Package 'cbsem'

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Type Package

Title Simulation, Estimation and Segmentation of Composite Based Structural Equation Models

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Description The composites are linear combinations of their indicators in composite based structural equation models. Structural models are considered consisting of two blocks. The indicators of the exogenous composites are named by X, the indicators of the endogenous by Y. Reflective relations are given by arrows pointing from the composite to their indicators. Their values are called loadings. In a reflective-reflective scenario all indicators have loadings. Arrows are pointing to their indicators only from the endogenous composites in the formative-reflective scenario. There are no loadings at all in the formative-formative scenario. The covariance matrices are computed for these three scenarios. They can be used to simulate these models. These models can also be estimated and a segmentation procedure is included as well.

Depends R (>= 2.10)

License GPL

Encoding UTF-8

LazyData true

Suggests R.rsp

VignetteBuilder R.rsp

RoxygenNote 6.0.1

NeedsCompilation no

Repository CRAN

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R topics documented:

`averageR2w` *For use in boottestgscm.*

Description

`averageR2w` computes the weighted average of average of coefficients of determination for the structural parts of a segmented GSC model

Usage

```
averageR2w(dat, B, indicatorx, indicatory, loadingx = FALSE,
  loadingy = FALSE, member)
```

Arguments

`dat`	(n,p)-matrix, the values of the manifest variables. The columns must be arranged in that way that the components of refl are (absolutely) increasing.
`B`	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
`indicatorx`	vector describing with which exogenous composite the X-variables are connected

`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`loadingx`	logical TRUE when there are loadings for the X-variables in the model
`loadingy`	logical TRUE when there are loadings for the Y-variables in the model
`member`	vector of length n, indicating the cluster the observation belongs to

Value

r scalar, 'global' r2 coefficiet of determination

`boottestgscm` *Testing two segmentations of a GSC model*

Description

`boottestgscm` computes a confidence interval for the difference of weighted average of averages of coefficients of determination for two segmentations of a GSC model For a one sided alternative hypothesis the error alpha has to be duplicated

Usage

```
boottestgscm(dat, B, indicatorx, indicatory, loadingx = FALSE,
  loadingy = FALSE, member1, member2, alpha, inner = FALSE)
```

Arguments

`dat`	(n,p)-matrix, the values of the manifest variables. The columns must be arranged in that way that the components of refl are (absolutely) increasing.
`B`	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
`indicatorx`	vector describing with which exogenous composite the X-variables are connected
`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`loadingx`	logical FALSE when there are no loadings for the X-variables in the model
`loadingy`	logical FALSE when there are no loadings for the Y-variables in the model
`member1`	vector of length n, indicating the cluster the observation belongs to for the first clustering
`member2`	vector of length n, indicating the cluster the observation belongs to for the second clustering
`alpha`	scalar, significance level (= 1 - confidence level)
`inner`	Boolean, should a inner bootstrap loop be computed?

Value

KI vector with the confidence bounds; positive lower limit indicates significant superiority of first clustering, negative upper limit of second clustering.

Examples

```
data(twoclm)
member1 <- c(rep(1,50),rep(2,50))
member2 <- twoclm[,10]
dat <- twoclm[,-10]
B <- matrix(c( 0,0,0, 0,0,0, 1,1,0),3,3,byrow=TRUE)
indicatorx <- c(1,1,1,2,2,2)
indicatory <- c(1,1,1)
boottestgscm(dat,B,indicatorx,indicatory,loadingx=FALSE,loadingy=FALSE,
             member2,member1,0.1,inner=FALSE)
```

---

checkw — *Checking composite based SE models if there are weights in accordance with the loadings and the covariance matrix of the composites*

Description

checkw determines if there are sets of weights fulfilling the critical relation for the covariance matricies of the composites.

