Package ‘cbsem’

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Type Package

Title Simulation, estimation and segmentation of composite based structural equation models

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Description Two block SEM's are considered: The indicators of the exogenous composites are named by X, the indicators of the endogenous by Y. Then in scenario 1 all indicators have loadings, i. e. arrows that are pointing from the composite to their indicator. This is also called reflective relations in the literature. In scenario 2 only from the endogenous composites arrows are pointing to their indicators and in scenario 3 there are no loadings at all. For these three scenarios the function gscals estimates the models. The covariance matrices are computed which can be used to simulate these models. A segmentation procedure is also included.

Depends R (>= 2.10)

License GPL

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

NeedsCompilation no

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

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)
out <- 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)
```

checkwce — *checkwce compares two formulations of the covariance matrix of composites. For use in gscmcovce*

Description

checkwce compares two formulations of the covariance matrix of composites. For use in gscmcovce

Usage

```
checkwce(s, indicator, w, L, Scomp)
```

Arguments

`s`	vector of correlations of errors in the regression relation of loadings
`indicator`	vector describing with which composite the indicators are connected
`w`	vector of weights for building composites
`L`	matrix of loadings
`Scomp`	covariance matrix of composites

Value

out sum of squared differences of two formulations of the covariance matrix of composites

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, 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
`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,2,1)
```

`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` — `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.*

Description

`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 scenario 1: mode A - mode A; scenario 2: mode B - mode A; scenario 3: modeB - mode B*

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, should a bootstrap bias correction be 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 gscmcovll, gscmcovwl and gscmcovww

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)
```

---

gscmcovce *Modification of a covariance matrix of a cb sem model to allow for correlated errors in the regression equaton of loadings.*

Description

gscmcovce determines the covariance matrix of a GSC model with correlated errors in the regression equaton of loadings.

Usage

```
gscmcovce(B, indicatorx, indicatory, lambdax = NULL, lambday, wx = NULL, wy,
  S, Scomp)
```

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
wx	vector of weights for building exogenous composites or NULL when there are no loadings for the X-variables in the model
wy	vector of weights for building endogenous composites
S	covariance matrix ofindicators
Scomp	covariance matrix of composites

Value

out list with components

S	covariance matrix of manifest variables
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
optval	vector with values of optimisation criterion

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)
out1 <- gscmcov(B,indicatorx,indicatory,lambdax=lambdax,lambday=lambday,
                wx=NULL,wy=NULL,Sxixi,R2=NULL)
out1a <- Checkw(B,indicatorx,indicatory,lambdax=lambdax,lambday=lambday,
                wx=FALSE,wy=FALSE,Sxixi,R2=NULL)
out2 <- gscmcovce(B,indicatorx,indicatory,lambdax=lambdax,lambday,
                  wx=out1a$wx,out1a$wy,out1$S,out1$Scomp)
```

---

gscmcovll — gscmcovll *determines the covariance matrix of a GSC model belonging to scenario 1.*

Description

gscmcovll determines the covariance matrix of a GSC model belonging to scenario 1.

Usage

```
gscmcovll(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 <- gscmcovll(B,indicatorx,indicatory,lambdax,lambday,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 gscmcovwl — gscmcovwl *determines the covariance matrix of a GSC model belonging to scenario 2.*

Description

gscmcovwl determines the covariance matrix of a GSC model belonging to scenario 2.

Usage

```
gscmcovwl(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 <- gscmcovwl(B,indicatorx,indicatory,lambday,wx,Sxixi,R2=NULL)
```

gscmcovww — *Determination of the covariance matrix of a GSC model belonging to scenario 3* `gscmcovww` *determines the covariance matrix of a GSC model belonging to scenario 3.*

Description

Determination of the covariance matrix of a GSC model belonging to scenario 3 `gscmcovww` determines the covariance matrix of a GSC model belonging to scenario 3.

Usage

```
gscmcovww(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 <- gscmcovww(B,indicatorx,indicatory,wx,wy,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

http://info.smartpls.com/index.php?id=smartpls-examples

`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")
```

`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)
```

Index