

The Computer Program A&NULR

This program carries out the calculations for the situation where one or more samples of unused resource units are compared with a single sample of available units. It is assumed that samples consist of only a small fraction of the possible units, but that enough units are selected to change the distribution over the sampled period of time.

Data Input

Line	
1	Title for the data.
2	NUNIT,NSAMP,NX, the number of sampled resource units, the number of samples (available and used), and the number of X variables for which data are input.
3	T(2),T(3),...,T(NSAMP), the times when the samples of unused units are taken, where the first sample (of available units) is taken at time 0.
4	SPL(1),X(1,1),X(1,2),...,X(1,NX), the data for resource unit 1, consisting of the sample it is in (with the available sample as number 1), and the values for the X variables for this unit.
.	
.	
NUNIT+ 3	SP((NUNIT),X(NUNIT,1),X(NUNIT,2),...,X(NUNIT,NX), the data for the last unit, in the same format as for resource unit 1.

Example

Here there are 2333 individual corixids, eight samples (one of available units at time 0 and seven of unused units at times 3, 4, ..., 9), and 15 X-variables that describe the type of corixid involved.

Selection of Corixids by Minnows

```

2333 8 15
 3 4 5 6 7 8 9
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
1 1 0 0 1 0 0 1 0 0 0 0 0 0 0
.
.
8 0 0 1 0 1 0 0 0 0 0 0 0 1 0
8 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0
8 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0
8 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0
8 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0

```

Computer Output

The output using the example set of data is as follows:

```
*****
*                                     *
*                               A&NULR                               *
*                                     *
* A program for polytomous logistic regression with                 *
* resource selection data, where there is one sample of           *
* available units, and one or more samples of unused              *
* units. This program is based on the program MAXLIK              *
* written by T.E. Reed for fitting a general multinomial          *
* model.                                                           *
*                                     *
* There can be up to 5000 resource units, with up to 9           *
* samples of unused units, and up to 100 estimated                *
* parameters.                                                     *
*                                     *
*                               Written by                           *
*                               Bryan F.J. Manly                    *
*                                     *
*                               Version 1.0, Dated July 2000       *
*****
```

Date: 12/ 7/2000 Time: 9: 9

Data Title: Selection of Corixids by Minnows
 Number of Units = 2333 Number of Samples = 8

Sample Times

0.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0

Unit	Spl	X-Values							
		0.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
1	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
2	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
3	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
4	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
5	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
6	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
7	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
8	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
9	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
10	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
11	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
12	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
13	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
14	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
15	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
16	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
17	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
18	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
19	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
20	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
21	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

22	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	1	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.									
.									
.									
2333	8	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	1.00	0.00	

Sample Sizes

1195 145 179 170 156 131 192 165

*** NULL MODEL FIT ***

The null model is fitted first. This just has the constant terms (Beta0) for samples 2 to 8 as parameters.

