Bulletin of The Japanese Classification Society

Volume 7
December 17, 1993

Tokyo, JAPAN

Contents

Analysis of Questionnaire Data by Combination of AHP and AID

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Abstract

The purpose of this paper is to propose a new method of questionnaire data analysis. Considering convenient answering and subsequent data processing, multiple-item selection typed questions are often used.

However, it is sometimes difficult to select one corresponding item from multiple items in case that the definitions of each item are inexplicit, or multiple items are fit for the answer. Same problems occur even if multiple answers are permitted. At data processing stage, single or cross statistical tables are computed. But, we obtain little information from those computer outputs other than frequency distributions of each item.

We propose a combinatorial utilization of AHP and AID. AHP is a decision making method of multiple objective type proposed by T. Saarty (1981). By introducing AHP, a traditional multiple-item selection typed questions can be changed to paired comparison between items typed questions. The essence of AHP is the computation of eigenvalues of paired comparison matrix. Paired comparison matrixes are similar to sociometry matrixes or similarity matrixes of Type 4 Quantification theory by T.Hayashi. As a result, we obtain not only the order of the degree of importance between items but also quantitative weights of each items reflecting the degree of importance. It is very important to stratify original sample data into homogeneous groups for obtaining stable and reliable statistics.

In our study, AID (Morgan & Sonquist; 1963) is used for homogenization by using AHP weight values as outer criterion and profiles or other questionnaire data as explanation variables. The combinatorial method proposed in this paper can be decomposed into two stages. The first stage is the extraction of the principal component by AHP, and the second stage is the clustering by AID.
We'd like to develop a integrated method from structured design of questionnaires to analysis o questionnaire data.

References

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Classification of Remotely Sensed Images Using Finite Mixture Distribution Models

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Abstract

This paper describes classification procedure using finite mixture model for LANDSAT image data. The following problems arise in classification an image data:

(1) At each pixel in an image a vector of observations is measured, and the distribution of these measurements is approximated by a mixture model for which a pixel may contain some objects.

(2) In certain case the data sets have heavier-tailed distributions than the normal.

The objective of this paper is to examine a classification procedure using a multivariate normal mixture model and a multivariate t mixture model, and to verify a validity of latter model. The procedure estimates a rough segmentation of the objects for the purpose of exploring the feature of an overall image data. An estimation methodology using EM algorithm with re-weighting method
for multivariate t mixture model is proposed. Another objective is to develop the coloring procedure that visualizes the characteristics as the result of a classification. Examples are presented in order to show how these procedures work for real image data.

A Classification Method by Using the Rank Graph

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Abstract

In this paper, a method for classifing items and judges from ranked observations by using the rank graph is proposed. The rank graph was proposed originally as a descriptive one in which an average rank and a degree of concordance of ranks assigned toeach item are represented by the vector called item vector.

As the distribution of an item vector is asymptotically approximated by a 2-dimensional normal distribution, we can obtain an elliptic confidence region of the item vector. It will be shown that it is possible to classify the items and the judges hierarchically according to the confidence coefficient.

Keywords: ranked observation, graphical representation, rank graph, classification

Consideration on Examination Permitted to Bring Reference Materials

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Abstract

The two kinds of examinations have been applied to students with regard to a subject of general introduction to engineering. At the end of the first semester an examination permitted to bring reference materials including their note and books was carried out and in the following second semester standard examination not capable to bring any reference material was put in which a design to check the effect of remembrance provoked by the examination with references was built-in. Total number of applicants were 152 and all students who wrote correct answer in the first semester attained to a number of 98 and among them only a number of ten students got right response to the same kind of question of second test regarding a specific term related with patent system in Japan and US. The examination with references could not get high evaluation. Finally correspondence analysis to the classified written words has been adopted to show the characteristics of two types of examinations.

Performance and Interpretation of AID, CART, MARS and ABLE

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Abstract
(not received)

A Hierarchical Clustering Method based on Reducibility Property and Reciprocal Nearest Neighbors

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Abstract

Various procedures will be required in order to classify large data sets under a personal computer environment and then observe the clustering process by graphical and colored representation. The objective of this paper is to propose some procedures for presenting the skeleton of the data structure, and not to directly display the distribution of large-scale data. The clustering process for classifying large-scale data sets (exceeding 10,000 observations) and representing the classification results smoothly with computer graphics is provided. The clustering process proposed here is essentially summarized as follows:

Step 1: Preliminary classification
A partial data set is sampled from a given data set at random in a certain proportion. Next, sampled data is subjected to the initial classification. At this time, the number of clusters is specified to be as large as possible to generate a large number of groups. The distance table is not used because it requires the use of a large matrix. The classification thereby completed is displayed by tree representation as the "preliminary classification."

