CRIIP User's Guide

1. Description

CRIIP is a FORTRAN77 program that **computes the population global relative achievement of feasible fixed weight systems.** (see De Corte, Lievens & Sackett, 2021).

3. Technical Aspects

The program is limited to single stage fixed weight systems with no more than 20 predictors.

4. Input

Observe that all input is in free format: Variables or vectores that have a name commencing with the letters I, J, K, L, M, N get INTEGER values (i.e., no decimal point). All other variables, vectors and matrices get FLOATING POINT values. The number of blanks between consecutive values on a line (record) can be freely chosen.

- $\#$ 1: **NP, NU**

    - NP: the number of predictors.

    - NU: the number of fixed weight systems.

- $\#$ 2: **DIFP(I)** (with I = 1, NP)
  DIFP(I) indicates the effect size of the predictors. Negative values indicate that the majority group has a higher average predictor score compared to the minority group.

- $\#$ 3 and following: **PC(I,J)** (with I = 2, NP and J = 1, I-1).
  The lower triangle of the predictor intercorrelation matrix. The first row contains the single element PC(2,1)
  The second row contains the elements PC(3,1) and PC(3,2), and so on.

- $\#$ 4 **PV(I)** (with I = 1, NP)
  PV holds the validity of the predictors.

- $\#$ 5 and following: **IDU(I, J)** (with I = 1, NU and J = 1, NP)
  Each row of IDU identifies a feasible fixed weight system. Within each row a zero in the jth position indicates that the jth predictor is given a weight of zero in the fixed system. Within each row a one in the jth position indicates that the jth predictor is given a weight of one in the fixed system.

5. Sample Input File

Important: in preparing the input file, use a simple text editor such as Notepad, Wordpad or any other standard ASCII producing editor. DO NOT USE TEXT PROCESSING PROGRAMS SUCH AS WORD. Also, when saving the input file in Notepad, use the option "All Files" in the "Save as type" box. When saving in Wordpad, use the "Text Document-MS-DOS Format" option in the "Save as type" box, and be **aware that Wordpad has the nasty habit of adding the extension .txt to the file name that you specify**. Thus, with Wordpad, if you specify the name of the input file as "MINPUT", the file will in fact be saved as "MINPUT.TXT"; and this is the name that you have to use in the command to run the present programs.

Here is a sample input file, for the `criip` program.

```
 5  6
0.720   0.390  -0.090   0.390   0.040
0.310
0.030   0.130
0.370   0.160   0.510
0.020  -0.020   0.340   0.250
0.520   0.480   0.220   0.320   0.200
 1 1 0 1 1
 1 1 1 1 0
 1 1 1 1 1
 1 0 1 1 1
 0 1 1 1 1
 0 1 1 0 1
```

6. Running the Program

Suppose you copied the executable source of the program to the `d:ssel` directory on your machine. In that case, the input file must also be saved in the `d:ssel` directory. Next, to run the program, you have to open an MS-DOS Command window. The way to do this varies from one operating system to the other, and you should use your local "START" button when in doubt about this feature.

In the MS-DOS Command window you type `d:`, followed by RETURN or ENTER, and your computer will return the `D:\>` command prompt. Next, you type `cd ssel` after the `D:\>` command prompt, again followed by RETURN or ENTER, and your computer will respond with the `D:\ssel>` command prompt. Now, you can execute the program by typing `criip < minput > moutput`   where "minput" is the name of the input file and "moutput" is the name of the output file. At the end of the execution, the PC will return the command prompt `D:\ssel>`. You can then inspect the output by editing the output file with either Notepad, Wordpad or any other simple editor program.

7. Sample Output

The output corresponds to the above demo input file.

```
DATE: 04/06/2021;   TIME: 17:51:26

EFFECT SIZE PREDICTORS    0.720   0.390  -0.090   0.390   0.040

COR MAT PRED   1  1.000  0.310  0.030  0.370  0.020
COR MAT PRED   2  0.310  1.000  0.130  0.160 -0.020
COR MAT PRED   3  0.030  0.130  1.000  0.510  0.340
COR MAT PRED   4  0.370  0.160  0.510  1.000  0.250
COR MAT PRED   5  0.020 -0.020  0.340  0.250  1.000


VALIDITY PREDICTORS    0.520   0.480   0.220   0.320   0.200

FIXED SYSTEM   1        1.0    1.0    0.0    1.0    1.0
EFFECT SIZE and VALIDITY Fixed System   1    0.6195    0.6114
FIXED SYSTEM   2        1.0    1.0    1.0    1.0    0.0
EFFECT SIZE and VALIDITY Fixed System   2    0.5322    0.5812
FIXED SYSTEM   3        1.0    1.0    1.0    1.0    1.0
EFFECT SIZE and VALIDITY Fixed System   3    0.4781    0.5737
FIXED SYSTEM   4        1.0    0.0    1.0    1.0    1.0
EFFECT SIZE and VALIDITY Fixed System   4    0.3995    0.4749
FIXED SYSTEM   5        0.0    1.0    1.0    1.0    1.0
EFFECT SIZE and VALIDITY Fixed System   5    0.2812    0.4699
FIXED SYSTEM   6        0.0    1.0    1.0    0.0    1.0
EFFECT SIZE and VALIDITY Fixed System   6    0.1722    0.4557

RELATIVE DIVERSITY AND QUALITY ACHIEVEMENT FIXED SYSTEMS
NUM    d-FWS   MAX-d   MIN-d   R-D-A   V-FWS   MIN-V   MAX-V   R-Q-A
  1    0.619   0.750   0.452   0.438   0.611   0.475   0.657   0.751
  2    0.532   0.750   0.383   0.593   0.581   0.418   0.639   0.738
  3    0.478   0.748   0.367   0.708   0.574   0.381   0.621   0.801
  4    0.400   0.619   0.189   0.510   0.475   0.327   0.589   0.565
  5    0.281   0.611   0.181   0.768   0.470   0.326   0.529   0.709
  6    0.172   0.589   0.160   0.972   0.456   0.284   0.464   0.955

RELATIVE ACHIEVEMENT FIXED SYSTEMS
SYSTEM  1       0.5944
SYSTEM  2       0.6655
SYSTEM  3       0.7547
SYSTEM  4       0.5376
SYSTEM  5       0.7384
SYSTEM  6       0.9632

CPU TIME in Seconds:           0.33
```

8. Description of Output

- NUM is the number of the fixed weight system

- d-FWS is the effect size of the fixed weight system

- Max-d is the maximum effect size attainable at the validity value of the fixed weight system

- Max-d is the minumum effect size attainable at the validity value of the fixed weight system

- R-D-A is the relative diversity achievement value of the fixed weight system V-FWS is the validity of the fixed weight system

- Max-d is the maximum validity attainable at the effect size value of the fixed weight system

- Max-d is the minumum validity attainable at the effect size value of the fixed weight system

- R-D-A is the relative quality achievement value of the fixed weight system

9. Dependencies and Acknowledgement

The present program is written in Fortran77. It was compiled to an executable code for Windows 7 and 10 with the GNU Fortran G77 compiler (cf. `http://www.geocities.com/Athens/O` The program uses routines from the SLATEC program library (cf. Fong et a., 1993; `http://www.geocities. com/Athens/Olympus/5564/`).

When the user reports results obtained by the present program, due reference should be made to De Corte, Lievens, & Sackett (2021).

10. References

De Corte, W, Lievens, F. & Sackett, P. (2021). A comprehensive examination of the cross-validity of Pareto-optimal vs. fixed weight selection systems in the bi-objective selection context. *Journal of Applied Psychology* (in press).

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