Usage

```
checkw(B, indicatorx, indicatory, lambdax = FALSE, lambday = FALSE,
  wx = FALSE, wy = FALSE, Sxixi, R2 = NULL)
```

Arguments

B	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
indicatorx	vector describing with which exogenous composite the X-variables are connected
indicatory	vector describing with which endogenous composite the Y-variables are connected
lambdax	vector of loadings for the X-variables in the model or FALSE
lambday	vector of loadings for the Y-variables in the model or FALSE
wx	vector of weights for the X-variables in the model or FALSE
wy	vector of weights for the Y-variables in the model or FALSE
Sxixi	covariance matrix of exogenous composites
R2	vector of coefficients of determination of structural regression equations

Value

out list with components

crit.value	vector of length 2 with the values of the optimisation criterion
wx	vector of length p1 of weights for constructing the exogenous composites
wy	vector of length p2 of weights for constructing the endogenous composites

Examples

```
B <- matrix(c(0,0,0,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,
              0,1,1,0,0,0,0,1,1,1,0,0,1,0,0,0,1,0),6,6,byrow=TRUE)
indicatorx <- c(1,1,1,1,1)
indicatory <- c(1, 1, 1, 2, 2, 3, 3, 3, 3, 3, 3, 3, 4, 4, 4, 5, 5, 5)
lambdax <- c(0.73, 0.60, 0.60, 0.77, 0.74)
lambday <- c(0.79, 0.68, 0.60, 0.90, 0.94, 0.80, 0.65, 0.78, 0.78, 0.74,
                     0.77, 0.78, 0.80, 0.84, 0.85, 0.86, 0.23, 0.87)
Sxixi <- matrix(1,1,1)
out <- checkw(B,indicatorx,indicatory,lambdax=TRUE,lambday=TRUE,wx=FALSE,wy=FALSE, Sxixi,R2=NULL)
```

`clustergscairls` *Clustering gsc-models*

Description

`clustergscairls` clusters data sets in that way that each cluster has a its own set of coefficients in the gsc-model.

Usage

```
clustergscairls(dat, B, indicatorx, indicatory, loadingx = FALSE,
  loadingy = FALSE, k, minmem = FALSE, wieder)
```

Arguments

`dat`	(n,p)-matrix, the values of the manifest variables
`B`	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij= 1 regression coefficient of eta_j in the regression relation in which eta_i is b_ij= 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
`indicatorx`	vector describing with which exogenous composite the X-variables are connected
`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`loadingx`	logical TRUE when there are loadings for the X-variables in the model

`loadingy`	logical TRUE when there are loadings for the Y-variables in the model
`k`	scalar, the number of clusters to be found
`minmem`	number of the cluster's members or FALSE (then ist is set to 2*number of indicators)
`wieder`	scalar, the number of random starts

Value

out list with components

member	(n,1)-vector, indicator of membership
Bhat	(k,q,q)-array, the path coefficients of the clusters
lambda	(p,k)-matrix, the loadings of the clusters
fitall	the total fit measure for the structural models only
fit	vector of length k, the fit values of the different models
R2	(k,q) matrix, the coefficients of determination for the structural regression equations

Examples

```
data(twoclm)
dat <- twoclm[,-10]
B <- matrix(c( 0,0,0, 0,0,0, 1,1,0),3,3,byrow=TRUE)
indicatorx <- c(1,1,1,2,2,2)
indicatory <- c(1,1,1)
out <- clustergscairls(dat,B,indicatorx,indicatory,loadingx=FALSE,loadingy=FALSE,2,minmem=6,1)
```

`FlDeriv` — `FlDeriv`*compute the Jacobian of the Fleishman transform for a given set of coefficients b,c,d*

Description

`FlDeriv`compute the Jacobian of the Fleishman transform for a given set of coefficients b,c,d

Usage

```
FlDeriv(coef)
```

Arguments

`coef`	vector with the coefficents for the Fleishman transform

Value

J (3,3) Jacobian matrix of partial derivatives

Examples

```
coef <- c( 0.90475830, 0.14721082, 0.02386092)
J <- FlDeriv( coef )
```

