Package: iopsych (via r-universe)

September 6, 2024

Type Package

Title Methods for Industrial/Organizational Psychology

Version 0.90.1

Date 2016-03-16

Author Allen Goebl <goebl005@umn.edu>, Jeff Jones <jone1087@umn.edu>, Jeff Dahlke <dahlk068@umn.edu>, and Adam Beatty <abeatty@humrro.org>

Maintainer Allen Goebl <goebl005@umn.edu>

Depends R (>= 3.0)

Imports mvtnorm (>= 1.0), mco (>= 1.0), stats (>= 1.0), fungible (>= 1.1)

Description Collection of functions for IO Psychologists.

License BSD_3_clause + file LICENSE

RoxygenNote 6.0.1

NeedsCompilation no

Date/Publication 2016-04-04 13:38:31

Repository https://allengoebl.r-universe.dev

RemoteUrl https://github.com/allengoebl/iopsych

RemoteRef HEAD

RemoteSha 5dc3cb65d441da56e6ce72edaf13ab6d0d10b0d8

Contents

`aiEst` *Estimate adverse impact given d and sr*

Description

Estimate adverse impact given d and sr

Usage

```
aiEst(d, sr, pct_minority)
```

Arguments

`d`	Subgroup difference.
`sr`	The percentage of the applicant population that is selected.
`pct_minority`	The percentage of the applicant population that is part of a given minority group.

Value

ai The adverse impact ratio.

overall_sr The overall selection ratio.

sr_majority The selection ratio for the majority group.

sr_minority The selection ratio for the minority group.

uc the predictor cutoff value that corresponds to the given overall selection ratio

Author(s)

Jeff Jones and Allen Goebl

References

De Corte, W., Lievens, F.(2003). A practical procedure to estimate the quality and the adverse impact of single-stage selection decisions. *International Journal of Selection and Assessment, 11(1)*, 87-95.

Examples

```
aiEst(d = -0.15, sr = 0.25, pct_minority = 0.30)

aiEst(d = -0.40, sr = 0.10, pct_minority = 0.15)
```

`aiPux` *Estimate ai and average criterion scores for majority and minority groups.*

Description

Estimate ai and average criterion scores for majority and minority groups.

Usage

```
aiPux(mr, dx, dy = -1, sr, pct_minority)
```

Arguments

`mr`	The correlation between the predictor and criterion composites.
`dx`	A vector of d values for the predictors. These d values are expected to have been computed in the direction of Minority - Majority.
`dy`	A vector of d values for the criteria These d values are expected to have been computed in the direction of Majority - Minority.
`sr`	The percentage of the applicant population that is selected.
`pct_minority`	The percentage of the applicant population that is part of a given minority group.

Value

AI Adverse Impact

Overeall_sr The overall selection ratio set by the user

Majority_sr Majority Selection Rate

Minority_sr Minority Selection Rate

Majority_Standardized Predicted composite criterion score relative to the majority population

Global_Standardized Predicted composite criterion score relative to the overall population

Author(s)

Jeff Jones and Allen Goebl

References

De Corte, W., Lievens, F.(2003). A practical procedure to estimate the quality and the adverse impact of single-stage selection decisions. *International Journal of Selection and Assessment.*, 11(1), 87-95.

Examples

```
aiPux(0.6, dx=-0.8, sr=0.3, pct_minority=0.25)
aiPux(0.6, dx=-0.8, dy=-0.2, sr=0.3, pct_minority=0.25)
```

---

aiPuxComposite — *Estimate ai and average criterion scores for majority and minority groups.*

Description

Estimate ai and average criterion scores for majority and minority groups.

Usage

```
aiPuxComposite(r_mat, y_col, x_col, dX, dY, wt_x, wt_y, sr, pct_minority)
```

Arguments

`r_mat`	Super correlation matrix between the predictors and criteria. This argument assumes that the predictors come first in the matrix.
`y_col`	A vector of columns representing criterion variables.
`x_col`	A vector of columns representing predictor variables.
`dX`	A vector of d values for the predictors. These d values are expected to have been computed in the direction of Minority - Majority.
`dY`	A vector of d values for the criteria These d values are expected to have been computed in the direction of Minority - Majority.

wt_x	Weights for the predictors to form the overall composite predictor.
wt_y	Weights for the criteria to form the overall composite criterion.
sr	The percentage of the applicant population that is selected.
pct_minority	The percentage of the applicant population that is part of a given minority group.

