BOOK REVIEWS

SPÄTH, Helmut: **Cluster-Analyse-Algorithmen zur Objektklassifizierung und Datenreduktion** (in German). München–Wien: R. Oldenbourg Verlag [1]1975. [2]1977. 217 p., ISBN 3-486-39912-8.

"Cluster-Analysis" (synon.: automatic classification, numerical taxonomy etc.) is a collective name designating numerous mathematical and statistical procedures for grouping a great set of objects described by a series of (numerical, ordinal, nominal or binary) variables into a small number of different classes (groups, clusters, types) such that each class is as homogeneous as possible and comprises only "similar" objects whilst on the other side, different classes should be well separated and "dissimilar" objects should be attributed to different classes. Such a classification (together with a corresponding interpretation of classes) gives more insight into the underlying structure of the set of objects; other motivations are: data reduction, segmentation for organisational purposes, formation of hypotheses etc.–

The book of H. *Späth* is an introduction in cluster analysis from the programmer's and user's viewpoint. It describes the most essential methods in a formally exact and well readable way, gives the corresponding FORTRAN computer programs (in a modular form) and illustrates the use of each program by one or more real data examples.–

Chap. 1: Introduction. Chap. 2 introduces various measures for the similarity and dissimilarity (distance) between objects for several types of variables. Chap. 3 presents exact enumerative and heuristic exchange procedures for minimizing a grouping criterion (e.g. trace criterion, determinantal criterion; dynamic programming approach). A method for solving the location-allocation problem is given. Chap. 4 comprises 9 hierarchical (divisive and agglomerative) procedures (no program for a dendrogram plot). Chap. 5 presents a method for optimizing the representation of profiles (e.g. cluster centers in multidimensional space) and a computational version of the "shaded diagram" method.–

On the basis of the given examples the author gives recommendations regarding the procedure to use. He argues for the procedure with the best interpretable result and evidently prefers the criterion minimizing procedures of chap. 3. The reviewer misses some method for reducing chaining effects (e.g. of *Wishart, Ling*) and for the simultaneous clustering of objects and variables. A table of contents is lacking. The examples are mostly two-dimensional whilst the very profit of cluster analysis lies in multidimensional applications. Some errors must be corrected (e.g.: (2.1.36); (2.2.6a) is the coefficient of *Jaccard* (comp. p. 25, line 6); (2.219); the criterion (3.3.4) is a constant lm; the splitting 3/9 is lacking in B 29).–

The book is a good guideline for people (able to read mathematical formulae) desiring an overview on cluster analysis or needing a corresponding short computer program.

H.-H. Bock

SPÄTH, Helmuth (Ed.): **Fallstudien Cluster-Analyse**. München–Wien: R. Oldenbourg Verlag 1977. 189 p., ISBN 3-486-20771-7.

Cluster analysis is a collective name designating numerous mathematical and statistical methods for dissecting a great set of objects into several small homogeneous and well separated classes (groups, clusters) and thereby using exclusively some numerically given information about properties, similarities or dissimilarities between these objects. The book "Fallstudien Cluster-Analyse" contains 11 papers of different authors which apply these methods to the solution of a practical problem (or subproblem) taken from the economical, sociological, administrational or psychological field. Generally the papers follow all the same scheme (presentation of the problem/description of data/motivation of the procedure/resulting classification/interpretation and valuation), they are easily readable and written from a non-mathematical view point. They differ considerably in their precision and their level of argumentation. I miss a real comparison between several clustering procedures whose selection is often motivated more by the available software than by substantial reasoning. The book illustrates the use of clustering methods and gives an idea of the kind of problems which can be tackled by these methods (ignoring fields like medicine, biometry, pattern recognition, data files etc.).

Contents: *D. Steinhausen/J. Steinhausen: Cluster-Analyse als Instrument der Zielgruppendefinition in der Marktforschung.* (Life-style data of 4000 persons are analysed by principal component analysis and minimal distance procedures; result: 15 groups of persons which differ by their consumer behaviour.) –

G. Blaschke/G. Liesegang: Die Klassifizierung von Nachfragekurven zur Verbesserung der kurzfristigen Absatzprognose in einem Betrieb mit modeabhängigem Produktionsprogramm. (Using a weighted euclidean distance between demand curves of textiles the hierarchical method of Ward reveals the existence of several groups of textiles; this permits the forecasting of a future demand and an improved ordering strategy based on preliminary data.) –

F. Bingemer/H.-A. Tauschwitz: Ein Modell zur Optimierung der Struktur von Absatzstellen. –

H. Späth: Partitionierende Cluster-Analyse für große Objektemengen mit binären Merkmalen am Beispiel von Firmen und deren Berufsgruppenbedarf. (An iterative exchange procedure (FORTRAN) is given for optimizing a clustering criterion with binary data; it is applied to the grouping of enterprises according to the professions in their staff.) –

W. Schläger: Die Klassifikation von Verweildauerhäufigkeiten stationärer Patienten der Medizinischen Klinik der Universität Erlangen–Nürnberg mittels Cluster-Analyse. –

W. Klösgen: Einsatz von Gruppierungsverfahren für Organisationsuntersuchungen. Cluster-Analyse und alternative Verfahren. (The sections of a ministry are grouped on the basis of their activities and their interactions; factor analysis, complete linkage method and maximal cliques are used.) –

H. Fakiner/E. Krieger/H. Rohmeier: Regional differenzierte Analyse und Prognose des Wasserbedarfs der