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Proposal of *k*-principal points for Binary Data by Introducing a Dendrogram

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Abstract

In recent years, many studies on principal points, which was proposed by Flury (1990), have been developed in the field of statistical analysis. When a probability density function is divided into several regions for the data for which the probability distribution is assumed, the points representing the respective regions are called the principal points.

On the other hand, there are numerous data, including selection type questionnaire data and personal profile data, which can return binary (0 or 1) values that assume the distributions of multivariate binary data. In regard to this, Haruka Yamashita and Suzuki (2010) proposed principal points for the distribution of binary data based on the framework of the conventional principal points scheme.

In this research, we propose a new search method by introducing a dendrogram for binary (0 or 1) type *k*-principal points (Haruka Yamashita and Hideo Suzuki; 2010). In this search method, we aggregate *n* samples into *k* groups using dendrograms obtained from a cluster analysis. Then, the minimum binary type vector is obtained for each group by finding the sum of the squares of the distances from each sample, and we set them as the principal points.

Furthermore, we classified various "line superiority organizations" using binary data and separating their characteristics into a few (*k*) typical types (principal points) whose characteristics are similar, as an example of an application of the proposed method. A "line superiority organization" is an organization scheme with members who have high levels of expertise and authority, who actually carry out duties as lines (Junichi Nagakura and Hiroshi Yamashita; 2002). For example, universities, hospitals, airlines, auditing corporations, think tanks, and others are can be considered as line superiority organizations.

Through this research, we describe the various characteristics of the "line superiority organizations" in a concise form, and we examine the validity and effectiveness of the proposed method from these results.

Keywords
Diversity, Binary Data, Cluster Analysis, Line Superiority Organizations

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