STA 303 / 1002

Note Title 3/29/2012

SAS proc mixed:

Uses Restricted maximum likelihood to estimate model parameters: - covariance parameters - using MLE
\ coefficients of fixed effects - (β's)
- generalized least squares

Since covariances & variances are estimated using ML, can compare models with same Y same X's but different covariance structures using AIC, SC = BIC

or LRTs

(Bayesian Information Criterion)

$AIC = -2 \log L + 2(\#\text{ of covariance parameters})$

$BIC = -2 \log L + (\#\text{ of covariance parameters}) \log(n)$

where $n = \#$ of subjects

- smaller is better

Since β's are estimated by generalized least squares, tests and CI's for β's, use t and F-tests

Example From Type 3 Tests of Fixed Effects

p-value for dist*time interaction' 0.0162

So we have evidence that difference among dists differs

among times in mean HDL
(we'll follow up with more details later)

Does assumed variance-covariance structure seem reasonable?

Looking at variance est by diet (from proc corr by diet), some indication that variability of HDL measurements is less on diet LG (s.d. ~.2 on LG but ~.3 on other diets)
Seems reasonable to assume that correlations are the same.

Can fit model with more complicated covariance structure than compound symmetry using repeated statement

Will use: type = UN ← unstructured
- all variances and covariances estimated from data (none have to be equal)

↑ of covariance structure

group option - different variance-covariance matrix for subjects depending on subject

For 3 measurements on subject with diet HG

$$D_{HG} = \begin{pmatrix} \sigma^2_{1,HG} & \sigma^2_{12,HG} & \sigma^2_{13,HG} \\ \sigma^2_{12,HG} & \sigma^2_{2,HG} & \sigma^2_{23,HG} \\ \sigma^2_{13,HG} & \sigma^2_{23,HG} & \sigma^2_{3,HG} \end{pmatrix}$$

where $\sigma^2_{1,HG}$ is var. of observations at time 1 for subject on diet HG

$\sigma^2_{12,HG}$ is cov. of observations between times 1 & 2 for subject on diet HG

etc.

For diet HG: 6 covariance parameters to estimate (3 var + 3 cov)

$\Rightarrow$ Total of 18 covariance parameters for all 3 diets

Example!

For diet HG

$$\hat{D}_{HG} = \begin{pmatrix} .1190 & .1080 & .1029 \\ .1080 & .1168 & .1073 \\ .1029 & .1073 & .1029 \end{pmatrix}$$

$$\hat{D}_{HM} = \begin{pmatrix} .1064 & & \\ .1002 & .1281 & \\ .1150 & .1315 & .1494 \end{pmatrix}$$

$$\hat{D}_{IG} = \begin{pmatrix} .03427 & & \\ .04201 & .04101 & \\ .03482 & .03647 & .04470 \end{pmatrix}$$