Chapter 3
Chance Discovery as Analogy Based Value Sensing

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ABSTRACT
The authors are finding rising demands for sensing values in existing/new events and items in the real life. Chance discovery, focusing on new events significant for human decision making, can be positioned extensively as an approach to value sensing. This extension enables the innovation of various artificial systems, where human’s talent of analogical thinking comes to be the basic engine. Games for training and activating this talent are introduced, and it is clarified that these games train the an essential talent of human for chance discovery, by discussing the experimental results of these games on the logical framework of analogical abductive reasoning.

INTRODUCTION: CHANCE DISCOVERY AS VALUE SENSING
Value sensing, to feel associated with the something in one’s environment, has been defined as a dimension of human’s sensitivity in the literature of developmental psychology (Donaldson, 1992, p.143). It is meaningful to extend this concept to the creation of business strategies based on real data. The “value” here can be dealt with as a relation to the social environment, which business workers and customers create from their interaction via products and services, to redesign the market sustainably. For example, data mining may be regarded as a method for showing objectively useful knowledge, if we read the application results of data mining superficially, because data are collected from the real world via sensing systems such as POS (position of sales) registers, RFID tags, etc. However, the relational

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patterns among items obtained by those tools mean no useful knowledge if the user does not sense the value of commercial items from the visualized result.

Since year 2000, we started studies on Chance Discovery under the definition of “chance” as an event significant for human’s decision, and edited books and special issues of journal. In these publications, we have been standing on the principle that a decision is to choose one from multiple scenarios of actions and events to be taken in the future. Based on this principle, a chance defined above can be regarded as an event at the cross point of scenarios, which forces humans to choose one from multiple scenarios. Events/items bridging multiple clusters of strongly co-related frequent items, which a tool such as C4.5, Correspondence Analysis, KeyGraph, etc may show, have been regarded as the candidates of “chances” that are rare events meaningful for making a decision. This way of looking at the result of data visualization has been proven to be more useful than the diagrams themselves, according our case studies involving users who are marketers and designers in real business sites. In this paper, we focus on the thought of these users, and present two games for activating and training the thinking skills for chance discovery. The behaviors of players are discussed, borrowing the concept of analogical abduction developed in artificial intelligence, to point out the essence of the games’ effect on human’s power for chance discovery.

CASES USING SCENARIO MAPS AS BASIS OF CHANCE DISCOVERY AND VALUE SENSING

In projects we conducted with companies, the marketing teams acquired novel awareness of valuable parts of their market they had not taken into consideration so far. For acquiring this awareness, KeyGraph assisted business people by showing a diagram as a map of the market having (1) clusters of items frequently bought as a set, i.e., at the same time together, and (2) items bridging the clusters in (1), which may embrace a latent market coming up in the near future.

From the original algorithm (Ohsawa et al., 1998), we improved and extended KeyGraph in response to opinions of users working in real business. For example, let us show an example where a diagram obtained by KeyGraph assisted textile marketers seeking new hit products (Ohsawa & Usui, 2006). Although they already had popular products, they also desired to develop new markets from a niche product, i.e., a product which may be rare for the time being but may expand the company’s opportunity. For this purpose, they started from data which had been collected in exhibition events, where pieces of textile samples had been arranged on shelves for customers representing apparel companies to pick preferable samples. Previously, the list of picked-up samples had been used as an order card on which to send samples to customers. However, once the marketers came to aim at hit sales, the same list was put into an electronic dataset. In comparison with data on past sales, the exhibition data were expected to include customers’ preferences of products not yet displayed in stores.

They visualized the data using decision trees (Quinlan, 1993), correspondence analysis (Greenacre, 2007) etc, but not even one expected niche has been discovered. After all, they reached KeyGraph, which showed (1) clusters of frequent items in the data, i.e., popular item-sets which tend to be ordered by the same customer, and (2) items which appear rarely but appear in the same baskets as items in multiple clusters. The diagram obtained was as in Figure 2, where the black nodes linked by black lines show the clusters corresponding to (1) above, and the red nodes and the red lines show the items corresponding to (2) above and their co-occurrence with items in clusters respectively. Note: The nodes are not colored in black and red in this paper, but the distinction is not necessary here.
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