`Fleishman` *`Fleishman` computes the variance, skewness and kurtosis for a given set of of coefficients b,c,d for the Fleishman transform*

Description

`Fleishman` computes the variance, skewness and kurtosis for a given set of of coefficients b,c,d for the Fleishman transform

Usage

```
Fleishman(coef)
```

Arguments

`coef` vector with the coefficents

Value

out vector with coefficients Var,Skew,Kurt

Examples

```
coef <- c( 0.90475830, 0.14721082, 0.02386092)
out <- Fleishman( coef )
```

`FleishmanIC` *Functions to generate nonnormal distributed multivariate random vectors with mean=0, var=1 and given correlations and coefficients of skewness and excess kurtosis. This is done with the method of Vale & Morelli: The coefficients of the Fleishman transform Y = -c + bX +cX^2 + dX^3 are computed. from given skewness gamma[1] = E(Y^3) and kurtosis gamma[2] = E(Y^4) - 3. A indermediate correlation matrix is computed from the desired correlation matrix and the Fleishman coefficients. A singular value decomposition of the intermediate correlation matrix is performed and a matrix of independend normal random numbers is generated and transformed into correlated ones. Finally the Fleishman transform is applied to the columns of this data matrix.*

Description

The function are adapted from online support of the SAS system, URL: support.sas.com/publishing/authors/extras/65378_Ap
`FleishmanIC` produce an initial guess of the Fleishman coefficients from given skewness and kurtosis. It is to use for Newton's algorithm. This guess is produced by a polynomial regression.

Usage

```
FleishmanIC(skew, kurt)
```

Arguments

`skew`	desired skewness
`kurt`	desired kurtosis

Value

par vector with coefficients b,c,d

Examples

```
out <- FleishmanIC(1,2)
```

---

gscals — *Estimating GSC models belonging to scenarios reflective-reflective, formative-reflective and formative-formative*

Description

`gscals` estimates GSC models alternating least squares. This leads to estimations of weights for the composites and an overall fit measure.

Usage

```
gscals(dat, B, indicatorx, indicatory, loadingx = FALSE, loadingy = FALSE,
  maxiter = 200, biascor = FALSE)
```

Arguments

`dat`	(n,p)-matrix, the values of the manifest variables. The columns must be arranged in that way that the components of refl are (absolutely) increasing.
`B`	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
`indicatorx`	vector describing with which exogenous composite the X-variables are connected

`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`loadingx`	logical TRUE when there are loadings for the X-variables in the model
`loadingy`	logical TRUE when there are loadings for the Y-variables in the model
`maxiter`	Scalar, maximal number of iterations
`biascor`	Boolean, FALSE if no bias correction is done, TRUE if parametric bootstrap bias correction is done.

Value

out list with components

Bhat	(q,q) lower triangular matrix with the estimated coefficients of the structural model
What	(n,q) matrix of weights for constructing the composites
lambdahat	vector of length p with the loadings or 0
iter	number of iterations used
fehl	maximal difference of parameter estimates for the last and second last iteration
composit	the data matrix of the composites
resid	the data matrix of the residuals of the structural model
S	the covariance matrix of the manifest variables
ziel	sum of squared residuals for the final sum
fit	The value of the fit criterion
R2	vector with the coefficients of determination for all regression equations of the structural model

Examples

```
data(mobi250)
ind <- c(1, 1, 1, 4, 4, 4, 2, 2, 2, 3, 3, 5, 5, 5, 6, 6, 6, 7, 1, 1, 4, 4, 4, 4)
o <- order(ind)
indicatorx <- c(1,1,1,1,1)
indicatory <- c(1, 1, 1, 2, 2, 3, 3, 3, 3, 3, 3, 3, 4, 4, 4, 5, 5, 5)
dat <- mobi250[,o]
dat <- dat[,-ncol(dat)]
B <- matrix(c(0,0,0,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,
              0,1,1,0,0,0,0,1,1,1,0,0,1,0,0,0,1,0),6,6,byrow=TRUE)
out <- gscals(dat,B,indicatorx,indicatory,loadingx=TRUE,loadingy=TRUE,maxiter=200,biascor=FALSE)
```

`gscalsout` *Output of gscals for the simplemodel data.*

Description

A list containing the result of gscals for the simplemodel data.

