ IMAG+EXPE+QUAL+VAL
VAL ~~ EXPE+QUAL
QUAL ~~ EXPE"

## computer the PLSPM parameters
sat.param <- plspm.params(Formula = satmodele, Data = plspmsat)
sat.param$inner.mat  ## inner matrix
sat.param$outer.list  ## outer list
```
Description

This data set contains the variables from a customer satisfaction study of a Spanish credit institution on 250 customers.

Usage

```r
data("plspmsat")
```

Details

See details on satisfaction

Source

Laboratory of Information Analysis and Modeling (LIAM). Facultat d'Informatica de Barcelona, Universitat Politecnica de Catalunya.
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