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STAT 1: A STATISTICAL TOOLBOX

Stat 1—A Statistical Toolbox is an easy to use menu-driven statistical package for IBM and compatible personal computers. It takes data from initial coding and documentation through printing the final analysis with titles and footnotes. *Stat 1* helps new users pick appropriate statistics with a unique "Statistical Decision Tree," implementation of Frank Andrews, et al. *A Guide to the Use of Statistics.* The Decision Tree, a glossary, "Reference Tree," and context-sensitive help screens all appear at the touch of a key.

Stat 1 prompts for input through each step of the analysis. Function keys call utility routines and data transformations from any procedure. All computations are done to 64 bit accuracy with direct algebraic implementations of standard procedures. The program is contained on a single floppy disk. A second disk contains extensive sample data files, a file of Longley benchmark data, Reference Tree, glossary and the Statistical Decision Tree. An easy to follow 284 page manual applies statistical procedures to social science problems of graded difficulty.

Features

Data entry and management: enter and edit variables or cases with a full screen editor, import ASCII Files, generate codebook, document files, select cases, run parallel group analyses.

Variable handling procedures: enter single variables, enter multidimensional tables, interactive recode, fixed transformations, formula transformations, matrix algebra, Winsorize, truncate, and lag variables, generate statistical distributions.

Descriptive statistics: mean, mode, median, quartiles, standard deviation, variance, skew, kurtosis, confidence intervals, histograms, frequency distributions.

Crosstabs: n-dimensional tables and chi-square with user entered or program calculated expected values, tests of goodness-of-fit for one or n-dimensional matrices.

t-Test: t-test for one or two groups, paired or unpaired observations, parametric and nonparametric test statistics. Data may be in separate variables, grouped by a variable in the file, or supplied as means, standard deviations, and sample size.

Correlation: Pearson, Spearman, gamma, tau-a, tau-b, Sommers'-D. Correlations among multiple variables are printed as a matrix or saved as matrix file.

Regression: linear regression (hierarchical and simultaneous), interactions, ANCOVA and unequal-n ANOVA, general linear model (multiple dependent variables), automatic dummy variable coding, robust regression on ranks.

Smallest space analysis: nonmetric cluster/factor analytic technique, applied to any symmetric matrix of similarity or distance data.

Hardware Requirements

Stat 1 requires an IBM-PC, ATT 6300, Compaq or other "99% compatible" PC-DOS or MS-DOS personal computer with 256K bytes of memory and two floppy disk drives or one floppy disk and one fixed disk drive. A Wang-PC version is also available. *Stat 1* will use the 8087 math processor automatically if one is installed, and supports a hard disk. A unique memory manager allocates all available computer memory.

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Stat 1 is priced at $179.95, air shipping prepaid, worldwide. Site licensing is available for 8 or more copies. The manual is sold for class adoption at $19.95. A demo version of the program, including the manual, is available for $24.95 + $3.00 personal checks with identification are accepted.

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Readers can reach the program's developers through Jerry M. Brennan at (808) 949-7926 or Lawrence H. Nitz at (808) 261-7536.

SIMCA: A PROGRAM TO PERFORM SIMPLE CORRESPONDENCE ANALYSIS

Correspondence analysis is an exploratory multivariate technique which displays the rows and columns of a rectangular data matrix as points in a scatterplot. It is a powerful descriptive statistical tool in almost any situation involving categorical data, especially in the social sciences. This method has been used extensively in France for over 20 years (see Benzécri, 1969; Benzécri, 1973), but is rapidly becoming popular elsewhere. It is very similar in style to principal component analysis, but is applicable to categorical data rather than data measured on a continuous scale. Whereas in principal component analysis the total variance of a set of variables is decomposed along principal axes, in correspondence analysis (of a contingency table, say) it is the usual chi-square statistic for testing row-column independence which is decomposed. Greenacre (1981) provides an introduction to the French approach, which is characterized by its emphasis on the geometric interpretation of the results. Comprehensive treatments of the technique may be found in Gifi (1981), Greenacre (1984) and Lebart, Marineau, and Warwick (1984). Correspondence analysis is computationally equivalent to dual scaling, discussed in detail by Nishisato (1980).

SIMCA (version 1.0) is a program to analyze and display a data matrix by correspondence analysis. It runs on an IBM PC (or compatible) with at least 128K free memory. The graphics stage of the program requires the IBM Color/Graphics Card (or compatible card), as well as an appropriate color or monochrome screen. This form of the analysis is called "simple" merely to distinguish it from "multiple" correspondence analysis, or homogeneity analysis (see the references mentioned above as well as Tenenhaus & Young, 1985). SIMCA can also be used to perform multiple correspondence analysis, but in a very limited fashion at present.