Usage

```
gscalsout
```

Format

A list with entries:

$Bhat estimated esign matrix of the simple model

$What matrix of weights

$lambdahat mvector of estimated loadings

$iter number of iterations

$fehl maximal difference of parameter estimates for the last and second last iteration

$composit data matrix of composites

$resid data matrix of residuals of the structural model

$S Covariance matrix of manifest variables

$ziel sum of squared residuals for the final sum

$fi The value of the fit criterion

$R2 vector with the coefficients of determination for structural regressions

---

gscalsresid — *For use in clustergscairls, residuals of a gsc-model*

Description

`gscalsresid` computes the residuals of a gsc-model when the parameters and weights are given

Usage

```
gscalsresid(dat, out, indicatorx, indicatory, loadingx, loadingy)
```

Arguments

`dat`	(n,p) data matrix
`out`	list, output from gscals
`indicatorx`	vector describing with which exogenous composite the X-variables are connected
`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`loadingx`	logical TRUE when there are loadings for the X-variables in the model
`loadingy`	logical TRUE when there are loadings for the y-variables in the model

Value

resid (n,q2) matrix of residuals from structural model, the q2 is the number of endogenous composites .

Examples

```
data(simplemodel)
data(gscalsout)
B <- matrix(c( 0,0,0, 0,0,0, 0.7,0.4,0),3,3,byrow=TRUE)
indicatorx <- c(1,1,1,2,2,2)
indicatory <- c(1,1,1)
out <- gscalsresid(simplemodel,gscalsout,indicatorx,indicatory,TRUE,TRUE)
```

---

gscmcov *Determination of the covariance matrix of a GSC model belonging to scenario 1, scenario 2, scenario 3*

Description

gscmcov determines the covariance matrix of a GSC model. This is a wrapper for the functions gscmcovrr, gscmcovfr and gscmcovff

Usage

```
gscmcov(B, indicatorx, indicatory, lambdax = NULL, lambday = NULL,
  wx = NULL, wy = NULL, Sxixi, R2 = NULL)
```

Arguments

B	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
indicatorx	vector describing with which exogenous composite the X-variables are connected
indicatory	vector describing with which endogenous composite the Y-variables are connected
lambdax	vector of loadings of indicators for exogenous composites or NULL when there are no loadings for the X-variables in the model
lambday	vector of loadings of indicators for endogenous composites or NULL when there are no loadings for the Y-variables in the model
wx	vector of weights for building exogenous composites or NULL when loadings are present
wy	vector of weights for building endogenous composites or NULL when loadings are present
Sxixi	covariance matrix of exogenous composites
R2	vector of coefficients of determination for regressions belonging to the structural model

Value

out list with components

S	covariance matrix of manifest variables
B	(q,q) lower triangular matrix with possibly modified coefficients of the structural model
Scomp	covariance matrix of composites
wx	vector of weights for building exogenous composites
wy	vector of weights for building endoogenous composites
Sdd	diagonal matrix of variances of errors of X variable loadings or NA
See	diagonal matrix of variances of errors of Y variable loadings or NA

Examples

```
Sxixi <- matrix(c(1.0,  0.01,  0.01, 1),2,2)
B <- matrix(c( 0,0,0, 0,0,0, 0.7,0.4,0),3,3,byrow=TRUE)
indicatorx <- c(1,1,1,2,2,2)
indicatory <- c(1,1,1)
lambdax <- c(0.83,0.87,0.87,0.91,0.88,0.82)
lambday <- c(0.89,0.90,0.80)
wx <- c(0.46, 0.31, 0.32, 0.34, 0.40, 0.37)
wy <- c(0.41, 0.39, 0.37)
out <- gscmcov(B,indicatorx,indicatory,lambdax,lambday,wx=NULL,wy=NULL,Sxixi,R2=NULL)
```

---

gscmcovff — `gscmcovff` *determines the covariance matrix of a GSC model belonging to scenario ff.*

Description

`gscmcovff` determines the covariance matrix of a GSC model belonging to scenario ff.

