Design and Development of KANSEI Model Database System

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Abstract: Most of the research and development on KANSEI databases are mainly focused on information retrieval systems assuming a specific content and situation. These databases cover the KANSEI for evaluation of contents. In these approaches, KANSEI is regarded as correspondence between specified contents and these evaluations by each user. User’s KANSEI shows different features for different situations and for different kind of contents. Therefore, we need an integrated database mechanism and an information processing mechanism that can manage multiple KANSEI models suitable for each situation and for each kind of contents.

In this paper, we consider multiple KANSEI models for each user that are designed for each situation and for each kind of contents. We propose architecture for the KANSEI model database that manages these models. Our database creates, updates, and retrieves each user’s KANSEI models according to each situation and each kind of contents. Our system gives a common platform for content-based retrieval and recommendation of contents, as well as environment control of living sphere.

Key words: Database, Kansei Model, Individual Rule Base, Situation Rule Base, Contents Rule Base

1. Introduction

Recently, researches on KANSEI as a subjective evaluation process of contents are becoming popular in database applications. User’s KANSEI shows different features for different situations and for different kind of contents. Most of these researches are the KANSEI modeling on a specific situation and specific content. Most of these developments about are contents-based retrieval systems based on these KANSEI models [1][2][3][4].

Not all of each user’s KANSEI are same. The KANSEI of a user may alter according to his situation, such as a situation that he evaluates about contents quickly and a situation that he evaluates about contents using a cellular phone. The KANSEI of a user may be adjusted according to the kind of contents, such as interior, exterior and clothes. Therefore, we need model each user’s KANSEI in each situation and in each kind of contents. We need an integrated database mechanism and an information processing mechanism that can manage multiple KANSEI models suitable for each situation and for each kind of contents.

In this research, we design and develop the KANSEI model database system. Our database system can create and retrieve each user’s KANSEI models that are designed for each situation and for each kind of contents. Our database system can perform information processing based on these models.
2. Requirements for managing the KANSEI model

In this chapter, we consider the information and rule that are reflected in KANSEI. Based on this result, we consider requirements in order to manage KANSEI models.

Requirement 1: Individual Rule

Not all of each user’s KANSEI are same. For example, a certain user focuses on the color of interior design goods and chooses them. Another user focuses on the form of interior design goods and chooses them. Moreover, when a certain user evaluates pictures, he focuses on the color and when he evaluates a chair, he focuses on the form. From these observations, we consider that each user has own evaluation rules to all kinds of contents and choose a suitable rule according to the kind of contents. We consider that each user is performing decision-making based on own KANSEI using these rules. We call them individual rules.

Requirement 2: Situation Rule

The KANSEI of a user may alter according to his situation. We consider that there are two kinds of situations; a situation that a user is situated on and a situation that the user is using the machine on. In this chapter, we consider a situation that a user is situated on. The following situations are example of a situation that a user is situated on.

(S1): A user evaluates a chair quickly.

(S2): A user evaluates a chair slowly.

In (S1) and (S2), we need attributes that are different in order to evaluate a chair. In a case of (S1), a user doesn’t evaluate detailed information, such as the material and intensity of a chair. Therefore, when he evaluates a chair quickly, we consider that it is appropriate using of 2-dimensions whole chair photograph that can understand the outline of a chair by a little information. In a case of (S2), a user evaluates detailed information of chair by looking at a chair from all angles. Therefore, when he evaluates slowly, we consider that it is appropriate using the 3-dimensional data of the chair that can be moved freely by a user.

From these observations, we consider that there are general rules that determine the optimum attribute and its value according to the situation. We consider that each user is performing decision-making using KANSEI based on these rule. We call them situation rules.
Requirement 3: Contents rule

The KANSEI of a user may be adjusted according to the kind of contents. The attribute and its value of contents differ in every kind of contents. For example, an attribute and its value, such as attribute of a color and line, for conveying art contents to user are required. An attribute and its value, such as attribute of a shape, for conveying the chair contents to user are required. From these observations, we consider that there is a rule that determines the attribute and its value suitable for conveying the contents. We consider that each user's KANSEI is altered according to these rules. We call them contents rules.

As mentioned above, we will create KANSEI models using these rules. We will create these models by creating the rule of various kinds. In order to manage these models, it is necessary building the database that manages individual rules, situation rules, and contents rules and performs KANSEI modeling based on these rules.

3. Framework of KANSEI Model Database

In order to create and retrieve each user’s KANSEI models that are designed for each situation and for each kind of contents, we have to manage individual rules, situation rules, and contents rules. Therefore, we design and develop the KANSEI model database that manages these rules and manages KANSEI models using these rules. Our database has the following three functions, in order to manage these models.

1. The function to manage individual, situation and contents rules that are used as the metadata of a KANSEI model.
2. The function to create, retrieve and management KANSEI models using metadata
3. The function to perform information processing using the KANSEI model

In the following chapters, we describe each function of the KANSEI model database in detail.

