# Package ‘cbsem’

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**Type** Package  
**Title** Simulation, estimation and segmentation of composite based structural equation models  
**Version** 0.1.0  
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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  
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**NeedsCompilation** no

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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 coefficient 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 matrices of the composites.

**Usage**

```r
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: 
  \[ b_{ij} = 1 \text{ regression coefficient of } \eta_j \text{ in the regression relation in which } \eta_i \text{ is the depend variable } b_{ij} = 0 \text{ if } \eta_i \text{ does not depend on } \eta_j \text{ in a direct way } (b_{ii} = 0)! \]
- **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**

```r
B <- matrix(c(0,0,0,0,0,1,0,0,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,1,0,0,0,0,0,0,1,1,0,0,0,1,0,0,0,1,0,0,1,0,0,1,0,0,1,0,0,1,0,0,1,0),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)
```
checkwce

checkwce <- matrix(1,1,1)
out <- Checkw(B,indicatorx,indicatory,lambdax=TRUE,lambday=TRUE,wx=FALSE,wy=FALSE,Sxixi,
R2=FALSE)

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

__________________________

crulergscairls

crulergscairls Clustering gsc-models

description

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

Usage

clusregsscairls(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)

F1Deriv

F1Deriv(compute the Jacobian of the Fleishman transform for a given set of coefficients b,c,d

Description

F1Deriv compute the Jacobian of the Fleishman transform for a given set of coefficients b,c,d

Usage

F1Deriv(coef)

Arguments

coeff vector with the coefficients for the Fleishman transform
Fleishman

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 coefficients b,c,d for the Fleishman transform

Description

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

Usage

Fleishman(coef)

Arguments

coef vector with the coefficients

Value

out vector with coefficients Var,Skew,Kurt

Examples

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

FleishmanIC

FleishmanIC produces 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 produces 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?
**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** 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)
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(0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0),6,6,byrow=TRUE)
out <- gscals(dat,B,indicatorx,indicatory,loadingx=TRUE,loadingy=TRUE,maxiter=200,biascor=FALSE)
**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**

```r
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)
```
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  

wy    vector of weights for building endogenous composites or NULL when loadings are  

Sxixi  covariance matrix of exogenous composites

R2    vector of coefficients of determination for regressions belonging to the structural  

model

Value

d 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 endogenous 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

```r
Sxixi <- matrix(c(1.0, 0.01, 0.01, 1),2,2)
B <- matrix(c( 0,0, 0,0, 0.7,0.4,0),3,3,byrow=TRUE)
indicatorx <- c(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)
```

Description

gscmcovce determines the covariance matrix of a GSC model with correlated errors in the regression equation 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 of indicators
- **Scomp**: covariance matrix of composites
Value

out list with components

\[ \mathbf{S} \quad \text{covariance matrix of manifest variables} \]
\[ \mathbf{Sdd} \quad \text{diagonal matrix of variances of errors of X variable loadings or NA} \]
\[ \text{See} \quad \text{diagonal matrix of variances of errors of Y variable loadings or NA} \]
\[ \text{optval} \quad \text{vector with values of optimisation criterion} \]

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$wx,wy=out1a$wy,out1$S,out1$Scomp)

---

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

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 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)
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

```r
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 dependent 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

- **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 endogenous composites

### Examples

```r
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

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 coefficients 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 boot-strap?
Value

out list with 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, 4, 4, 4, 4, 2, 2, 3, 3, 5, 5, 6, 6, 6, 7, 1, 4, 4, 4)
o <- order(refl)
dat <- mobi250[,o]
dat <- dat[, -ncol(dat)]
refl <- refl[o][1:length(refl)]
indicatorx <- refl[1:5]
indicatory <- refl[-c(1:5)] - 1
B <- matrix(c(0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0),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 coefficients 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 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 coefficients for the Fleishman transform of the first variable
coef2 vector with coefficients 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)
**VMTargetCorr**

**Arguments**

- **w**: vector of weights
- **indicator**: vector describing with which exogenous composite the indicators are connected
- **S**: covariance matrix of errors resulting from regression for loadings
- **L**: matrix of loadings
- **Scomp**: covariance matrix of composites

**Value**

out scalar, sum of squared differences

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**twoclm**

*Simulated data.*

**Description**

The data were simulated with two gsc models, both with two exogeneous and one endogeneous composites. The exogeneous and endogeneous 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

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**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)
VMTargetCorr

Arguments

R            desired correlation matrix of transformed variables
Fcoef        either vector with coefficients 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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