Usage

```
gscmcovff(B, indicatorx, indicatory, wx, wy, Sxixi, R2 = NULL)
```

Arguments

`B`	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
`indicatorx`	vector describing with which exogenous composite the X-variables are connected
`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`wx`	vector of weights for building exogenous composites or NULL when loadings are present
`wy`	vector of weights for building endogenous composites or NULL when loadings are present

Sxixi	covariance matrix of exogenous composites
R2	vector of coefficients of determination for regressions belonging to the structural model

Value

out list with components

S	covariance matrix of manifest variables
B	(q,q) lower triangular matrix with possibly modified coefficients of the structural model
Scomp	covariance matrix of composites
wx	vector of weights for building exogenous composites
wy	vector of weights for building endoogenous composites

Examples

```
B <- matrix(c(0,0,0, 0,0,0, 0.7,0.4,0),3,3,byrow=TRUE)
indicatorx <- c(1,1,1,2,2,2)
indicatory <- c(1,1,1)
Sxixi <- matrix(c(1.0, 0.01, 0.01, 1),2,2)
wx <- c(0.46, 0.31, 0.32, 0.34, 0.40, 0.37)
wy <- c(0.41, 0.39, 0.37)
out <- gscmcovff(B,indicatorx,indicatory,wx,wy,Sxixi,R2=NULL)
```

---

gscmcovfr — `gscmcovfr` *determines the covariance matrix of a GSC model belonging to scenario fr. The covariance matrices of the errors are supposed to be diagonal.*

Description

`gscmcovfr` determines the covariance matrix of a GSC model belonging to scenario fr. The covariance matrices of the errors are supposed to be diagonal.

Usage

```
gscmcovfr(B, indicatorx, indicatory, lambday, wx, Sxixi, R2 = NULL)
```

Arguments

B	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
indicatorx	vector describing with which exogenous composite the X-variables are connected

`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`lambday`	vector of loadings of indicators for endogenous composites
`wx`	vector of weights for building exogenous composites
`Sxixi`	covariance matrix of exogenous composites
`R2`	vector of coefficients of determination for regressions belonging to the structural model

Value

out list with components

S	covariance matrix of manifest variables
B	(q,q) lower triangular matrix with possibly modified coefficients of the structural model
Scomp	covariance matrix of composites
wx	vector of weights for building exogenous composites
See	diagonal matrix of variances of errors of Y variable loadings or NA

Examples

```
Sxixi <- matrix(c(1.0,  0.01,  0.01, 1),2,2)
B <- matrix(c( 0,0,0, 0,0,0, 0.7,0.4,0),3,3,byrow=TRUE)
indicatorx <- c(1,1,1,2,2,2)
indicatory <- c(1,1,1)
lambday <- c(0.89,0.90,0.80)
wx <- c(0.46, 0.31, 0.32, 0.34, 0.40, 0.37)
out <- gscmcovfr(B,indicatorx,indicatory,lambday,wx,Sxixi,R2=NULL)
```

`gscmcovout` *Output of covgscmodel for the simplemodel data.*

Description

A list containing the result of gscmcov for the simplemodel data.