Value

AI Adverse Impact

Overeall_sr The overall selection ratio set by the user

Majority_sr Majority Selection Rate

Minority_sr Minority Selection Rate

Majority_Standardized Predicted composite criterion score relative to the majority population

Global_Standardized Predicted composite criterion score relative to the overall population

Author(s)

Jeff Jones and Allen Goebl

References

De Corte, W., Lievens, F.(2003). A Practical procedure to estimate the quality and the adverse impact of single-stage selection decisions. *International Journal of Selection and Assessment, 11(1)*, 87-95.

De Corte, W. (2003). Caiqs user's guide. http://allserv.rug.ac.be/~wdecorte/software.html

Examples

```
# Example taken from De Corte, W. (2003)
R <- matrix(c(1.000, 0.170, 0.000, 0.100, 0.290, 0.160,
              0.170, 1.000, 0.120, 0.160, 0.300, 0.260,
              0.000, 0.120, 1.000, 0.470, 0.120, 0.200,
              0.100, 0.160, 0.470, 1.000, 0.240, 0.250,
              0.290, 0.300, 0.120, 0.240, 1.000, 0.170,
              0.160, 0.260, 0.200, 0.250, 0.170, 1.000), 6, 6)

wt_x <- c(.244, .270, .039, .206)
wt_y <- c(6, 2)
sr    <- 0.25
pct_minority <- .20

dX   <- c(-1, -0.09, -0.09, -0.20)
dY   <- c(-0.450, 0.0)

aiPuxComposite(R, 5:6, 1:4, dX, dY, wt_x, wt_y, sr, pct_minority)

# compare the output from predictAI with the output in the CAIQS manual on page 7 where SR = .250
```

`asvab` *Wee, Newman, & Joseph, (2014) ASVAB data*

Description

This dataset was published in Wee, Newman, and Joseph (2014) and describes the results of a military validation study. The first four rows contain the intercorrelations of the four predictor variables. The fifth row contains the black-white score differences (d). Rows 6-12 contain the correlations between the four predictor variables and the six job performance variables.

Usage

```
asvab
```

Format

A data frame with 12 rows and 4 columns.

References

Wee, S., Newman, D. A., & Joseph, D. L. (2014). More than g: Selection quality and adverse impact implications of considering second-stratum cognitive abilities. *Journal of Applied Psychology, 99(4)*.

`cor2d` *Convert from r to d*

Description

Convert from r to d

Usage

```
cor2d(r, n_1 = 1, n_2 = 1)
```

Arguments

`r`	A r-value or a vector of r values.
`n_1`	The sample size of group 1.
`n_2`	The sample size of group 2.

Value

A d value or a vector of d values.

Author(s)

Jeff Dahlke, Allen Goebl, and Jeff Jones

Examples

```
cor2d(.3)
cor2d(.3, n_1 = 20, n_2 = 50)
cor2d(((1:9)/10))
```

---

d2cor *Convert from d to r*

Description

Convert from d to r

Usage

```
d2cor(d, n_1 = 1, n_2 = 1)
```

Arguments

d	A d-value or a vector of d values.
n_1	The sample size of group 1.
n_2	The sample size of group 2.

Value

A r value or a vector of r values.

Author(s)

Jeff Dahlke, Allen Goebl, and Jeff Jones

Examples

```
d2cor(.3)
d2cor(.3, n_1 = 20, n_2 = 50)
d2cor(((1:9)))
```

`dComposite` *Estimates the d of a composite.*

Description

Estimates the d of a composite.

Usage

```
dComposite(rxx, d_vec, wt_vec = rep(1, length(d_vec)))
```

Arguments

`rxx`	A matrix of predictor intercorrelations.
`d_vec`	A vector containing d's for each predictor.
`wt_vec`	A vector containing the weights of each item in rxx.

Value

A vector of correlation coefficients.

Note

This is essentially the same function as solveWt().

Author(s)

Jeff Jones and Allen Goebl

References

Sackett, P. R., & Ellingson, J. E. (1997). *Personnel Psychology., 50(3)*, 707-721.

