PROGRAM ABSTRACTS/ALGORITHMS

Data-editing BASIC programs for creating, modifying, and combining Apple II disk files

RICHARD F. WEST

James Madison University, Harrisonburg, Virginia

A wide assortment of statistical analyses can now be conducted on conveniently available microcomputers using programs written in the BASIC language (e.g., Lyczak, 1980). Indeed, *Behavior Research Methods & Instrumentation* has served as a source for numerous statistical programs that can perform tasks that range from *t* tests and multiple-regression analyses to large-design, between- and within-subject ANOVAs (e.g., Galla, 1981, 1982; Gorman & Primavera, 1981; Hacker & Angiolillo-Bent, 1981; Lane, 1981; Steinmetz, Romano, & Patterson, 1981; Wolach, 1981). Random-access data files stored on floppy disks provide an efficient way to store data that will be used in statistical analyses conducted on microcomputers. These files store separate data items in a sequence of individually accessible "records" that are identified by a number that indicates the record's position in a file. Unfortunately, the built-in editing functions of most microcomputers cannot be used to edit disk files, and programs must be written to create and edit these files. Writing such programs can be time-consuming, particularly if the data are to be analyzed in more than one way or if they are stored in more than one file. The menu-driven data-editing package of five programs described here provides a user-friendly means of creating and editing random-access data files for the Apple II microcomputer.

Description. FILE EDITOR presents a menu that runs any of the four other editing programs or a statistical analysis menu. FILE MAKER can be used to create a new random-access data file, to add data to an existing file, to insert or delete a specific record (i.e., data item), to change an existing record, to list a specific record, or to list the data in a file in a subject-by-variable format. FILE VAR COMBINER can be used to form a new data file that contains a user-selected subset of subjects and variables from one or more existing files. The order in which the variables are entered into the new file can be specified. In addition, new variables that are formed by summing, taking the difference between, or averaging two variables can be entered into the new file. FILE MERGER-END can be used to form a new data file that contains the records from one existing

file followed by the records from a second existing file. FILE MERGER-MIDDLE forms a new data file that contains the first-half records from one existing file, then the first-half records from a second existing file, and, finally, the second-half records of the two existing files. Each editing program can return to the FILE EDITOR menu for additional editing-function selection. Data are saved in disk files prior to a switch to a new editing program and can be loaded into the newly selected program as needed. Finally, the editing programs contain routines designed to protect against the accidental overwriting or erasure of data in existing files.

Limitations. A number of the editing functions are carried out by use of arrays that have been dimensioned to contain a maximum of 5,000 elements (i.e., data items). Although a single program could have been written to carry out the editing functions described above, such a program would have been large, thus greatly reducing the amount of memory available for data (e.g., array values require 5 bytes each). One characteristic of Apple II random-access files is that each record in a given file holds the same amount of information (i.e., number of bytes or characters). The number of bytes that can be stored in a record of a given file is referred to as the record "length," which must be specified when the file is created. As written, the data-editing programs create files with a record length of 10. Thus, a data item may not exceed 10 decimal places in length. This maximum length can easily be changed by changing the value of the second variable in each program prior to running that program.

Computer and Language. The programs are written in APPLESOFT BASIC and run on an Apple II Plus microcomputer with two disk drives, 48K RAM, and language card. No modification should be needed to run on a 48K system that has no language card. A single disk-drive system can be used if, prior to running a program, the value of the first variable in the program is changed to "1" (this variable indicates the drive number of the disk containing the data files).

RAM and Time Requirements. Each program has been written in two forms. One form is documented, and the other form is undocumented and contains several statements on each program line. The documented programs take up between 836 and 5,972 bytes in RAM, whereas the more compact versions take up between 687 and 3,445 bytes in RAM. Although the more compact programs run slightly faster than the documented programs, their compact form makes them difficult to edit; their main value lies in the economical use of RAM. As a result, the more compact forms of the

The author's mailing address is: Department of Psychology, James Madison University, Harrisonburg, Virginia 22807.

editing programs make possible either the use of arrays larger than those discussed above (which correspond to the documented forms of the programs) or implementation on systems with less than 48K RAM. The editing programs run reasonably fast. For example, the documented form of FILE MERGER-END was able to combine two files to form a new file with 200 data items in approximately 30 sec. The formation of a much larger file that contained 2,000 data items required nearly 3.5 min.

Availability. A listing of the data-editing programs and instructions on their use (including examples of how they can be used with statistical programs) can be obtained without charge by writing Richard F. West, Department of Psychology, James Madison University, Harrisonburg, Virginia 22807. A diskette containing both the documented and more compact forms of the editing programs, as well as examples of statistical programs that can use data from the created files, is available for \$8.00 (to cover diskette and mailing costs).

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