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A GWAP Approach for Collecting Qualitative Product Attributes and Perceptual Mapping

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Abstract

An ESP-like game is proposed for collecting qualitative product attributes relevant to the preferences of consumers efficiently. It is also discussed how to analyze the qualitative attributes and the supplemental data such as matching counts and input times acquired through the game and to yield a perceptual map.

Introduction

For a company to survive, it is important to develop new products and services appealing to consumers. Thus, the company must comprehend the preferences of target consumers, for example, by capturing how they perceive related products currently available in the market. To this end, questionnaires have been widely used. The methods are grouped into two categories; *selection type* and *free-description type*. In the former type, quantifiable data are obtained and they can be easily processed through a numerical analysis method into a perceptual map to visually capture the preferences. However, the data, and hence the resultant perceptual map, only reflect the product attributes pre-specified by the questioner. In the latter type, on the other hand, descriptive data on even unforeseen attributes can be collected. The data may be suggestive for conceptualizing an appealing new product, but are not easy to be handled numerically. Thus, it is desirable to combine the pros of both types. Further, no matter which type is used, questionnaires take much time and cost, and it is not easy to have the questionees answer in an engaged manner.

To tackle the problems described above, we take a *game with a purpose* (GWAP) approach. GWAP is the way of collecting valuable data from many people by having them play a game, and it has been confirmed to be a time-and-cost-efficient and reliable approach for data collection through a growing number of applications (Law and von Ahn 2011). Gamification aspect of GWAP draws engagement from the questionees or plyers (Shaili and Parkes 2013). For example, ESP game is one of the leading examples of GWAP, and has been successfully used for labeling images (von Ahn, and Dabbish 2004). Now, ESP-like games are also used for labeling music (Law et al. 2007), movies and so on (Michelucci 2013). These games inherit the ability of capturing unforeseen attributes from *free-description type* questionnaires. Further, the raw data collected by these games are usually in the form of a word or a phrase, rather than lengthy sentences typical in ordinary questionnaires, and game logs are also available as supplemental data. Thus, it will be easier to convert the raw data into a numerically treatable form.

Thus, the objective of this work is twofold and expressed as follows:

- Designing an ESP-like GWAP system for collecting words and phrases which represent qualitative attributes relevant to the preferences of target consumers among a given set of products.
- Proposing a data analysis method for drawing a perceptual map from the data obtained by the proposed GWAP system.

In the remainder, the proposed GWAP system and the data analysis method are presented in sequence.

Game for Collecting Qualitative Attributes

In this section, we propose a GWAP system for collecting *qualitative attributes* in Japanese words or phrases, which are relevant to the preferences of target consumers among a given set of products. Though the proposed system is similar to ESP game, it has two important differences.

One is the difference in the information given to players. In each game session, instead of an image to be annotated, the players are visually provided an imaginary product

purchase or consumption scenario; *a person with a certain characteristics prefers product A to product B in a given scene*. For example, a persona who is male, in his early 40's, thin and tall, with glasses and working with an IT firm prefers Starbucks hot chocolate to café late after a lengthy business meeting in winter.

Figure 1: Game screen example (Original is in Japanese)

The other is the difference in the information supplied by the players. As shown in figure 1, they are supposed to fill in the blank of a sentence explaining why the persona chose product A. In order to have it match with an entry *from the unknown partner and thereby to earn scores, each* player will avoid lengthy phrases or sentences and will enter relevant qualitative attributes in a compact phrase or a word. Taboo list can also be used to prevent the players from entering some common words or phrases.

Products A and B are extracted randomly from a given set of products to be plotted on the resultant perceptual map. The features of the persona and the scene are selected randomly from a list prepared for an ex-post stratified analysis. If necessary for the analysis, coeval or congeneric players are chosen as a pair. Further, since Japanese language has vast amounts of synonymous expressions, it is judged whether a pair of entries match with each other with the help of a synonyms dictionary. Not only the entries, both matched and unmatched, but also matching counts and input times are stored into the database.

Game Data Analysis for Perceptual Mapping

In this game, various qualitative product attributes relevant to the preferences of consumers will be collected. Though these attributes are suggestive even in the form of the raw data, it is also valuable to process them numerically into a perceptual map. In this section, we propose how to yield a perceptual map from the game data.

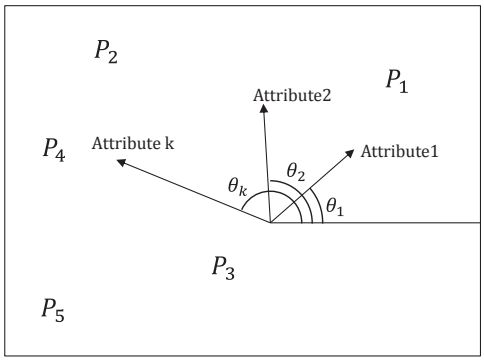

Figure 2: Perceptual map example

The collected qualitative attributes are connected to a pair of products, and the strength of each connection can be quantified by the supplemental data such as matching counts and input time. The strength values for all the product pairs in terms of a certain attribute can define a semi-order relation among the products. As shown in figure 2, if an angle from the horizontal axis is assigned to the attribute and the projections of the products onto the attribute's axis reflect the semi-order relation, the map can be judged to fit the game data. The proposed analysis method quantifies the fitness, and determines the positions of the products and the angles of the attributes on the map simultaneously so as to maximize the fitness value.

Future Directions

An important next step is to conduct laboratory and field experiments to confirm the utility of the proposed GWAP system and analysis method. It is also necessary to refine the method for selecting the pair of products and the features for the persona and the scene. Further, exploring other application fields for the game data besides perceptual mapping will be fruitful.

References

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