The present version accepts a rectangular data matrix of nonnegative numbers as input, usually a two-way contingency table or another type of frequency table. The style of input is a combination of batch and interactive. On the one hand the parameters and data of the analysis reside in a standard ASCII disk file on the microcomputer. Then, once the analysis is successfully completed, various two-dimensional projections of the row and column points may be requested interactively. A number of options are available at this stage, for example different standardizations of the row and column configurations may be specified and selections of "active" or "supplementary" rows and columns can be made. In this way one can explore the graphical results quite extensively without reinitiating the analysis. This strategy suits the iterative nature of this technique which typically passes between the analytical and graphical stages a few times during the data exploration.

The program also provides extensive numerial output to either the screen, printer or a specified file, according to the user's choice. This output is in the style of the French approach, that is in the form of tables of absolute and relative contributions made by the rows and columns to the principal axes, as described by Greenacre (1984). The coordi-

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nates of the row and column points may also be saved in a file so that other plotting devices may be programmed to draw the appropriate scatterplots of these points.

This program is not sold as a commercial venture. Any profits from its sale will be used to cover costs of further development. Buyers of this software will be kept informed immediately of further enhancements which are being planned, including: a version which will handle larger data matrices (the present version analyzes a matrix with at most 100 rows and 30 columns), a portable mainframe version which accepts an identical input file, a new program designed specifically to perform multiple correspondence analysis, investigating the stability of the results by "bootstrapping" the display under a variety of sampling schemes.

The cost of this version is $50 for academic users at educational institutions, otherwise $100, with an additional $5 charge for postage and packing in either case. The program diskette includes two sets of test data and their output files. The 36 page manual which accompanies the program describes in detail how to set up the input file and lists the input and output of the test examples in annotated form. We stress that the manual is not a stand-alone description of correspondence analysis, and that the references given below will need to be consulted in order to give the user an adequate introduction to the method itself and its interpretation.

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EQS AND EQS/PC: STRUCTURAL EQUATIONS PROGRAMS

EQS (pronounced "X") is a computer program for the estimation and testing of linear structural equation models. Such models, made popular via LISREL (Jöreskog & Sörbom, 1983), permit theory testing with nonexperimental data. Important applications include confirmatory factor analysis, path analysis, multivariate regression, and latent variable models of all sorts. EQS/PC is the microcomputer version of the program.

Two fundamental advances have been built into EQS. First, the restrictive assumption of multivariate normality of variables has been superseded by two generalizations (Bentler, 1983; Browne, 1984). Elliptical distribution theory permits variables to have heavier or lighter tails as compared to normal theory. Arbitrary distribution theory permits a distribution-free approach to structural models. Both theories can be implemented

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via fully iterated or one-step efficient linearized estimators (Bentler & Dijkstra, 1985). Of course, normal theory methods are also provided, yielding the same statistics as LISREL. The second major feature of EQS is that the user does not need to know matrix algebra. Since no matrices (vs. 8 in LISREL) are used, EQS is an ideal teaching tool. For example, a one-factor model (F) with three variables (V) is specified as follows:

$$V1 = .8 * F1 + E1; \qquad V2 = .8 * F1 + E2; \qquad V3 = .8 * F1 + E3;$$

where $E1$, $E2$, and $E3$ are error (E) or unique variables, .8 is a guessed factor loading value, and * indicates that .8 is a free parameter. Specifying variances as $F1 = 1$; and $E1$ to $E3 = .5*$; fixes the variance of $F1$ at 1.0 (there is no *), and starts the free error variances at .5. Internally, the program uses the Bentler-Weeks (1980) matrix representation for structural models, but the user does not encounter matrices.

The program provides a number of convenient features, such as the ability to: detect and delete outliers, test multivariate normality, extensively check specification errors, draw a path diagram, constrain parameters by general linear equalities and inequalities (e.g., to force variances to be nonnegative), generate equations, automatically select variables, accept variables in arbitrary input order, control convergence, and so forth. Further information is available in the manual (Bentler, 1985), which also provides a self-contained introduction to structural models as well as a discussion of the statistical and computational theory involved.

EQS is written in FORTRAN. It is available on tape for IBM and IBM-compatible MVS and VM/CMS systems, as well as for VAX/VMS systems. EQS/PC is available on floppy diskettes for IBM/PC XT and ATs and their compatibles that have 512KB memory. Since EQS/PC (unlike PC-LISREL) has no restrictions on the number of times it can be used, it can be used conveniently in teaching contexts and in running inexpensive simulations.

EQS is distributed on an annual lease basis (currently, $250). EQS/PC is a licensed sale product (currently $300, with substantial discounts for multiple installations in PC laboratories). The manual costs $10. Contact:

BMDP Statistical Software, Inc.
1964 Westwood Blvd.
Suite 202
Los Angeles, CA 90024
(Ph. 213-475-5700).

EQS and EQS/PC are standalone programs, that is, they are not part of the BMDP package of programs.

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