Examples

```
Rxx <- matrix(.3, 3, 3); diag(Rxx) <- 1
ds  <- c(.2, .4, .3)
dComposite(rxx = Rxx, d_vec = ds)

Rxx <- matrix(c(1.0, 0.3, 0.2,
                0.3, 1.0, 0.1,
                0.2, 0.1, 1.0), 3, 3)
ds  <- c(.1, .3, .7)
ws  <- c(1, .5, .5)
dComposite(rxx = Rxx, d_vec = ds, wt_vec = ws)
```

`dls2007` *Decorte, Lievens, & Sackett (2007) example data*

Description

This hypothetical dataset was published in De Corte, Lievens, and Sackett (2007). The first column contains black-white subgroup difference scores. Columns 2-7 contain a hypothetical predictor, job performance correlation matrix.

Usage

```
dls2007
```

Format

A data frame with 6 rows and 7 columns.

References

De Corte, W., Lievens, F., & Sackett, P. R. (2007). Combining predictors to achieve optimal trade-offs between selection quality and adverse impact. *Journal of Applied Psychology, 92(5)*, 1380.

`fuse` *Computes the correlation between two composites of items.*

Description

Computes the correlation between two composites of items. Composites may contain overalapping items. Items weights for each composite may be specified.

Usage

```
fuse(r_mat, a, b, wt_a = rep(1, length(a)), wt_b = rep(1, length(b)))
```

Arguments

`r_mat`	A correlation matrix.
`a`	The items used for composite A specified as a vector of column numbers.
`b`	The items used for composite B specified as a vector of column numbers.
`wt_a`	A vector containing the weights of each item in composite A.
`wt_b`	A vector containing the weights of each item in composite B.

Value

A correlation coefficient.

correlation The correlation between two composites.

covariance The covariance between two composites.

variance_a The variance of composite A.

variance_b The variance of composite B.

Note

This function is entended to be used for single cases. See `fuse2()` for a vectorized alternative to this function.

Author(s)

Allen Goebl and Jeff Jones

References

Lord, F.M. & Novick, M.R. (1968). *Statisticl theories of menal test scores*.

Examples

```
Rxx <- matrix(c(1.00, 0.25,  0.50,  0.61,
                0.25, 1.00,  0.30,  0.10,
                0.50, 0.30,  1.00, -0.30,
                0.61, 0.10, -0.30,  1.00), 4, 4)
a   <- c(1, 3)
b   <- c(2, 4)

# Example using overlapping items and weights
Rxx  <- matrix(.3, 4, 4); diag(Rxx) <- 1
a    <- c(1, 2, 4)
b    <- c(2, 3)
wt_a <- c(.60, .25, .15)
wt_b <- c(2, 3)

fuse(r_mat = Rxx, a = a, b = b, wt_a = wt_a, wt_b = wt_b)
```

---

fuse2 *Computes the correlation between two composites of items using weights.*

Description

Computes the correlation between two composites of items. Composites may contain overalapping items. Items weights for each composite may be specified.

Usage

```
fuse2(r_mat, wt_a, wt_b)
```

Arguments

`r_mat`	A correlation matrix.
`wt_a`	A vector containing the weights of each item in composite A. Items which are not included in the composite should be assigned a weight of 0.
`wt_b`	A vector containing the weights of each item in composite B. Items which are not included in the composite should be assigned a weight of 0.

Value

A correlation coefficient.

Note

This is an alternative version of `fuse()` which uses weight vectors to specify both item selection and weight. This syntax maybe be preferable to some users. Furthermore, this function is more powerful in that it can return values for multiple sets of weights.

Author(s)

Allen Goebl and Jeff Jones

References

Lord, F.M. & Novick, M.R. (1968). *Statisticl theories of menal test scores*.

Examples

```
Rxx <- matrix(c(1.00, 0.25,  0.50,  0.61,
                0.25, 1.00,  0.30,  0.10,
                0.50, 0.30,  1.00, -0.30,
                0.61, 0.10, -0.30,  1.00), 4, 4)
wt_a   <- c(1, 0, 1, 0)
wt_b   <- c(0, 1, 0, 1)

# Example using overlapping items and weights
Rxx  <- matrix(.3, 4, 4); diag(Rxx) <- 1
wt_a <- c(.60, .25, 0, .15)
wt_b <- c(0, 2, 3, 0)

fuse2(r_mat = Rxx, wt_a = wt_a, wt_b = wt_b)
```

fuseMat *The intercorrelation among items and composites made of these items.*

Description

The key matrix is used to specify any number of weighted item composites. A correlation matrix of these composites and the original correlation matrix is then computed and returned.

