Notes and Comments on MINISSA(N)

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MINI-SSA (Michigan-Israel-Netherlands-Integrated Smallest Space Analysis (Nijmegen) provides internal analysis of:

1. **two-way, one-mode *data* in a symmetric (lower-triangular) matrix of dis/similarities**
2. **by means of a Euclidean distance *model***
3. **using an ordinal (non-metric) *transformation* of the data.**

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1. MINISSA implements the basic non-metric distance model of multidimensional scaling, associated with Shepard and Kruskal. The shortcomings and problems associated with earlier programs were analysed extensively by Lingoes and Roskam (1973), and problems were located primarily in the Initial Configuration (the superiority of a quasi-metric start) and the differences between the Kruskal and Guttman minimization procedures (whimsically referred to as the "Soft Squeeze" and the"Hard Squeeze" in the documentation). As a result, MINISSA was constructed to implement the strengths of both approaches, and has proved to be a remarkably robust and effective program. This version has several important features:

   The simple option to input similarity or dissimilarity data (an irritating shortcoming of basic SPSS implementations)

   As well as choosing between the primary and secondary approach to stress, the ability to specify the value of a parameter EPSILON. If the difference between two data values is less than this value, they are treated as tied.

   Rather than using the Kruskal "rule-of-thumb" values of "acceptable stress", the Spence simulation data are built in, so that users can compare their value of stress1 with the value obtained by scaling random data with the same number of points in the same dimensionality.

   Overall stress is partitioned between each point ("Point Contribution to Stress"), so that badness of fit can be pinpointed

   Solutions can also be run in City-block (as well as Euclidean) metric.

2. **MDSX DOCUMENTATION:**

MDS(X) Users Manual, Edinburgh 1981, ch. 8(*MINISSA_TUM.pdf*)
The User' Guide to MDS, Heinemann 1982 ,ch 3 (*MINISSA_TUG3.pdf*)

Section 1 (The Basic Model) 3 readings from Key Texts in Multidimensional Scaling , Heinemann 1983 *(KTMDS_BASIC_MODEL.pdf)*

3. MDSX DATA:

TEST INPUT: (*TESTMDPREF_INP.txt*)
Social mobility between 13 occupational groups, defined by the Index of dissimilarity. (Macdonald 1972)
TESTOUTPUT: (*TESTMDPREF_OUT.txt)*

4. COMMENTS:

MINISSA is the workhorse of non-metric multidimensional scaling and is undoubtedly the most commonly used program in the MDS(X) Library. It has also been implemented in a number of other packages, including UCINET and ANTHROPAC. .

5. HINTS:

Often used in conjunction with HICLUS; if default options are used, virtually identical ste-ups can be used.
If the Shepard diagram indicates a fairly linear trend, then MRSCAL can be used for metric (and log-power) analysis of the same data.

6. REFERENCES

BASIC REFERENCES:

Kruskal, J. B. (1964a,b) Multidimensional scaling by optimizing goodness of fit to a nonmetric hypothesis. Psychometrika 29 , 1-27.
Nonmetric multidimensional scaling: a numerical method. Psychometrika 29: 115-130.
(A shortened version of this classic article is reprinted in Key Texts in Multidimensional Scaling and (with other important articles on the basic model) is contained in the .pdf documentation to this program, qv.)

Roskam, E.E. and Lingoes, J.C (1970) MINISSA-1: A FORTRAN IV (G) program for the smallest space analysis of square symmetric matrices, Behavioral. Science, 15 , 204-5

Lingoes, J.C. & E.E. Roskam (1973) A mathematical and empirical comparison of two multidimensional scaling algorithms, Psychometrika, 38 (monograph supplement no 19)

Other:

Macdonald, K.I. (1972) MDSCAL and distances between socio-economic groups, in K. Hope, ed The Analysis of Social Mobility Oxford: Clarendon Press

Spence, I. (1979) A Simple Approximation for Random Ranking Stress Values Multivariate Behavioural Research 1979, 14, 355 - 365

Spence, I., Young, F. W. (1978) Monte Carlo Studies in Nonmetric Scaling , Psychometrika 1978,43, 115 - 117

7. STATUS

The algorithm is stable and reliable. Usage: High (most commonly used program)