Book Reviews

JAMBU, M.; LEBEAUX, M.-O.: Cluster Analysis and Data Analysis.
Amsterdam-New York-Oxford: North-Holland 1983. XXIV,898p., ISBN 0-444-866345-5

The book consists of two parts: Cluster analysis and data analysis, although the first is often considered as a part of the second. The author defines the first part as "the set of computer procedures which build up or recognize hierarchies or partitions of underlying data sets", the second as "the set of computer procedures which describe, recognize or identify structures of underlying clouds of points, usually points of a low-dimensional space built from the data sets...". It does not become clear why the author speaks of computer programs instead of algorithms. The reason may be that three quarters of the book consist of listings and descriptions of FORTRAN programs for the different altorithms described in the theoretical part of the book.

The theoretical part starts after a brief introduction to the classification problem with a chapter on correspondence analysis and another one on properties of hierarchical classifications. A description of distance and similarity measures follows. The following chapters are devoted to classical and fast algorithms for hierarchical classifications, algorithms for determining partitions and overlapping clusters and interpretational aids and validity of classifications. Exact definitions, theorems and their proofs are given but they are always explained and justified by practical examples.

The book can be recommended to users of classification methods who want to create a program library and also to those who are interested in the theoretical background of the methods. Peter Ihm

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DAHLBERG, Ingetraut (Ed.): Klassifikation als Werkzeug der Lehre und Forschung (Classification as a tool in teaching and research). Frankfurt/ Main: Indeks Verlag 1986. 184p. = Studien zur Klassifikation, Bd.16; ISBN 3-88672-015-2

In this volume of lectures under review, the attempt is made, among other things, to focus the attention of those users engaged in teaching and research on the concept of "classification".

In the Preface it is emphasized "how the methods of classification as the organisation of knowledge attend on and exercise an essential influence on the research process and, indeed, may even become a direct aid in research. First of all, concept analysis and concept definition form the basis of all research, for without a firm grasp of concepts as units of our knowledge, problems can neither be scientifically recognized as such nor solutions found for them. The next step, which usually consists in the collecting and analysis of data, demands classification knowledge of the correct assigning of data and their grouping. In a further, third step, data structuring and data ordering must be undertaken, and it is sure that without an explicit knowledge of existing classification possibilities, this can only be done in an amateurish fashion" (Dahlberg).

To consider classification under the aspect of the "ordering of knowledge" has not only become important in respect of the rationalisation of traditional methods of research. The reapid development of information technology marked by the transition from "data processing" to "knowledge processing" also makes new demands on the methods of classification. In this field, a large number of problems have, up to now, found either no solution whatsoever or have been but unsatisfactorily solved. It is not so much problems of computer technology or programming techniques which now lie to the fore, but mainly problems connected with the form of human knowledge processing, with semantics, and with suitable concept ordering.

If systems based on knowledge (expert systems) are also to carry out "intelligent" functions and be employed to solve scientific problems, then we must not forget that in doing so a great number of characteristics considered a prerequisite for intelligence must also be taken into account in a certain way when solving problems with the aid of a computer.

NEDOBITY lists these characteristics in his paper and comes to the conclusion that they are not only of great interest for research. They are also an integral part of classification activity itself. What is more, an effective man-computer interaction is surely hardly realisable if the user's conceptions of order or the method of ordering knowledge in the user's memory has not been adjusted to the order of knowledge fed into the computer system. In his contribution, Nedobity points out this psychological aspect of classification and knowledge techniques. Here, the comparison of the various approaches to the presentation of knowledge is of particular interest:

- in artificial intelligence
- in classification, and
- in cognitive psychology.

The description of the consequences and advantages of these approaches stimulates analogous reflections which may also contribute to the optimisation of relevant methods and aids. When from all approaches and conclusions it follows over and over again that knowledge is "structured" information, that "problem solving behaviour is a structured process", that "the human brain operates in symbolic pictures" (Nedobity), then in my opinion the question - would a structured picture-form of knowledge presentation as opposed to other methods not have certain advantages? - is irresistible. As is known, the structured formula picture of a chemical compound possibly represents a very great deal of knowledge in concise form and, compared to the relevant chemical name of the compound, distinguishes itself in a high degree of condensed information and transparency.

Of course, the structured form of presentation of any given store of knowledge pre-supposes a certain formalisation of existing knowledge in the natural language analogous to the structured formula picture in chemistry, a degree of formalisation adapted to the relevant purpose of application, as has been done, for example, in a subject thesaurus. From these points of

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