Least squares model

Model description

Least squares model example is based on data from Schaeffer & Dekkers: Random regressions in animal models for test-day production in dairy cattle (Proc. 5th WCGALP, 18:443–446, 1994).

The model is:

$$\mathbf{y} = \mu + f(\mathbf{p}, \mathbf{DIM}) + \mathbf{Xb} + \mathbf{e},$$

where

$\mathbf{y}$ is vector of milk yield observations,
μ is general mean,
$f(\mathbf{p}, \mathbf{DIM})$ is fixed general regression function,
$\mathbf{b}$ is vector of fixed herd times test-day interaction effects,
$\mathbf{X}$ is design matrix to link observations to appropriate fixed effects, and
$\mathbf{e}$ is random residual vector.

The fixed regression function has form

$$f(\mathbf{p}, DIM) = DIM \cdot p_1 + \ln(305/DIM) \cdot p_2.$$

It is assumed that $\mathrm{var}(\mathbf{e}) = \mathbf{I}$.

Input files

Datafile:

The data file contains information on the data to be analyzed together with class and regression variables for the model. The data file can be in free format (columns are separated by at least one space) or in binary format.

Each record, i.e., line in a free format file, has been divided to two parts: 1) Integer number columns and 2) real number columns. Columns of real numbers are always after the integer number columns.

LS.dat

```
1  1   73.0   1.4298500   26.0
2  1  123.0   0.9081270   23.0
3  1  178.0   0.5385280   21.0
1  1   34.0   2.1939499   29.0
2  1   84.0   1.2894900   18.0
3  1  139.0   0.7858380    8.0
4  1  184.0   0.5053760    1.0
1  1    8.0   3.6408701   37.0
2  1   58.0   1.6598700   25.0
3  1  113.0   0.9929240   19.0
4  1  158.0   0.6577170   15.0
5  1  218.0   0.3358170   11.0
2  1    5.0   4.1108699   44.0
3  1   60.0   1.6259700   29.0
4  1  105.0   1.0663500   22.0
5  1  165.0   0.6143660   14.0
6  1  215.0   0.3496740    8.0
4  1   14.0   3.0812500   35.0
5  1   74.0   1.4162500   23.0
6  1  124.0   0.9000300   17.0
5  1   31.0   2.2863200   28.0
6  1   81.0   1.3258600   22.0
6  1  268.0   0.1293250    7.0
```

Column 1: Herd x Test-day (integer)
Column 2: Ones (integer)
Column 3: Covariable for regression effect, days in milk (real)
Column 4: Covariable for regression effect, ln(305/days in milk) (real)
Column 5: Milk yield (real)

Command file:

CLIM instructions for least squares model analysis. Everything beyond '#' sign is considered as a comment.

LS.clm

```
TITLE "LEAST SQUARES MODEL, data from L.Schaeffer & J.Dekkers (1994)"

DATAFILE LS.dat
INTEGER  HTD ONES        # Integer column names
REAL     linear ln305d & # Covariables
         milk_yld        # Milk yield

MODEL
  milk_yld = linear ln305d HTD ONES
```

Solution files

Structure of the formatted solution files depends on the model. Therefore, explanation of the content of those files is given in the printout of the particular run of the program.

MiX99-solver program has been run by command `mix99s -s,` meaning that in all parts of the program default values are used.

"Solreg"-file contains solutions for general regressions.

```
 Trt Reg-No  Solution    Trait  Covariable
   1    1 -.49385E-01   milk_yld   linear
   1    2  5.7753       milk_yld   ln305d
```

Column 1: Trait number
Column 2: Regression number within trait
Column 3: Solution
Column 4: Name of trait
Column 5: Name of covarible

"Solfix"-file contains solutions for fixed effects.

```
 Fact. Trt      Level    N-Obs  Solution              Factor Trait
   1    1          1        3  8.0963                   HTD milk_yld
   1    1          2        4  8.8503                   HTD milk_yld
   1    1          3        4  9.1280                   HTD milk_yld
   1    1          4        4  5.7957                   HTD milk_yld
   1    1          5        4  7.8290                   HTD milk_yld
   1    1          6        4  7.6106                   HTD milk_yld
```

Column 1: Factor number
Column 2: Trait number
Column 3: Level code
Column 4: Number of observations
Column 5: Solution
Column 6: Name of factor
Column 7: Name of trait

"Solf01 "-file contains solutions for the mean.

```
   1     23   10.478
```

Column 1: Level Code
Column 2: Number of observations
Column 3: Solution for trait 1 milk_yld and factor ONES