Usage

```
fuseMat(r_mat, wt, type = "full")
```

Arguments

`r_mat`	A correlation matrix.
`wt`	A matrix with one row for each composite and one column for each item contained in `r_mat`. The value if each element corresponds to the weight given to an item.
`type`	The type of output desired.

Value

If `type` = "cxc" then a matrix of the intercorrelations between the specified composites are returned. If `type` = "full" then all the intercorrelations between both the original items and the specified composites are returned.

Author(s)

Allen Goebl and Jeff Jones

Examples

```
Rxx <- matrix(c(1.00, 0.25,  0.50,  0.61,
                0.25, 1.00,  0.30,  0.10,
                0.50, 0.30,  1.00, -0.30,
                0.61, 0.10, -0.30,  1.00), 4, 4); Rxx

# Single composite
wt <- matrix(c(1, 2, 3, -1), 1, 4); wt

fuseMat(r_mat = Rxx, wt = wt)

# Three composites
wt  <- matrix(c(1, 2, 3, -1,
                2, 1, 0, -2,
                1, 1, 0,  0), 3, 4, byrow = TRUE)

fuseMat(Rxx, wt)
```

fuseVec *Computes the correlations between a correlation matrix and a weighted composite of items from the matrix.*

Description

Computes the correlations between a correlation matrix and a weighted composite of items from the matrix.

Usage

```
fuseVec(r_mat, wt)
```

Arguments

r_mat	A correlation matrix.
wt	A vector containing the weights of each item in composite A or a matrix with one row per weight vector.

Value

A vector of correlation coefficients will be returned if wt_a is a vector. If /codewt_b is a matrix, a matrix of correlation coefficients with one row for each weight vector will be returned.

Author(s)

Allen Goebl and Jeff Jones

References

Lord, F.M. & Novick, M.R. (1968). *Statisticl theories of mental test scores*.

Examples

```
data(dls2007)
dat <- dls2007
rxx <- dat[1:4, 2:5]
wt1 <- c(1, 1, 1, 1)
wt2 <- c(2, 0, 1, 0)
wt  <- rbind(wt1, wt2)

fuseVec(r_mat=rxx, wt=wt1)
```

`lMvrrc` *Lawley multivariate range restriction correction.*

Description

Lawley multivariate range restriction correction.

Usage

```
lMvrrc(rcov, vnp, as_cor = TRUE)
```

Arguments

`rcov`	The covariance matrix of the restricted sample.
`vnp`	The covariance matrix of predictors explicitly used for selection. This matrix should be based on the the unrestricted population.
`as_cor`	This argument can be set to FALSE to return a covariance matrix.

Value

The the correlation matrix or variance/covariance matrix in the unrestricted population.

Author(s)

The original function was written by Adam Beatty and adapted by Allen Goebl.

References

Lawley D. N (1943). A note on Karl Pearson's selection formulae. *Proceedings of the Royal Society of Edinburgh, 62(Section A, Pt. 1)*, 28-30.

Examples

```
data(rcea1994)
vstar <- rcea1994$vstar
vpp   <- rcea1994$vpp

lMvrrc(rcov=vstar, vnp=vpp)
```

`paretoXX` *Computes data needed for a XX Pareto plot.*

Description

Computes data needed for a XX Pareto plot.

Usage

```
paretoXX(r_mat, x_col, y_col, pts = 100)
```

Arguments

`r_mat`	A correlation matrix.
`x_col`	A vector of columns representing predictor variables.
`y_col`	A vector of columns representing criterion variables.
`pts`	The number of points used. Determines accuracy.

