of variables or by some indices of pairwise similarity resp. dissimilarity. These notions are clarified in Section 2 which not only discusses nominal, ordinal and quantitative variables, but also treats on variables whose alternatives are ordered hierarchically or bear some lattice structure. It is shown how several measures of distance may be aggregated to a "global" distance. Section 3 presents some clustering methods for forming partitions, coverings, hierarchies or quasi-hierarchies of classes using several criteria for measuring the homogeneity of classes or evaluating the goodness-of-fit of a classification. In Section 4 a Euclidean representation of objects is found by the usual methods of principal component analysis or by nonmetric multidimensional scaling. — For the identification of objects (Section 5) an optimal weighting of (quantitative) variables is found by discriminant analysis or by regression and canonical correlation analysis. Identification with qualitative or mixed data is handled by calculating some distance index for each variable and linearly aggregating these indexes to a global index d such that the partition to be explained is a minimum-distance partition generated by d (system of linear inequalities) resp. such that d is a monotone function of δ (= distance induced by the given representation; Kruskal — like gradient algorithm). These methods are new. — Section 6 informs on existing computer programs. — The text is written for students of economics, its style is informal and illustrative. Because all formulas and algorithms are given in their exact mathematical form the reader should have some prior mathematical or statistical knowledge (the Section 1.3 on "mathematical foundations" seems to be insufficient). However the methods are only heuristically motivated, no proofs or probabilistic arguments are given. Most algorithms are illustrated by a numerical example (5 objects).

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BRITISH STANDARDS INSTITUTION: BSI **ROOT** Thesaurus. Part 1: Subject display; Part 2: Alphabetical list. Hemel Hempstead, Herts.1981. 620+676 p., £ 155.-

According to the Foreword, the ROOT Thesaurus can be regarded as the product of both, the in-house thesaurus of the British Standards Institution and the institution's contribution to the ISONET thesaurus started in 1974 by a working group of the International Standardisation Organisation. A French version of this work is still held on computer file only, the English one was printed recently as the ROOT Thesaurus in two heavy volumes off the magnetic tapes.

Once the British became famous for the finest car on earth, called Rolls Royce. For my opinion the ROOT Thesaurus is the Rolls Royce in thesaurus making, and again a product of the good advice of Mrs. Jean Aitchison, our model-setter in this field!

Although nowhere in the introduction an explanation is given why the name ROOT was chosen, (an acronym?) the design on the cover page explains it by showing big stem roots of named technical areas emerging out of a center and extending into smaller and smaller roots of less comprehensive technical fields and their subfields. Usually a classification hierarchy is depicted by a tree; the root idea comprises in addition the possibility that sections of this thesaurus can be used in a given field as a starting point and compatible instrument for the development of separate thesauri at other centers.

What are the excelling features of the new thesaurus breed?

ROOT consists of a subject display embracing 24 main classes with a one-letter notation covering mostly technical areas in which standards have been developed. These are subdivided by altogether 139 subclasses with a two and sometimes a three letter notation (capital letters). ROOT contains altogether some 11 800 descriptors and 5500 lead-in terms. The arrangement in the subject display is in faceted order; characteristics of division are added in brackets. In a few cases, such characteristics have become class descriptors themselves, but in general this kind of structuring was avoided. Recognition of hierarchy is facilitated by the typography with a bold-face type in different sizes for the first three levels. Wherever necessary, additional information is added to a descriptor such as synonyms, related terms in alternative hierarchy, and broader and narrower terms in alternative hierarchy. A specialty is also the indication of synthesized terms by a certain symbol which should warn not to use the descriptor following but the combination of terms as indicated.

The socalled alphabetical list contains in bold-face print all descriptors, their notations and the descriptors of the next hierarchical levels as well as the non-descriptors. At their respective entries an arrow points to the descriptor to use.

Yes, one uses a new the symbolization, namely the internationally known mathematical symbols which are easy to learn and easy to write but not easy to type.

Indeed with all of this we are having a new thesaurus model and a fine one too. Is it a perfect model? The user will soon answer this question. And what will the theoricians have to say? They might observe that the conceptual structure of the fields as indicated by the characteristics of division does not always comply with the hierarchy, e.g. if a descriptor denotes a process it is sometimes treated as if it were a field with its subdivisions including objects, materials, systems etc. Also regrettably the elaboration of a recurring array of facets was not aimed at. The notation depicts the hierarchy, however, in cases of concept combination (syntheses) the notation pre-coordinates the otherwise differing facets. There is no rule for expression of syntax in cases of compound terms or term combinations. Thus this product is meant rather to serve as a tool for coordinate indexing than as one to express complex subjects in a predictive and reconstructable way. However, since no other symbols are used with the ROOT notation than capital letters and a period after three such letters, there may still be a chance, at some later date, to develop a syntax and its symbols for an improved condensation, organization and retrieval of information.

Ingetraut Dahlberg