Summary of Iterations

Iter	Initial log-lik	Final log-lik	Halvings
1	-3822.921	-3822.921	1

Final Deviance = 7645.84 with 2326 df

AIC = 7659.84

21	-0.045	-0.041	-0.045	-0.647	-0.041	-0.046	-0.050	0.048	0.080	-0.007
	0.003	0.042	0.060	-0.003	0.002	0.048	0.079	-0.006	0.002	0.694
	1.000									
22	-0.021	-0.019	-0.021	-0.242	-0.018	-0.021	-0.022	0.005	-0.004	0.054
	0.041	0.003	-0.003	0.052	0.055	0.005	-0.004	0.057	0.040	0.052
	-0.038	1.000								
23	-0.036	-0.032	-0.036	-0.399	-0.032	-0.036	-0.039	0.006	0.002	0.040
	0.098	0.004	0.001	0.037	0.129	0.006	0.002	0.042	0.094	0.042
	0.012	0.460	1.000							
24	-0.059	-0.054	-0.059	-0.059	-0.918	-0.060	-0.066	0.064	0.051	0.004
	0.006	0.056	0.038	0.003	0.008	0.065	0.050	0.004	0.006	0.065
	0.044	0.004	0.006	1.000						
25	-0.046	-0.041	-0.046	-0.045	-0.719	-0.046	-0.051	0.048	0.082	-0.008
	0.003	0.042	0.061	-0.003	0.002	0.049	0.081	-0.007	0.002	0.049
	0.071	-0.003	0.002	0.772	1.000					
26	-0.012	-0.011	-0.012	-0.012	-0.162	-0.012	-0.013	0.003	-0.004	0.033
	0.025	0.002	-0.003	0.030	0.032	0.003	-0.004	0.034	0.024	0.003
	-0.003	0.032	0.024	0.031	-0.030	1.000				
27	-0.032	-0.028	-0.032	-0.032	-0.404	-0.032	-0.034	0.005	0.002	0.035
	0.086	0.004	0.001	0.032	0.113	0.005	0.002	0.036	0.083	0.005
	0.002	0.035	0.082	0.039	0.011	0.320	1.000			
28	-0.067	-0.060	-0.067	-0.066	-0.060	-0.913	-0.074	0.072	0.057	0.005
	0.006	0.062	0.042	0.004	0.009	0.073	0.056	0.005	0.006	0.073
	0.049	0.005	0.006	0.066	0.050	0.003	0.006	1.000		
29	-0.048	-0.043	-0.048	-0.048	-0.044	-0.676	-0.054	0.051	0.086	-0.007
	0.003	0.044	0.063	-0.003	0.002	0.052	0.085	-0.006	0.003	0.051
	0.074	-0.004	0.002	0.047	0.077	-0.004	0.002	0.731	1.000	
30	-0.020	-0.018	-0.020	-0.020	-0.017	-0.246	-0.021	0.004	-0.004	0.054
	0.041	0.003	-0.003	0.051	0.054	0.004	-0.004	0.056	0.039	0.004
	-0.004	0.054	0.039	0.003	-0.004	0.032	0.034	0.042	-0.035	1.000
31	-0.036	-0.032	-0.036	-0.036	-0.031	-0.414	-0.038	0.006	0.002	0.039
	0.096	0.004	0.001	0.036	0.127	0.006	0.002	0.041	0.092	0.006
	0.002	0.039	0.092	0.006	0.002	0.023	0.080	0.035	0.010	0.485
	1.000									
32	-0.075	-0.067	-0.075	-0.075	-0.068	-0.076	-0.888	0.081	0.064	0.005
	0.007	0.070	0.047	0.004	0.010	0.082	0.063	0.005	0.007	0.082
	0.055	0.005	0.007	0.075	0.056	0.003	0.006	0.084	0.059	0.004
	0.007	1.000								
33	-0.054	-0.049	-0.054	-0.054	-0.050	-0.055	-0.651	0.057	0.097	-0.010
	0.004	0.049	0.072	-0.003	0.003	0.058	0.096	-0.008	0.003	0.057
	0.084	-0.004	0.002	0.053	0.087	-0.004	0.002	0.059	0.091	-0.005
	0.002	0.720	1.000							
34	-0.015	-0.013	-0.015	-0.015	-0.013	-0.015	-0.209	0.004	-0.004	0.039
	0.029	0.003	-0.003	0.036	0.039	0.004	-0.004	0.040	0.028	0.004
	-0.003	0.038	0.028	0.003	-0.004	0.023	0.025	0.004	-0.004	0.038
	0.028	0.038	-0.033	1.000						
35	-0.034	-0.030	-0.034	-0.034	-0.030	-0.034	-0.467	0.005	0.002	0.037
	0.092	0.004	0.001	0.034	0.120	0.006	0.002	0.039	0.088	0.006
	0.002	0.037	0.087	0.005	0.002	0.022	0.076	0.006	0.002	0.036
	0.085	0.042	0.012	0.365	1.000					