SDAIZ User's Guide

1. Description

The program computes **analytically** the expected value and the sampling distribution function of the adverse impact (AI) ratio for single-stage, top-down, finite sample selections using a predictor with known effect size. In addition, the program provides the expected hiring rate in both the majority and the minority group. Finally, the program also reports the traditional population (i.e., infinite sample) approximations to the expected hiring rates and the expected adverse impact ratio.

2. Assumptional Basis and Method

The calculations are based on the assumption that the predictor has a normal distribution with the same variance but a different mean value in the two applicant populations. In particular, and without loss of generalization, it is understood that the predictor has a standard normal distribution in the minority applicant population. De Corte and Lievens (2004) detail the method used to derive the sampling distribution function of the AI ratio.

3. Running the Program

First, copy the executable source of the program to a directory on your machine. Next, to run the program, double click the source file. The program automatically opens a MS-DOS Command window, and asks for input information. A typical example of the resulting dialogue is as follows:

```
  Filename to write output of the program?
sout.out
 File sout.out       found - write over it  (y/n) ?
y
 Total number of applicants?
80
 Number of applicants from the majority group?
60
 Required number of new employees?
25
 Effect size predictor composite?
0.70
```

So, the program first asks for the name of the file on which the output will be written, and the user responds in this case by typing sout.out (the name of the file can be chosen freely, however) and pressing ENTER or RETURN. The output file (sout.out) is

automatically appended to the directory where the program file was copied. When the directory already contains a file with the same name, then the program asks permission to overwrite the file.

Next, the user provides the input data, as prompted by the program (Do not forget to press ENTER or RETURN after each submission of the requested input data). **The program does not perform validity checks on these input values, and the program will abort as soon as one of the input datum is not of the appropriate kind (e.g., when typing letters instead of a number)**. Observe that the first three numbers must be integers, whereas the final number should have a decimal point (cf. 0.70).

When the input is complete, the program starts and displays some output in the MS-DOS Command window. This feature was added to inform the user that the program is still running. At the end of the computations, the program asks:

```
Ready to exit (Answer with y or n)?
```

Responding with y will close the application, and the output will be written on the file indicated by the user (here the file sout.out).

4. Technical Aspects

The present program is limited to situations where the total number of applicants is at most equal to 25,000. For such large applicant groups, the computations will take a couple of minutes. For smaller applications. the execution time is just a few seconds.

To execute the program, a PC running under MS-Windows 95, 98, NT, XP or 2000 is required.

5. Sample Output

```
++++++++++
++ SDAIZ ++
++++++++++

Analytical computation of the expected value and the
sampling distribution function of the adverse impact ratio
for single-stage selection decisions.

Program written by Wilfried De Corte, Ghent University, Belgium

The program uses routines from the Slatec library (see
http://www.geocities.com/Athens/Olympus/5564) and a couple
of algorithms from StatLib (see http://lib.stat.cmu.edu/apstat/)
```

PROBLEM SPECIFICATION

Total number of applicants: 80
Number of majority group applicants: 60
Number of minority group applicants: 20
Required number of new employees: 25
Effect size predictor (composite): 0.700000

PROGRAM OUTPUT

Exact Sampling Distribution Function Adverse Impact (AI).
The value -1.000 for AI means AI is not defined
N2: number selected from the minority applicant group
N1: number selected from the majority applicant group

AIvalue	Prob	CProb	N2	N1
0.000	0.0296	0.0296	0	25
0.125	0.1258	0.1554	1	24
0.261	0.2371	0.3926	2	23
0.409	0.2637	0.6562	3	22
0.571	0.1937	0.8499	4	21
0.750	0.0998	0.9497	5	20
0.947	0.0373	0.9871	6	19
1.167	0.0104	0.9974	7	18
1.412	0.0022	0.9996	8	17
1.688	0.0003	1.0000	9	16
2.000	0.0000	1.0000	10	15
2.357	0.0000	1.0000	11	14

Exact values (i.e., values derived from the exact sampling distribution) for the expected selection rate in the majority group (SRA), the expected selection rate in the minority group (SRI) and the expected adverse impact ratio (AI)
Observe that the expected adverse impact is computed over only the finite values of AI!

SRA	SRI	AI

```
  0.36696  0.14912  0.42220

Percentile values sampling distrubtion AI: 5, 10, 25, 50,
75, 90 and 95th percentile
    P05    P10    P25    P50    P75    P90    P95
  0.125  0.125  0.261  0.409  0.571  0.750  0.947

Population values for SRA, SRI and AI:
      SRA      SRI       AI
  0.36694  0.14918  0.40654

CPU TIME IN SECONDS         1.81
```

6. Description of Output

The output is self-explanatory.

7. Dependencies and Acknowledgement

The present program is written in Fortran77. It was compiled to an executable code for WIN32 PCs (ie, Windows 95/98/ME, XP or NT/2000) with the GNU Fortran G77 compiler (cf. `http://www.geocities.com/Athens/Olympus/5564/`). The program uses routines from the SLATEC program library (cf. Fong et a., 1993; `http://www.geocities.com/Athens/Olympus/5564/`) and a couple of algorithms from StatLib `http://lib.stat.cmu.edu/apstat/`).

When the user reports results obtained by the present program, reference should be made to De Corte (2004) and De Corte and Lievens (2004).

8. References

De Corte (2004). SDAIZ User's Guide.

De Corte, W., & Lievens, F. (2004). The risk of adverse impact in selections based on a test with known effect size. *Educational and Psychological Measurement*, (in press).

Fong, K. W., Jefferson, T. H., Suyehiro, & Walton, L. (1993). Guide to the SLATEC common mathematical library (`http://www.netlib.org/slatec/`).