Step 2: Refinement by reclassification
All individuals in the data set subjected to the initial classification are classified consecutively using the tree obtained in Step 3 as a decision tree (i.e., each individual is assigned consecutively to some cluster in the tree by a binary decision rule). After all individuals are assigned, "reclassification" or "refinement" is conducted using the centroid vector of each cluster at the terminal end of the tree. The reclassification obtained in this step is the fine adjustment of the relationship between each cluster andthe individuals belonging to each cluster. At this time, the tree structure is reconstructed using the RNN-rule (reciprocal nearest neighbor rule) and the NN-chains (nearest neighbor chains).

Step 3: Output presentation
The tree structure obtained by reclassification is displayed and observed again, and is compared with that obtained by the preliminary classification.

In our talk, the experimental results obtained using artificial data sets were presented.

Determining Core Journals in Social Sciences: Ranking Scholarly Journals by the Number of Articles and Citations

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Abstract

The purpose of this study is to assess the importance of individual social science journals by two indicators: the number of articles and the number of citations received. The first indicator shows the extent to which the journal contributes to dissemination of research output in a particular discipline. The list of journals ranked by this indicator, in general, shows that numerous articles are concentrated in a few 'core' journals. This regularity is often referred to as 'Bradford's law.' The second indicator--the number of citations received--represents the significance or impact of cited articles, and is employed to compensate for important journals that publish only a small number of articles.

The core journal list by the number of articles (called "List A") was compiled from the International Bibliography of the Social Sciences (IBSS), which covers four disciplines--economics, political science, sociology and cultural anthropology--and maintains a high level of selectivity of entries. Nearly 93,000 entries of journal articles in the IBSS (1981-1985) were analyzed, and the concentration of articles in a small number of journals was observed in all four disciplines. The core journals were defined as the top group of journals in the ranking containing one-third of the total articles in each discipline. In economics, for example, only 75 journals (3.9% of all the economics journals in the IBSS) were identified as core journals. On the other hand, the data on citations were obtained from the Journal Citation Report (JCR) of the Social Science Citation Index (SSCI) that provides an 'impact factor', calculated as the ratio between citations and citable articles published. The core journal list (called "List B") of the top one-third journals was produced based on this indicator for each of the four disciplines.

A comparison between List A and List B in economics showed that only 20 journals appear in both lists, out of 75 journals in List A and 55 journals in List B. This means that these 20 journals are the most important journals according to both indicators. In addition, 55 journals appearing only in List A and 35 journals in List B are important ones by the first or second indicator. These core journal lists, including those for the other three disciplines, can be utilized for library collection management.

Evaluation of Root Resorption in Cleft Lips and Palate Patients Underwent Orthodontic Treatment

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Abstract

Root resorption is one of the most troublesome problems in orthodontic treatment. To avoid root resorption is a key to successful treatment. Orthodontic treatment of Cleft Lip and Palate(CLP) patients with severe malocclusions, such as collapsed , severe narrow maxillary arch and crossbite is very difficult. Then, long term treatment period and a great deal of tooth movement is inevitable, which is thought to induce more root resorption.

The object of this study is to investigate the condition of the root resorption in CLP patients who underwent orthodontic treatment.

Materials and methods

Cleft and Class III group as a control were selected from finished orthodontic treatment cases in the department of orthodontics, Showa University. The Class III group showed reversed occlusion, which could be thought same treatment mechanics used as the Cleft group. In those cases periapical root was completed and root resorption had not been detected on pretreatment radiographs. Examined teeth were upper four incisors. Evaluation of root resorption was done in degree and shape by oral X-ray films before and after orthodontic treatment. Besides, the amount of changes of upper central incisors were measured by both frontal and lateral cepharograms at before and after treatment.

Results

To compare with Cl. III patients, Cleft group showed more root resorption during orthodontic treatment. The shape of resorbed root in Cleft group was quite different from Cl. III group. Most of Cleft group showed oblique resorbed pattern and most of Cl. III group were horizontal patterns. In Cleft group the teeth near to the cleft side were higher frequency of root resorption than the other side.

These results suggest that a new approach in orthodontic treatment of Cleft patients such as surgical procedure should be required actively.

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