Notes and Comments on INDSCAL

INDSCAL (Individual Differences SCALing)

provides analysis of:
- **three-way, two-mode (dis) similarity *data* matrices**
- **by means of an scalar-products / weighted Euclidean distance *model***
- **using a linear (metric) *transformation* of the data.**

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1.   INDSCAL in MDSX has two variants: INDSCAL-S (S for symmetric or short) which implements only the "INDIFF" option, and INDSCAL (the original program). In both cases, it is the 3-way, 2-mode version of CANDCOMP (qv). It is a Bell Laboratories Program implementing Carroll and Chang's (1970) paper.

INDSCAL (Individual Differences Scaling) gives a three-way decomposition of a stack of 2-way, 2-mode matrices, where the third way usually represents individuals, occasions, times etc. The solution consists of a Group Space (whose dimensions are FIXED), and each of the elements in the third way is thought of as applying a set of (non-negative) weights to the dimensions, to produce a "private" space. The pattern of individual dimensional weights is represented in a "Subject Space".

2.   **MDSX DOCUMENTATION:**
MDS(X) Users Manual, Edinburgh 1981, ch. 4(*INDSCAL_TUM.pdf*)
The User' Guide to MDS, Heinemann 1982 , 7.2.1 and A7.2
                              (*INDSCAL_TUG721.pdf, INDSCAL_TUGA72.pdf*)

3.   MDSX DATA:
          TEST INPUT: (*TESTINDSCAL_INP.txt*)
          14 subjects from Quadrant I (People-Oriented; High Status); Dissimilarities between 19 Occupational Tiles
          TESTOUTPUT: (*TESTINDSCAL_OUT.txt)*

4.   COMMENTS:
INDSCAL-S is the most common individual differences program, and is expressly dimensional in form: the dimensions are the common referent of the Group Space (to which all other private spaces are referred and systematically distort) and of the Subject Space, which defines the profile of individual dimensional weights.

5.   HINTS:
Very extensively used program. External methods are often used to identify the spanning

Dimensions. There is a strong temptation (to be avoided) of considering the Subject-Space as giving information on the "proximity" of individual profiles. Rather, the angular separation gives this information.

6.   REFERENCES
BASIC REFERENCE:
        Carroll, J.D. & Chang, J.J. (1970) Analysis of individual differences in multidimensional scaling via an N-way generalization of "Eckart-Young" decomposition. *Psychometrika, 35*, 283- 319 (reproduced in KTMDS)

Other:
Arabie, P, J.D. Carroll & Wayne DeSarbo (1987) Three Way Scaling : A Guide to Multidimensional Scaling and Clustering. Sage: Quantitative Applications in the Social Sciences series, Volume: 65

 http://www.fsw.leidenuniv.nl/~kroonenb/ (Three Mode Bibliography)

 http://forrest.psych.unc.edu/teaching/p230 /SR&YChap16B.pdf   (INDSCAL & other 3W2M models)

http://www.liv.ac.uk/~pbarrett/idanet.htm (Individual Differences & Assessment Network, via Paul Barrett). Bibliography and programs.

7. STATUS
The algorithm appears to be stable and reliable. Usage: High