Loglinear Regression: nagdmc_loglinear

Purpose

nagdmc_loglinear computes a loglinear regression model with p parameters and is a simplified interface to **nagdmc_poisson_reg** using a log link function.

Declaration

```
#include <nagdmc.h>
void nagdmc_loglinear_reg(long rec1, long nvar, long nrec, long dblk, double data[],
                          long nxvar, long xvar[], long yvar, double *dev,
                          long *df, double b[], double se[], double cov[],
                          double model[], int *info);
```

Parameters

1: **rec1** – `long` *Input*

On entry: the index in the data of the first data record used in the analysis.

Constraint: **rec1** ≥ 0.

2: **nvar** – `long` *Input*

On entry: the number of variables in the data.

Constraint: **nvar** > 1.

3: **nrec** – `long` *Input*

On entry: the number of consecutive records, beginning at **rec1**, used in the analysis.

Constraint: **nrec** > 1.

4: **dblk** – `long` *Input*

On entry: the total number of records in the data block.

Constraint: **dblk** $\geq$ **rec1** $+$ **nrec**.

5: **data**[**dblk** $*$ **nvar**] – `double` *Input*

On entry: the data values for the jth variable (for $j = 0, 1, \ldots,$ **nvar**-1) are stored in **data**[$i*$**nvar**$+j$], for $i = 0, 1, \ldots,$ **dblk** $- 1$.

6: **nxvar** – `long` *Input*

On entry: the number of independent variables. If **nxvar** $= 0$ then all variables in the data, excluding **yvar**, are treated as independent variables.

Constraint: $0 \leq$ **nxvar** $<$ **nvar**.

7: **xvar**[**nxvar**] – `long` *Input*

On entry: the indices indicating the position in **data** in which values of the independent variables are stored. If **nxvar** $= 0$ then **xvar** must be 0, and the indices of independent variables are given by $j = 0, 1, \ldots,$ **nvar** $- 1$; $j \neq$ **yvar**.

Constraints: if **nxvar** > 0, $0 \leq$ **xvar**[i] $<$ **nvar**, for $i = 0, 1, \ldots,$ **nxvar** $- 1$; otherwise **xvar** must be 0.

8: **yvar** – `long` *Input*

On entry: the index in **data** in which values of the dependent variable are stored.

Constraints: $0 \leq$ **yvar** $<$ **nvar**; if **nxvar** > 0, **yvar** $\neq$ **xvar**[i], for $i = 0, 1, \ldots,$ **nxvar** $- 1$.

9: **dev** – `double` *Output*

On exit: the deviance from the fitted model.

10: **df** – `long *` *Output*

On exit: the degrees of freedom for the deviance.

11: **b**[p] – `double` *Output*

On exit: the parameter estimates. **b**[0] is the mean parameter. **b**[i] is the coefficient of the ith variable included in the model, for $i = 1, 2, \ldots, p-1$. If **nxvar** > 0 then the order the independent variables are added to the model is defined by **xvar**, otherwise the order is defined by indices in the data.

12: **se**[p] – `double` *Output*

On exit: the standard errors of the parameters in **b**.

13: **cov**[$p * (p+1)/2$] – `double` *Output*

On exit: the first $p * (p+1)/2$ elements of **cov** contain the upper triangular part of the variance-covariance matrix of the p parameters in **b**. They are stored packed by column, i.e., the covariance between the parameter estimate given in **b**[i] and the parameter estimate given in **b**[j], $j \geq i$, is stored in **cov**[$j(j+1)/2 + i$], for $i = 0, 1, \ldots, p-1$ and $j = i, i+1, \ldots, p-1$.

14: **model**[$(3 * p * (p+1))/2 +$ **nvar** $+ 14$] – `double` *Output*

On exit: if not 0, information on the fitted model for use in the functions described in 'See Also'.

15: **info** – `int *` *Output*

On exit: **info** gives information on the success of the function call:

-4: a model value has reached a boundary.
0: the function successfully completed its task.
i; $i = 1, 2, \ldots, 4, 6, 7, 8$: the specification of the ith formal parameter was incorrect.
42: invalid value for response variable.
45: model has not converged.
57: there are no degrees of freedom for the error estimates.
58: the fit is exact, no error estimates.
59: more variables than observations.
98: there is an underlying computational problem (this is an unlikely error exit).
99: the function failed to allocate enough memory.

Notation

nrec the number of observations, n.
nxvar the number of independent variables, $p-1$.
xvar the independent variables, X, excluding the mean.
yvar the dependent variable, y.
b the parameter estimates, $\hat{\beta}$.

Description

See the description for **nagdmc_poisson_reg**.

References and Further Reading

Cook R D and Weisberg S (1982) *Residuals and Influence in Regression* Chapman and Hall.

McCullagh P and Nelder J A (1983) *Generalized Linear Models* Chapman and Hall.

Plackett R L (1974) *The Analysis of Categorical Data* Griffin.

See Also

nagdmc_extr_reg computes fitted values, residuals and leverages for a regression.
nagdmc_poisson_reg generalized linear model with Poisson errors.
nagdmc_predict_reg computes predictions given a fitted regression model.
loglinear_reg_ex.c the example calling program.