SUMMARY OF Ph.D. DISSERTATION

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Title

A Study on the Analysis of One-mode Proximities and Its Applications

Abstract

Proximity data are often analyzed by multidimensional scaling (MDS) or cluster analysis. In the present Ph.D. Dissertation, the author pays attention to the analysis and its applications of the proximity data. He proposes a new rescaling method of brand-switching data and overlapping cluster analysis for one-mode three-way proximity data

At first, the author summarizes the earlier studies of proximity data analysis such as MDS and cluster analysis models, points out some problems of the proximity data analysis, and then he shows the purpose of the present Ph.D. Dissertation in Chapter 1.

In Chapter 2, the author pays attention to the rescaling method of brand-switching data. Several researchers have analyzed the brand-switching data which are one of the proximity data, using MDS or cluster analysis models. It was pointed out in earlier studies that it is necessary to rescale the matrix because there are large differences among the overall sums of the rows and columns that depend on external factors, such as market share. The author introduces a new method that rescales one-mode two-way proximity data using entropy which measures the variability of brand-switching. Actually the author rescales based on the entropies for the rows and columns of the brand-switching data matrix, and analyzes the rescaled data by MDS. The results suggest that the configurations using the rescaled method can be interpreted as ``circumplex''. In addition, the author applies the rescaling method to two-mode three-way proximity data, and analyzes the resulting rescaled proximity data by INDSCAL. As a result, the configurations are also interpreted as the circumplex.

In Chapter 3, the author introduces an overlapping cluster analysis model and an associated algorithm to analyze one-mode three-way proximity data. The present model is developed based on ADCLUS model, and the present algorithm is based on the MAPCLUS algorithm. In the present model, one-mode three-way proximity data are represented by the sum of the numerical weights of clusters to which any triplet of objects belongs. The present model and algorithm were applied to joint purchase data, and compared the one of MAPCLUS. It is concluded that the present model is effective in representing the one-mode three-way proximity data.

In Chapter 4, the author summarizes the results of the present studies, the left problems, and the future plans.