Using sem

This example uses the path model given on page 104 (Figure 4.1).

Generating the data: use my R function “gen.path.model.4.1” to generate data having a specified structure. The default values use parameter values that generate standard normal variates. The object “data.path.model.4.1” holds a sample data set with 100 observations using the default values.

Here are the default values:

function (n=100,sigma1=1,sigma2=1,a13=0.5,a23=0.5,a34=-0.8,a35=0.3,S45=0.2,

sigma3=sqrt(1-a13^2-a23^2),sigma4=sqrt(1-a34^2),sigma5=sqrt(1-a35^2))

Specifying the causal structure: use the “specify.model(“”)” function. This allows one to enter the structure from the keyboard. Alternatively, save as a text file and import. Here are the commands:

> specify.model.4.1<-specify.model("")

1: X3<-X1,a13,NA

2: X3<-X2,a23,NA

3: X4<-X3,a34,NA

4: X5<-X3,a35,NA

5: X1<->X1,sigma1,NA

6: X2<->X2,sigma2,NA

7: X3<->X3,sigma3,NA

8: X4<->X4,sigma4,NA

9: X5<->X5,sigma5,NA

10: X4<->X5,cov45,NA

11:

Running the model: use “sem()”. The fitted model object using the generated data is saved in “fitted.model.4.1”.

Typing summary will give the full summary of model. fit. Here are the commands (alternatively, “summary(fitted.model.4.1):

> summary(sem(ram=specify.model.4.1,S=cov(data.path.model.4.1),N=100))

 Model Chisquare = 1.0603 Df = 5 Pr(>Chisq) = 0.95755

 Chisquare (null model) = 236.39 Df = 10

 Goodness-of-fit index = 0.99581

 Adjusted goodness-of-fit index = 0.98744

 RMSEA index = 0 90% CI: (NA, NA)

 Bentler-Bonnett NFI = 0.99551

 Tucker-Lewis NNFI = 1.0348

 Bentler CFI = 1

 SRMR = 0.026763

 BIC = -21.966

 Normalized Residuals

 Min. 1st Qu. Median Mean 3rd Qu. Max.

-0.5710 -0.2370 -0.0725 -0.0710 0.0897 0.3110

 Parameter Estimates

 Estimate Std Error z value Pr(>|z|)

a13 0.57295 0.065847 8.7014 0.0000e+00 X3 <--- X1

a23 0.59666 0.082714 7.2135 5.4512e-13 X3 <--- X2

a34 -0.86065 0.053356 -16.1302 0.0000e+00 X4 <--- X3

a35 -0.32451 0.107200 -3.0272 2.4684e-03 X5 <--- X3

sigma1 1.17510 0.167055 7.0342 2.0037e-12 X1 <--> X1

sigma2 0.74470 0.105875 7.0337 2.0108e-12 X2 <--> X2

sigma3 0.50274 0.071484 7.0328 2.0239e-12 X3 <--> X3

sigma4 0.31479 0.044784 7.0290 2.0803e-12 X4 <--> X4

sigma5 1.27067 0.180679 7.0327 2.0253e-12 X5 <--> X5

cov45 0.27026 0.069112 3.9104 9.2125e-05 X5 <--> X4

 Iterations = 0

>