# SEM SIMULATIONS FOR CORRELATION MODELS

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#

# Load the relevant libraries:

library(mvtnorm)

library(lavaan)

#

# Generate the data:

gendata <- function(n1,n2,mean1,mean2,sigma1,sigma2) {

mat1 <- rmvnorm(n1, mean = mean1, sigma = sigma1)

mat2 <- rmvnorm(n2, mean = mean2, sigma = sigma2)

z <- c(rep(-1,n1),rep(1,n2))

mattot <- cbind(rbind(mat1,mat2),z)

colnames(mattot) <- c("x","y","z")

mattot

}

#

# Correlation models:

# Unequal x-variances and unequal y-variances model.

#

compcor3 <- function(n1,n2,mean1,mean2,sigma1,sigma2) {

tdata <- as.data.frame(gendata(n1,n2,mean1,mean2,sigma1,sigma2))

# Now, fit an equal-x-variances model:

modc1 <- '

fy =~ y

fx =~ equal(c("","fx =~ x"))\*x

fx~~fy

fx~~fx

fy~~fy

x ~ 1

y ~ 1

'

cov1 <- sem(modc1, data = tdata, group = "z", std.lv = TRUE, likelihood = "wishart")

cov1chi <- fitMeasures(cov1, c("chisq", "df"))

# Equal y-variances model (Note that this does NOT test equal y-error-var):

modc1b <- '

fy =~ equal(c("","fy =~ y"))\*y

fx =~ x

fx~~fy

fx~~fx

fy~~fy

x ~ 1

y ~ 1

'

cov1b <- sem(modc1b, data = tdata, group = "z", std.lv = TRUE, likelihood = "wishart")

cov1bchi <- fitMeasures(cov1b, c("chisq", "df"))

# Now, fit equal-correlations model with x-variances & y-variances unequal:

modc2 <- '

fy =~ y

fx =~ x

fy~~equal(c("","fy ~~ fx"))\*fx

fx~~fx

fy~~fy

x ~ 1

y ~ 1

'

cov2 <- sem(modc2, data = tdata, group = "z", std.lv = TRUE, group.equal = "lv.covariances", likelihood = "wishart")

cov2chi <- fitMeasures(cov2, c("chisq", "df"))

rbind(cov1chi,cov1bchi,cov2chi)

}

#

# Loop the models many (sim) times and count the number of rejections:

corsim3 <- function(sim,n1,n2,mean1,mean2,sigma1,sigma2) {

outmat <- matrix(c(rep(0,3\*sim)),ncol = 3)

for (i in 1:sim) {

treg <- compcor3(n1,n2,mean1,mean2,sigma1,sigma2)

outmat[i,1] <- ifelse(1 - pchisq(treg[1,1],treg[1,2])<=.05,1,0)

outmat[i,2] <- ifelse(1 - pchisq(treg[2,1],treg[2,2])<=.05,1,0)

outmat[i,3] <- ifelse(1 - pchisq(treg[3,1],treg[3,2])<=.05,1,0)

}

reject <- rbind(colSums(outmat),c(rep(sim,3)),c(n1,n2,NA))

colnames(reject) <- c("x-var","y-var","corr")

rownames(reject) <- c("rejections","runs","sample")

reject

}

#

#

# Example of a 20,000 run simulation with variance-covariance

# matrices both = matrix(c(1,1,1,2),ncol = 2):

T7070c1 <- corsim3(10000,70,70,c(0,0),c(0,0), matrix(c(1,1,1,2),ncol = 2),matrix(c(1,1,1,2),ncol = 2)); T7070c1