Usage

```
gscmcovout
```

Format

A list with entries:

$S Covariance matrix of manifest variables

$B Design matrix of the simple model

$Scomp Covariance matrix of composites

$wx weighting vector for exogenous composites

$wy weighting vector for endogenous composites

$Sdd diagonal covariance matrix of errors for loadings of X-variables

$See diagonal covariance matrix of errors for loadings of Y-variables

---

`gscmcovrr` — `gscmcovrr` *determines the covariance matrix of a GSC model belonging to scenario rr.*

Description

`gscmcovrr` determines the covariance matrix of a GSC model belonging to scenario rr.

Usage

```
gscmcovrr(B, indicatorx, indicatory, lambdax, lambday, Sxixi, R2 = NULL)
```

Arguments

`B`	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij = 1 regression coefficient of eta_j in the regression relation in which eta_i is the depend variable b_ij = 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
`indicatorx`	vector describing with which exogenous composite the X-variables are connected
`indicatory`	vector describing with which endogenous composite the Y-variables are connected
`lambdax`	vector of loadings of indicators for exogenous composites
`lambday`	vector of loadings of indicators for endogenous composites
`Sxixi`	covariance matrix of exogenous composites
`R2`	vector of coefficients of determination for regressions belonging to the structural model

Value

out list with components

S	covariance matrix of manifest variables
B	(q,q) lower triangular matrix with possibly modified coefficients of the structural model
Scomp	covariance matrix of composites
Sdd	diagonal matrix of variances of errors of X variable loadings
See	diagonal matrix of variances of errors of Y variable loadings

Examples

```
Sxixi <- matrix(c(1.0,  0.01,  0.01, 1),2,2)
B <- matrix(c( 0,0,0, 0,0,0, 0.7,0.4,0),3,3,byrow=TRUE)
indicatorx <- c(1,1,1,2,2,2)
indicatory <- c(1,1,1)
lambdax <- c(0.83,0.87,0.87,0.91,0.88,0.82)
lambday <- c(0.89,0.90,0.80)
out <- gscmcovrr(B,indicatorx,indicatory,lambdax,lambday,Sxixi,R2=NULL)
```

---

mobi250 *Mobile phone data for the ECSI model.*

Description

A dataset containing 250 values of indicators of an investigation for the ECSI in the mobile phone industry.

Usage

```
mobi250
```

Format

A data frame with 250 rows and 24 variables:

IMAG1, IMAG2, IMAG3, IMAG4, IMAG5 Indicators of IMAGE

PERQ1,PERQ2,PERQ3,PERQ4,PERQ5,PERQ6,PERQ7 Indicators of Perceived Quality

CUEX1, CUEX2, CUEX3 Indicators of Customer Expectation

PERV1,PERV2 Indicators of Perceived Value

CUSA1, CUSA2, CUSA3 Indicators of Customer Satisfaction

CUSL1, CUSL2, CUSL3 Indicators of Customer Loyality

CUSCO Indicator of Customer Complaints

Source

https://www.smartpls.com

NewtonFl — NewtonFl *Newton's method to find roots of the function FlFunc.*

Description

NewtonFl Newton's method to find roots of the function FlFunc.

Usage

```
NewtonFl(target, startv, maxIter = 100, converge = 1e-12)
```

Arguments

target	vector with the desired skewness and kurtosis
startv	vector with initial guess of the coefficents for the Fleishman transform
maxIter	maximum of iterations
converge	limit of allowed absolute error

Value

out list with components

coefficients	vector with the approximation to the root
value	vector with differences of root and target
iter	number of iterations used

Examples

```
skew <- 1; kurt <- 2
startv <- c( 0.90475830, 0.14721082, 0.02386092)
out <- NewtonFl(c(skew,kurt),startv)
```

plspath — *Estimation of pls-path models*

Description

plspath estimates pls path models using the classical approach formulated in Lohmueller.