Value

betas A matrix of beta weights for each criteria weight

wt_one The weight given to the first criterion

multiple_r The correlation between the predictor and criterion composites

Author(s)

Allen Goebl and Jeff Jones

Examples

```
# Setup Data
data(dls2007)
r_mat <- dls2007[1:6, 2:7]

#Run Model
XX1 <- paretoXX(r_mat=r_mat, x_col=1:4, y_col=5:6)
# Plot Multiple correlations
plot(c(0,1), c(.3,.5), type="n", xlab="C1 Wt", ylab="mr")
lines((XX1$wts)[,1], (XX1$multiple_r)[,1])
lines((XX1$wts)[,1], (XX1$multiple_r)[,2])
```

`paretoXY` *Computes data needed for a XY Pareto plot.*

Description

Computes data needed for a XY Pareto plot.

Usage

```
paretoXY(r_mat, x_col, y_col, d_vec = NULL, gen = 100, pop = 100,
  pred_lower = rep(-2, length(x_col)), pred_upper = rep(2, length(x_col)),
  ...)
```

Arguments

`r_mat`	A correlation matrix.
`x_col`	A vector of columns representing predictor variables.
`y_col`	A vector of columns representing criterion variables.
`d_vec`	A vector of d scores.
`gen`	The number of iterations used by the algorithim.
`pop`	The population or number of cases used by the algorithim.
`pred_lower`	The minimum weight allowed for each predictor.
`pred_upper`	The maximum weight allowed for each predictor.

Value

betas A matrix of beta weights for each criteria weight

mr_d A matrix of multiple correlations or d values corresponding to each row of beta weights.

pareto_optimal A vector indicating whether each value is pareto optimal

Author(s)

Allen Goebl Jeff Jones

Examples

```
data(dls2007)
dat <- dls2007
r_mat <- dat[1:6, 2:7]
x_col <- 1:4
y_col <- 5:6
d_vec <- -dat[1:4, 1]

paretoXY(r_mat=r_mat, x_col=1:4, y_col=5, d_vec=d_vec, pred_lower=c(0,0,0,0))
paretoXY(r_mat=r_mat, x_col=1:4, y_col=c(5,6))
```

`rcea1994` *Ree, Carretta, Earles, and Albert (1994)*

Description

This example data was published in Ree, Carretta, Earles, and Albert (1994). The data set contains two matrices stored as a list, which can be used to demonstrate multivariate range restriction corrections. The vstar matrix is the variance-covariance matrix of the unrestricted sample. The vpp matrix is the variance covariance matrix of the restricted sample. The vpp matrix represents the subset of variables which were explicitly used for selection, which are also found in the upper left corner of the vstar matrix.

Usage

```
rcea1994
```

Format

A list containing a 4x4 matrix and a 2x2 matrix as elements.

References

Ree, M. J., Carretta, T. R., Earles, J. A., & Albert, W. (1994). Sign changes when correcting for range restriction: A note on Pearson's and Lawley's selection formulas. *Journal of Applied Psychology, 72(2)*, 298.

`reliabate` *Disattenuate a correlation matrix using an estimate of the component reliabilities*

Description

Disattenuate a correlation matrix using an estimate of the component reliabilities

Usage

```
reliabate(r_mat, rel_vec)
```

Arguments

`r_mat`	A correlation matrix
`rel_vec`	A vector or reliabilities.

Value

A reliabated (disattenauted) correlation matrix.

Author(s)

Allen Goebl and Jeff Jones

Examples

```
r_mat <- matrix(c(1.00, 0.25, 0.30,
                  0.25, 1.00, 0.50,
                  0.30, 0.50, 1.00), 3, 3)
rel   <- c(.70, .64, .81)
reliabate(r_mat = r_mat, rel_vec = rel)
```

---

relWt *Relative weights*

Description

Function to implement Johnson's (2000) relative weight computation.

Usage

```
relWt(r_mat, y_col, x_col)
```

Arguments

r_mat	A correlation matrix.
y_col	A vector of columns representing criterion variables.
x_col	A vector of columns representing predictor variables.

Value

A list containing the objects eps, beta_star, and lambda_star. The object eps contains the vector of relative weights of the predictors whose sum is equivalent to the model R^2 (see Johnson, 2000, ps 8 - 9). The object beta_star contains the regression weights from regressing the criterion on Z, the 'best fitting orthogonal approximation' of the predictor variables (see Johnson, 2000, p. 5). The object lambda_star contains the regression coefficients from regressing Z on the predictor variables (see Johnson, 2000, p. 8).

