IndValCom

User's Manual

Description of program IndValCom as a supplement to the text
Podani, J and B. Csányi. 2010. Detecting indicator species: Some extensions of
the IndVal measure. *Ecological Indicators* **10:** 1119-1124.

Introduction

IndValCom calculates five variants of the Indicator Value as described in
Podani and Csányi (2010). It is a stand alone WINDOWS application. By
clicking the IndValCom icon, a text window appears on the screen and asks the
user to enter some basic information, and then outputs the results. This manual
describes how the data are to be prepared, and how to specify input parameters.

Input data files

IndValCom uses two input files, one for the raw species by sites data and the
other for specifying the classification of sites.

Input data
It is a text file with the following structure:
Row 1: Text specifying the problem
Row 2: Number of rows in the data (species), Number of columns (sites),
number of groups
Rows 3 – Raw data in free format such that each species starts in a new row, but
may be continued in as many rows as needed.

Example file EX.DAT:

```
Test data
10 10 3
2 3 4 1 4 0 0 0 0 2
4 3 1 0 34 2 3 1 2 3
1 2 1 3 4 0 0 0 0 0
2 3 4 3 4 1 1 1 1 1
4 5 0 0 0 3 3 3 2 1
0 0 2 3 4 1 1 1 1 0
```

```
12 34 56 34 12 0 0 0 0 0
0 0 0 1 1 1 1 1 1 1
0 4 4 4 4 1 1 2 2 1
0 0 0 0 0 0 0 1 2 1
```

Input classification

It is a text file containing the group membership values of all sites. These are integers ranging from 1 to NOCLUS, where NOCLUS is the number of groups (clusters). For example, if the 10th value in this file is 3, its means that site 10 belongs to cluster 3.

Example file PART.DAT:

```
1 1 2 2 2 3 3 3 3 3
```

Please leave a blank line at the end of each file for technical reasons.

The input/output window

The program asks the user to specify the following parameters:

1. Input data filename
2. A random integer with 5 digits as a random seed value
3. The number of randomization steps
4. Filename for classification (group memberships)

If the program is in the same folder as the data, filenames without path are to be entered.

Then, the calculations start and the output appears in the window and, at the same time, is saved in file RESULTS.TXT.

A sample run

The following example shows the use of the program with EX.DAT and PART.DAT, with 10 randomizations. In the output list, IndVal versions are numbered 1 to 5, referring to APCF, ACF, ASF, PCF and PSF.
The results for each randomization step include the sum of IndVal scores over all species for each type of IndVal, and then gives the id. number of the species which has the highest contribution to this sum.

```
  ENTER INPUT FILENAME
ex.dat
  enter random seed
43432
  enter number of randomizations
```

```
10
   ENTER INPUT FILENAME FOR GROUP MEMBERSHIPS
part.dat

   Randomization step    1

  IndVal   1  SUM=    5.88664
  max. spec.   6 its contribution=    .789474

  IndVal   2  SUM=    5.15196
  max. spec.   6 its contribution=    .701754

  IndVal   3  SUM=    5.75702
  max. spec.   6 its contribution=    .770370

  IndVal   4  SUM=    5.79683
  max. spec.   5 its contribution=    .714286

  IndVal   5  SUM=    4.23889
  max. spec.   8 its contribution=    .666667
   Randomization step    2

  IndVal   1  SUM=    4.12271
  max. spec.   2 its contribution=    .520930

  IndVal   2  SUM=    3.57874
  max. spec.   7 its contribution=    .480769

  IndVal   3  SUM=    3.71736
  max. spec.   7 its contribution=    .537778

  IndVal   4  SUM=    3.75968
  max. spec.   1 its contribution=    .533333

  IndVal   5  SUM=    2.98667
  max. spec.   1 its contribution=    .466667
   Randomization step    3

  IndVal   1  SUM=    4.31542
  max. spec.   5 its contribution=    .655738

  IndVal   2  SUM=    3.51747
  max. spec.   5 its contribution=    .601093

  IndVal   3  SUM=    3.60261
  max. spec.   5 its contribution=    .676042

  IndVal   4  SUM=    4.40159
  max. spec.   6 its contribution=    .714286

  IndVal   5  SUM=    3.19889
  max. spec.   6 its contribution=    .583333
   Randomization step    4

  IndVal   1  SUM=    4.90440
  max. spec.   2 its contribution=    .842185

  IndVal   2  SUM=    4.16671
  max. spec.   3 its contribution=    .551471

  IndVal   3  SUM=    4.32965
```

```
max. spec.    3 its contribution=    .620370


IndVal   4  SUM=    4.41111
max. spec.    5 its contribution=    .714286


IndVal   5  SUM=    3.46556
max. spec.    5 its contribution=    .583333
Randomization step    5


IndVal   1  SUM=    4.26792
max. spec.    2 its contribution=    .682540


IndVal   2  SUM=    3.52609
max. spec.    8 its contribution=    .441176


IndVal   3  SUM=    3.57424
max. spec.    7 its contribution=    .431373


IndVal   4  SUM=    3.82635
max. spec.    2 its contribution=    .555556


IndVal   5  SUM=    3.21556
max. spec.    1 its contribution=    .700000
Randomization step    6


IndVal   1  SUM=    4.15936
max. spec.    2 its contribution=    .729730


IndVal   2  SUM=    3.26335
max. spec.    1 its contribution=    .487013


IndVal   3  SUM=    2.95612
max. spec.    1 its contribution=    .537037


IndVal   4  SUM=    3.94540
max. spec.    2 its contribution=    .555556


IndVal   5  SUM=    2.63222
max. spec.    1 its contribution=    .533333
Randomization step    7


IndVal   1  SUM=    4.59509
max. spec.    3 its contribution=    .640000


IndVal   2  SUM=    3.91506
max. spec.    3 its contribution=    .560000


IndVal   3  SUM=    4.32715
max. spec.    3 its contribution=    .612500


IndVal   4  SUM=    4.75460
max. spec.    3 its contribution=    .640000


IndVal   5  SUM=    3.78667
max. spec.    1 its contribution=    .600000
Randomization step    8


IndVal   1  SUM=    5.03729
max. spec.   10 its contribution=    .882353


IndVal   2  SUM=    4.14330
```

```
  max. spec.   10 its contribution=   .735294

 IndVal   3  SUM=   4.55425
 max. spec.   10 its contribution=   .777778

 IndVal   4  SUM=   4.69778
 max. spec.    6 its contribution=   .714286

 IndVal   5  SUM=   3.44889
 max. spec.   10 its contribution=   .900000
 Randomization step    9

 IndVal   1  SUM=   3.44509
 max. spec.    2 its contribution=   .682540

 IndVal   2  SUM=   2.67322
 max. spec.    8 its contribution=   .325424

 IndVal   3  SUM=   2.20727
 max. spec.    2 its contribution=   .314116

 IndVal   4  SUM=   3.91111
 max. spec.    2 its contribution=   .555556

 IndVal   5  SUM=   2.02778
 max. spec.    6 its contribution=   .366667
 Randomization step   10

 IndVal   1  SUM=   6.06731
 max. spec.    7 its contribution=   .895954

 IndVal   2  SUM=   5.08527
 max. spec.    7 its contribution=   .789981

 IndVal   3  SUM=   5.19104
 max. spec.    7 its contribution=   .830524

 IndVal   4  SUM=   4.97778
 max. spec.   10 its contribution=   .666667

 IndVal   5  SUM=   4.81556
 max. spec.   10 its contribution=   .900000

 INDEX  ACTUAL   MEAN   Z-SCORE
APCF  5.88664  4.25466  1.01431
ACF   5.15196  3.54738  1.15666
ASF   5.75702  3.65606  1.34362
PCF   5.79683  4.04384  1.19141
PSF   4.23889  3.07424  .921476
STOP
```