Usage

```
plspath(dat, B, indicatorx, indicatory, modex = "A", modey = "A",
  maxiter = 100, stdev = FALSE)
```

Arguments

`dat`	(n,p)-matrix, the values of the manifest variables. The columns must be arranged in that way that the components of refl are (absolutely) increasing
`B`	(q,q) lower triangular matrix describing the interrelations of the latent variables: b_ij= 1 regression coefficient of eta_j in the regression relation in which eta_i is b_ij= 0 if eta_i does not depend on eta_j in a direct way (b_ii = 0 !)
`indicatorx`	(p1,1) vector indicating with which exogenous composite the x-indicators are related.
`indicatory`	(p2,1) vector indicating with which endogenous composite the y-indicators are related. The components of the indicators must be increasing.
`modex`	equals "A" or "B" , the mode for this block of indicators
`modey`	equals "A" or "B" , the mode for this block of indicators
`maxiter`	Scalar, maximal number of iterations
`stdev`	Boolean Should the standard deviations of the estimates be computed by bootstrap?

Value

out list wih components

Bhat	(q,q) lower triangular matrix with the estimated coefficients of the structural model
eta	(n,q)-matrix, the scores of the latent variables
w	vector of length p of weights for constructing the latent variables
lambdahat	vector of length p with the loadings
resa	(n,?) matrix of residuals from outer model
resi	(n,?) matrix of residuals from inner model
R2	vector with the coefficients of determination for all regression equations of the structural model
iter	number of iterations used
ret	scalar, return code:
	0 normal convergence
	1 limit of iterations attained, probably without convergence
sdev.beta	(q,q) matrix, the standard deviations of path coefficients (when stdev = TRUE)
sdev.lambda	vector, the standard deviations of loadings (when stdev = TRUE)

Examples

```
data(mobi250)
refl <- c(1, 1, 1, 4, 4, 4, 2, 2, 2, 3, 3, 5, 5, 5, 6, 6, 6, 7, 1, 1, 4, 4, 4, 4)
o <- order(refl)
dat <- mobi250[,o]
dat <- dat[,-ncol(dat)]
refl <- refl[o][-length(refl)]
indicatorx <- refl[1:5]
indicatory <- refl[-c(1:5)] - 1
B <- matrix(c(0,0,0,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,
              0,1,1,0,0,0,0,1,1,1,0,0,1,0,0,0,1,0),6,6,byrow=TRUE)
out <- plspath(dat,B,indicatorx,indicatory,modex="A",modey="A")
```

`poloecfree` *Political and economical freedom.*

Description

A dataset containing the values of political an economical situation for 91 countries in 1975 an 1995.

Usage

```
poloecfree
```

Format

A data frame with 14 variables and 91 cases:

no number

country country

CP75 Competition of Parties 1975

PR75 Politial Rights 1975

CL75 Civil Liberties 1975

AoP75 Amount of Privatisation 1975

FFE75 Freedom of Foreign Exchange 1975

FCM75 Freedom of Capital Movements 1975

CP95 Competition of Parties 1995

PR95 Politial Rights 1995

CL95 Civil Liberties 1995

AoP95 Amount of Privatisation 1995

FFE95 Freedom of Foreign Exchange 1995

FCM95 Freedom of Capital Movements 1995

Source

Scholing, E. und Timmermann, V. (2000): Political and Economic Freedom

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`rValeMaurelli` — `rValeMaurelli` *Simulate data from a multivariate nonnormal distribution such that 1) Each marginal distribution has a specified skewness and kurtosis 2) The marginal variables have the correlation matrix R*

Description

`rValeMaurelli` Simulate data from a multivariate nonnormal distribution such that 1) Each marginal distribution has a specified skewness and kurtosis 2) The marginal variables have the correlation matrix R

Usage

```
rValeMaurelli(n, R, Fcoef)
```

Arguments

`n`	number of random vectors to be generated
`R`	desired correlation matrix of transformed variables
`Fcoef`	either vector with coefficents for the Fleishman transform to be applied to all variables or (nrow(R),3) matrix with different coefficients

Value

X (n,nrow(R)) data matrix

Examples

```
R <- matrix(c(1, 0.5, 0.3, 0.5 ,1, 0.2 , 0.3, 0.2 , 1),3,3)
coef <-  matrix(c( 0.90475830, 0.14721082, 0.02386092,0.78999781,0.57487681,
                       -0.05473674,0.79338100, 0.05859729, 0.06363759 ),3,3,byrow=TRUE)
V <- rValeMaurelli(50, R, coef)
```

`simplemodel` — *Simulated data.*

Description

The data were simulated with a gsc model with two exogeneous and one endogeneous compostes. Each composite has three indicators. All have loadings. There are 50 observations.

