Recursive estimation in the
general linear model

Susanti Lianto

Recursive estimation in the linear regression model is a technique
for updating parameter estimates and regression sum of squares when new
data become available. This technique has been found useful for a wide
range of problems, including the monitoring of medical patients and
nuclear reactors as well as testing constancy of regression in economic
and hydrologic problems.

The associated field of Kalman filtering gives a means of recursively
estimating the regression parameter of a linear model when the parameter
itself may be randomly chosen at each observation time.

The ideas of recursive estimation in the general linear model have
been extended to:

(a)   The analysis of a mixed model with random components which have a
nested structure but have no restriction on the number of observations in
each cell or the number of components in each part of the structure.

(b)   The general analysis of an unbalanced mixed model with two-way
crossed classification with interaction. Main effects and interactions

---

351

Susan Lianto

are random effects and the numbers of observations in each cell vary from cell to cell.

(c)   The general linear model with a type of error covariance structure which has random blocks, subblocks and autoregressive errors within each subblock. The method is illustrated using one of the examples in Sallas and Harville (1981) who have applied a Kalman filter technique to a problem involving the lactation rates of cows having various breeding characteristics.

Recursive methods are discussed for field experiments. While no major extensions to the theory are accomplished here, it just indicates how recursive methods have the potential to be applied to a great variety of dependent error models.

Surabaya Institute of Technology,
Surabaya,
Indonesia.