Program Abstracts/Algorithms

A pseudo-three-dimensional computer plotting procedure*

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The programming approach and flow chart described here permit the use of any conventional X-Y plotter for pseudo-three-dimensional plotting. Our version of this program approach is in FOCAL-12 and currently operates on a PDP-12 computer using a Mosley 7035 X-Y plotter. The essential point is the logic tree which permits hidden line suppression.

Figure 1 presents the logic flow chart for the program and is annotated for ease of interpretation. Horizontal (HO) and vertical offsets (VO) must be tailored to the individual data to maximize the three-dimensional illusion. The central manipulation is a component-by-component comparison of the previous plot vector (X, Y_{pbj}) with a current data vector as incremented by the vertical offset ($X, Y_{dfj} + VO$). The largest number is retained as the new plot vector component (Y_j). Figure 2 shows data plotted with (HO) = 0 and (HO) = 10. With (HO) set to a negative value, successive records would be offset to the left.

This program approach does not employ perspective techniques such as the familiar illusion of railroad tracks meeting at a point on the horizon. The advantage of this method is its basic simplicity. A major side benefit is that it is relatively easy to program, particularly in FOCAL-12 or other interpreter languages that have

Fig. 1. Logic flow chart.

Fig. 2. Examples of plotting with hidden line suppression. The same data are plotted in A and B. A shows plots with no horizontal offset, while B uses an offset of 10 units. Horizontal trace is 256 units.

digital to analog capabilities, as well as in assembly or computer languages.

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CLUSTER: A hierarchical clustering program for large data sets ($n > 100$)

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CLUSTER is a program especially designed to perform hierarchical clustering on large data matrices

($n > 100$). Although several excellent programs were already in existence for either single iteration or hierarchical procedures, none was oriented toward handling the massive data arrays often collected by current survey procedures in the behavioral and social sciences. Since clustering provides a good method for reducing large data arrays, a program specifically oriented toward such problems could be particularly useful.

CLUSTER is basically an extension of Veldman's (1967) HGROU program. It utilizes Ward's (1963) hierarchical procedure of successively combining n objects together to form $n, n-1, n-2, \dots, 2$ groups by minimizing an objective error function. This error, or distance, function is defined to be the weighted sum of squared differences between corresponding scores on m measures for each possible pairing of two groups. That