Author(s)

Jeff Jones and Allen Goebl

References

Johnson, J. (2000). A heuristic method for estimating the relative weight of predictor variables in multiple regression. *Multivariate Behavioral Research, 35*, 1–19.

Examples

```
Rs <- matrix(c(1.0, 0.2,  0.3, 0.4, -0.4,
               0.2, 1.0,  0.5, 0.1,  0.1,
               0.3, 0.5,  1.0, 0.2, -0.3,
               0.4, 0.1,  0.2, 1.0,  0.4,
              -0.4, 0.1, -0.3, 0.4,  1.0), 5, 5)
ys <- 5
xs <- 1:4

relWt(Rs, ys, xs)
```

---

rmatReg *Regression*

Description

Regression

Usage

```
rmatReg(r_mat, y_col, x_col, N = NULL, alpha = 0.05)
```

Arguments

r_mat	A correlation matrix.
y_col	The column representing the criterion variable.
x_col	A vector of columns representing predictor variables.
N	Number of observations
alpha	alpha value for (1 - alpha)% Confidence Interval

Value

Regression beta weights and R^2. If N is supplied, the standard error of the beta weights as well as the confidence intervals are returned as well.

Note

If N is non-null the function will compute corrected standard errors for the standardized regression coefficients using the delta method. For additional details on the calculation of the corrected standard errors see Yuan and Chan (2011) and Jones and Waller (2015).

Author(s)

Allen Goebl and Jeff Jones

References

Jones, J. A. & Waller, N. G. (2015). The normal-theory and asymptotic distribution-free covariance matrix of standardized regression coefficients: Theoretical extensions and finite sample behavior. *Psychometrika, 80*, 365-378.

Yuan, K. and Chan, W. (2011). Biases and standard errors of standardized regression coefficients. *Psychometrika, 76*, 670-690.

Examples

```
Rs <- matrix(c(1.0, 0.2,  0.3, 0.4, -0.4,
               0.2, 1.0,  0.5, 0.1,  0.1,
               0.3, 0.5,  1.0, 0.2, -0.3,
               0.4, 0.1,  0.2, 1.0,  0.4,
              -0.4, 0.1, -0.3, 0.4,  1.0), 5, 5)
ys <- 5
xs <- 1:4

rmatReg(Rs, ys, xs)

# Example with standard errors
rmatReg(Rs, ys, xs, N = 100)
```

---

rmatWtR2 — *Find $R\hat{}2$ given arbitrary predictor weights*

Description

Find R^2 given arbitrary predictor weights

Usage

```
rmatWtR2(r_mat, y_col, x_col, wt)
```

Arguments

r_mat	A correlation matrix.
y_col	A vector of columns representing criterion variables.
x_col	A vector of columns representing predictor variables.
wt	A vector of predictor weights or a list of multiple vectors.

Value

Regression R2.

Note

This is a wrapper for solveWt().

Author(s)

Allen Goebl and Jeff Jones

Examples

```
library(iopsych)
#Get Data
data(dls2007)
r_mat <- dls2007[1:6, 2:7]

#Get weights
unit_wt <- c(1,1,1,1)
other_wt <- c(1,2,1,.5)
wt_mat <- rbind(unit_wt, other_wt)

#Solve
rmatWtR2(r_mat=r_mat, y_col=6, x_col=1:4, wt=unit_wt)
rmatWtR2(r_mat=r_mat, y_col=6, x_col=1:4, wt=other_wt)
rmatWtR2(r_mat=r_mat, y_col=6, x_col=1:4, wt=wt_mat)
```

---

solveBeta *Find beta weights*

Description

Find beta weights

Usage

```
solveBeta(rxx, rxy)
```

Arguments

rxx	A matrix of predictor intercorrelations.
rxy	A vector of predictor criterion intercorrelations, or a matrix with one row per criterion.

Value

A vector or matrix of regression weights.

Author(s)

Allen Goebl and Jeff Jones

Examples

```
library(iopsych)
data(dls2007)
dat <- dls2007[1:6, 2:7]
rxx <- dat[1:4, 1:4]
rxy <- dat[1:4, 5]

solveBeta(rxx=rxx, rxy=rxy)
```

---

solveR2 *Find R2*

Description

Find R2

Usage

```
solveR2(rxx, rxy)
```

Arguments

rxx	A matrix of predictor intercorrelations.
rxy	rxy A vector of predictor criterion intercorrelations, or a matrix with one row per criterion.