If the number of randomization steps is specified to be 1, then we have the following dialogue on the screen:

```
  ENTER INPUT FILENAME
ex.dat
  enter random seed
12121
  enter number of randomizations
```

```
1
  ENTER INPUT FILENAME FOR GROUP MEMBERSHIPS
part.dat
  Randomization step    1

  IndVal   1  SUM=    5.88664
  max. spec.   6 its contribution=    .789474


  IndVal   2  SUM=    5.15196
  max. spec.   6 its contribution=    .701754


  IndVal   3  SUM=    5.75702
  max. spec.   6 its contribution=    .770370


  IndVal   4  SUM=    5.79683
  max. spec.   5 its contribution=    .714286


  IndVal   5  SUM=    4.23889
  max. spec.   8 its contribution=    .666667
 STOP
```

while the RESULTS.TXT file contains values for all the species and all the groups, as exemplified below

```
  Randomization step    1

  IndVal   1  SUM=    5.88664
  max. spec.   6 its contribution=    .789474
  INDVAL TYPE    1
   .4237    .5085    .0136
   .2015    .4479    .1267
   .3600    .6400    .0000
   .3488    .5116    .1395
   .6522    .0000    .3478
   .0000    .7895    .1684
   .4035    .5965    .0000
   .0000    .2667    .6000
   .1351    .5405    .1892
   .0000    .0000    .6000


  IndVal   2  SUM=    5.15196
  max. spec.   6 its contribution=    .701754
  INDVAL TYPE    2
   .3814    .3955    .0136
   .1871    .2431    .1083
   .3000    .5067    .0000
   .3140    .4806    .1395
   .6159    .0000    .2957
   .0000    .7018    .1684
   .3070    .4678    .0000
   .0000    .2667    .6000
   .1351    .5405    .1568
   .0000    .0000    .6000


  IndVal   3  SUM=    5.75702
  max. spec.   6 its contribution=    .770370
  INDVAL TYPE    3
   .2400    .4019   -.1567
  -.2733    .2735   -.3943
```

```
 .0521   .5690  -.0000
 .0409   .4910  -.5682
 .6926  -.0000   .0283
-.0000   .7704  -.1867
 .1343   .5190  -.0000
-.0000   .1111   .6667
-.0875   .5750  -.3314
-.0000  -.0000   .6000


IndVal   4  SUM=    5.79683
max. spec.    5 its contribution=    .714286
INDVAL TYPE    4
 .3333   .5000   .0333
 .2222   .1481   .5556
 .4000   .6000   .0000
 .2000   .3000   .5000
 .2857   .0000   .7143
 .0000   .4286   .4571
 .4000   .6000   .0000
 .0000   .1905   .7143
 .0556   .3333   .5556
 .0000   .0000   .6000


IndVal   5  SUM=    4.23889
max. spec.    8 its contribution=    .666667
INDVAL TYPE    5
 .4000   .4000  -.1600
 .1667  -.2222   .1667
 .5000   .5000  -.0000
 .0000   .0000   .0000
 .5000  -.0000   .5000
-.0000   .6000   .2400
 .5000   .5000  -.0000
-.0000   .1111   .6667
-.2500   .2500   .2500
-.0000  -.0000   .6000
```

Please report errors and problems to J. Podani at podani@ludens.elte.hu

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