Usage

```
simplemodel
```

Format

A data frame with 9 variables and 50 cases:

V1,V2,V3 Indicators of first exogeneous composite

V4,V5,V6 Indicators of second exogeneous composite

V7,V8,V9 Indicators of endogeneous composite

SolveCorr — `SolveCorr` *Solve the Vale-Maurelli cubic equation to find the intermediate correlation between two normal variables that gives rise to a target correlation (rho) between the two transformed nonnormal variables.*

Description

`SolveCorr` Solve the Vale-Maurelli cubic equation to find the intermediate correlation between two normal variables that gives rise to a target correlation (rho) between the two transformed nonnormal variables.

Usage

```
SolveCorr(rho, coef1, coef2)
```

Arguments

`rho`	desired correlation of transformed variables
`coef1`	vector with coefficents for the Fleishman transform of the first variable
`coef2`	vector with coefficents for the Fleishman transform of the second variable

Value

root the intermediate correlation

Examples

```
rho <- 0.5
coef1<-  c( 0.90475830, 0.14721082, 0.02386092)
coef2<-  c( 0.90475830, 0.14721082, 0.02386092)
r <- SolveCorr(rho, coef1, coef2)
```

`subcheckw` *Function for use in checkw*

Description

`subcheckw` computes the sum of squared differences of two formulas for the covariancematrix of composites

Usage

```
subcheckw(w, indicator, S, L, Scomp)
```

Arguments

`w`	vector of weights
`indicator`	vector describing with which exogenous composite the indicators are connected
`S`	covariance matrix of errors resulling from regession for loadings
`L`	matrix of loadings
`Scomp`	covariance matrix of composites

Value

out scalar, sum of squared differences

`twoclm` *Simulated data.*

Description

The data were simulated with two gsc models, both with two exogeneous and one endogeneous composites. The exogeneous and endegeneous composites have three indicators. There are no loadings. The first 50 observations were simulated with one set of path coefficients, the second 50 observations with another set. the last column is the membership of a former clustering (k=2).

Usage

```
twoclm
```

Format

A data frame with 10 variables and 50 cases:

X1,X2,X3 Indicators of first exogeneous composite

X4,X5,X6 Indicators of second exogeneous composite

Y1,Y2,Y3 Indicators of endogeneous composite

member membership of a former clustering

VMTargetCorr — `VMTargetCorr` *Given a target correlation matrix, R, and target values of skewness and kurtosis for each marginal distribution, find the "intermediate" correlation matrix, V*

Description

`VMTargetCorr` Given a target correlation matrix, R, and target values of skewness and kurtosis for each marginal distribution, find the "intermediate" correlation matrix, V

Usage

```
VMTargetCorr(R, Fcoef)
```

Arguments

`R`	desired correlation matrix of transformed variables
`Fcoef`	either vector with coefficents for the Fleishman transform to be applied to all variables or (nrow(R),3) matrix with different coefficients

Value

V the intermediate correlation matrix

Examples

```
R <- matrix(c(1, 0.5, 0.3, 0.5 ,1, 0.2 , 0.3, 0.2 , 1),3,3)
coef <-  matrix(c( 0.90475830, 0.14721082, 0.02386092,0.78999781,0.57487681,
                        -0.05473674,0.79338100, 0.05859729, 0.06363759 ),3,3,byrow=TRUE)
V <- VMTargetCorr(R, coef)
```

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