Value

R2 and Regression weights

Author(s)

Allen Goebl and Jeff Jones

Examples

```
print("example needed")
```

solveReg — *Find beta weights and R2*

Description

Find beta weights and R2

Usage

```
solveReg(rxx, rxy)
```

Arguments

rxx	A matrix of predictor intercorrelations.
rxy	A vector of predictor criterion intercorrelations, or a matrix with one row per criterion.

Value

R2 and Regression weights

Author(s)

Allen Goebl and Jeff Jones

Examples

```
print("example needed")
```

solveWtCrit — *Correlation between weighted criterion composite and predictors.*

Description

Correlation between weighted criterion composite and predictors.

Usage

```
solveWtCrit(ryy, rxy, wt)
```

Arguments

ryy	A matrix of criterion intercorrelations.
rxy	A vector of predictor criterion intercorrelations, or a matrix with one row per criterion.
wt	A vector of criterion weights, or a matrix with one set of criterion weights per row.

Value

A matrix of correlation coefficent with one row per weight vector and one column per predictor.

Author(s)

Allen Goebl Jeff Jones

Examples

```
library(iopsych)
data(dls2007)
dat <- dls2007[1:6, 2:7]
ryy <- dat[5:6, 5:6]
rxy <- dat[5:6, 1:4]

wt1 <- c(.25, .75)
wt2 <- c(.75, .25)
wt_mat <- rbind(wt1, wt2)

solveWtCrit(ryy=ryy, rxy=rxy, wt=wt_mat)
```

---

solveWtPred *Correlation between weighted predictor composite and criterion.*

Description

Correlation between weighted predictor composite and criterion.

Usage

```
solveWtPred(rxx, rxy, wt)
```

Arguments

rxx	A matrix of predictor intercorrelations.
rxy	A vector of predictor criterion intercorrelations, or a matrix with one row per criterion.
wt	A vector of predictor weights, or a matrix with one set of predictor weights per row.

Value

A matrix of correlation coefficent with one row per weight vector and one column per rxy vector.

Author(s)

Allen Goebl Jeff Jones

Examples

```
library(iopsych)
data(dls2007)
dat <- dls2007[1:6, 2:7]
rxx <- dat[1:4, 1:4]
rxy <- dat[5:6, 1:4]

wt1 <- c(1,1,1,1)
wt2 <- c(1,2,3,4)
wt_mat <- rbind(wt1, wt2)

solveWtPred(rxx=rxx, rxy=rxy, wt=wt_mat)
```

---

trModel *Taylor-Russell Ratio*

Description

Computes the Taylor Russel ratio

Usage

```
trModel(rxy, sr, br)
```

Arguments

`rxy`	The correaltion between the predictor composite and the criterion.
`sr`	The selection ratio.
`br`	The base rate of the criterion. The cutoff point indicating success or failure.

Value

The success ratio.

Author(s)

Allen Goebl and Jeff Jones

References

Taylor, H. C., & Russell, J. T. (1939). The relationship of validity coefficients to the practical effectiveness of tests in selection: Discussion and tables. *Journal of Applied Psychology, 25(5)*, 565.

Examples

```
trModel(rxy=.5, sr=.5, br=.6)
```

utilityB *Boudreau Utility Model.*

Description

This utility model extends the BCG model with additional financial variables.

Usage

```
utilityB(n = 1, sdy, rxy = NULL, uxs = NULL, sr = NULL, pux = NULL,
  cost = 0, period = 1, v = 0, tax = 0, i = 0)
```

Arguments

n	The size of the applicant pool
sdy	The standard deviation of performance in monetary units.
rxy	the correlation between the predictor composite and the criterion.
uxs	The average predicter score of those selected. If the uxs is unknown, the sr argument can used instead.
sr	A selection ratio or a vector of selection ratios.
pux	The expected average criterion score of selected applicants.
cost	The cost per applicant of a selection system.
period	The anticipated tenure of selected employees.
v	The proportion of new costs to new revenue (i.e. sc/sv).
tax	The marginal tax rate.
i	Discount rate.

Value

Estimated gain in utility.

Note

This functions can except either (1) pux, (2) uxs and rxy, or (3) sr and rxy.

Author(s)

Allen Goebl and Jeff Jones

References

Boudreau, J.W. (1983). Economic considerations in estimating the utility of human resource productivity improvement programs. *Personnel Psychology, 36*, 551-576.

Examples

```
utilityB(sdy=10000, rxy=.50, sr=.30, period=4, v=.5, tax=.1, i=.02)
```

utilityBcg *Brogeden-Cronbach-Gleser Utility Model.*

Description

Estimates the utility of an employee selection system.

Usage

```
utilityBcg(n = 1, sdy, rxy = NULL, uxs = NULL, sr = NULL, pux = NULL,
  cost = 0, period = 1)
```

Arguments

n	The size of the applicant pool
sdy	The standard deviation of performance in monetary units.
rxy	The correlation between the predictor composite and the criterion.
uxs	The average predicter score of those selected. If the uxs is unknown, the sr argument can used instead.
sr	A selection ratio or a vector of selection ratios.
pux	The expected average criterion score of selected applicants
cost	The cost per applicant of a selection system.
period	The anticipated tenure of selected employees.

Value

Estimated gain in utility.

Note

This functions can except either (1) pux, (2) uxs and rxy, or (3) sr and rxy.

Author(s)

Allen Goebl and Jeff Jones

References

Cronbach, L. J., & Gleser, G. C. (1965). *Psychological tests and personnel decisions*.

Examples

```
utilityBcg(sdy=10000, rxy=.50, sr=.30)
```

utilityRbn *Raju-Burke-Normand Utility Model*

Description

This utility model uses SD of job performance ratings rather than the SD of job performance in monetary units.

Usage

```
utilityRbn(n = 1, sdr, a, rxy, uxs = NULL, sr = NULL, pux = NULL,
  cost = 0, period = 1)
```

Arguments

n	The size of the applicant pool.
sdr	The standard deviation of ratings of job performance.
a	The average total compensation.
rxy	The correlation between the predictor composite and the criterion.
uxs	The average predicter score of those selected. If the uxs is unknown, the sr argument can used instead.
sr	A selection ratio or a vector of selection ratios.
pux	The expected average criterion score of selected applicants.
cost	The cost per applicant of a selection system.
period	The anticipated tenure of selected employees.

Value

Estimated gain in utility.

Note

This functions can except either (1) pux, (2) uxs and rxy, or (3) sr and rxy.

Author(s)

Allen Goebl and Jeff Jones

References

Raju, N.S., Burke, M.J. and Normand, J. (1990). A new approach for utility analysis. *Journal of Applied Psychology, 75*, 3-12.

Examples

```
utilityRbn(sdr=10000, a=90000, rxy=.50, sr=.30)
```

`utilityShp` *Schmidt-Hunter-Pearlman Utility Model.*

Description

This model calculates the utility of an intervention accepting d rather than rxy as an argument.

Usage

```
utilityShp(n = 1, sdy, d, cost = 0, period = 1)
```

Arguments

`n`	The number of employees involved in the intervention.
`sdy`	The standard deviation of performance in monetary units.
`d`	The difference in job performance between the group recieving a treatment and the group not recieving a treatment, expressed in standard deviation units.
`cost`	The cost of the intervention per participant.
`period`	The anticipate duration of the training effect.

Value

Estimated gain in utility.

Author(s)

Allen Goebl and Jeff Jones

References

Schmidt, F. L., Hunter, J. E., & Pearlman, K. (1982). Assessing the economic impact of personnel programs on workforce productivity. *Personnel Psychology, 35(2)*, 333-347.

Examples

```
utilityShp(sdy=10000, d=.50, period=4)
```

ux *The average score of selected applicants on a predictor composite.*

Description

When scores on the predictor composite are assumed to be normally distributed, the average score of selected applicants can be computed for an arbitrary selection ratio using the ordinate of the normal curve.

Usage

```
ux(sr)
```

Arguments

`sr`	A selection ratio or a vector of selection ratios.

Value

ux: The average score of those selected on a predicter composite.

Author(s)

Allen Goebl and Jeff Jones

References

Naylor, J. C., & Shine, L. C. (1965). A table for determining the increase in mean criterion score obtained by using a selection device. *Journal of Industrial Psychology*, 78-109.

Examples

```
ux(.6)
```

Index