3.1. Metadata Management Function

In this chapter, we describe management mechanisms of individual rules, situation rules, and contents rules required for KANSEI modeling.

A KANSEI model database manages individual, situation and contents rules using space as shown in Fig. 2. We call this space KANSEI model management space. This space has the rule base of the individual, situation and contents. These rule bases manage an individual, a situation, and a contents rule, respectively.

- Individual rule base:
  This rule base manages individual rules of each user and typical user. Typical users are the common users of the profile of an age or a hobby. Typical individual rules are rules based on accumulation of a subjective interpretation example about contents of typical users.

- Situation rule base:
  This rule base manages two kinds of situation rules.
  (1) This rule base manages the situation rule for modeling of KANSEI such as the situation that a user evaluates contents quickly.
  (2) This rule base manages situation rules for performing information processing using the KANSEI model such as the situation that a user performs contents retrieval using a cellular phone.
3. Contents rule base:

This rule base manages contents rules about various kinds of contents, such as interior design and a scenery photograph.

Thus, we can create and retrieve each user's KANSEI models that are designed for each situation and for each kind of contents by creating multiple individual, situation, and object rules. We can manage these models on KANSEI model management space.

3.2. KANSEI models Management function

The KANSEI model management space controls also relation rules which showed the relation between rules, such as “Use situation rule of No3 and contents rule of No.7, when user performs contents retrieval using a cellular phone” or “Since art contents and texture contents are similar, The rule of the contents of art is reusable to texture contents”. By using this relation rule, the KANSEI model database can perform two kinds of processing for KANSEI modeling.

P1. P1 creates an individual rule, a situation rule, and an object rule newly, and creates the KANSEI model using these rules.

P2. P2 creates the KANSEI model using other rules corresponding to a user's requirement.
Processing 1: create rules

Creation of the KANSEI model by the P1 is performed as follows.

P1-1. To each people, we carry out a questionnaire to user about the evaluation of contents, and create an individual rule using the questionnaire.

P1-2. We create a situation rule and an object rule based on KANSEI model information processing algorithm.

P1-3. We carry out KANSEI modeling using these rules.

Processing 2: reuse of rules

About the P2, we can consider two processes that are the reuse of individual rule and the reuse of contents rule. We explain these processes of KANSEI modeling by reuse of these rules using the following examples; Example: Mr. OGINO of the 20s male evaluates interior design goods quickly

Reuse of an individual rule

As the creation process of the KANSEI model by reuse of an individual rule, this database can perform two kinds of process, (A)-1 and (A)-2 (Fig.3).

(A)-1 is the process of creating models using the individual rule about an average of users that a profile is similar. We consider that KANSEI of an average of the users to whom a profile is similar with Mr. OGINO is similar to Mr. OGINO KANSEI. Therefore, in order to create the KANSEI model of Mr. OGINO's interior design goods, we substitute for the individual rule of an average of a user similar to a profile.

(A)-2 performs to retrieve contents using the KANSEI model of the users to whom a profile is similar. This process creates the individual rule of reuse based on the result. This process is the creation process about Mr. OGINO's KANSEI model using the individual rule of reuse. This process performs to retrieve interior design
goods using the KANSEI model about interior design goods of all users similar to a user's profile. This process calculates the average of the retrieval results. This process considers that this average is the process of the evaluation about these users' interior design goods. This process is the process of substituting for the process of this evaluation and creating the KANSEI model about Mr. OGINO's interior design. This process is creating the KANSEI model about Mr. OGINO's interior design using the substitute process.

Reuse of a contents rule

As the creation process of the KANSEI model by reuse of a contents rule, we can consider the process of (B). The process of (B) is the process of creating KANSEI models using other contents rules that the attribute for conveying contents is similar. For example, the attribute for conveying scenery photo contents and art contents is similar. Therefore, the process of (B) creates the KANSEI model about art contents using the contents rule on scenery photo contents.

3.3. KANSEI models retrieving function

KANSEI is modeled using an individual rule, a situation rule, and a contents rule. Therefore, we can specify a KANSEI model by retrieving the individual, situation and contents rule suitable for the demand of a user. By using the KANSEI model management space, we can retrieve the KANSEI model suitable for a user's situation and contents. For example, using Mr. OGINO’s individual rule as a key, we can retrieve Mr. OGINO’s KANSEI model about various contents in various situations. Therefore, a user can use the service that used the model of the KANSEI about evaluation of various situations or contents on one system that could not be done by the retrieval system.

3.4. Information Processing function

In this chapter, we explain the function of information processing on the KANSEI model database. This database manages each user’s KANSEI models are designed for each situation and for each kind of contents. In order to perform information processing using the KANSEI model, this database retrieves a KANSEI model suitable for the demand of a user. This database has the processing function of two processes of supporting information processing using the KANSEI model.

IP1. How to determine by the user the KANSEI model for information processing and the program which processes information

IP2. How to determine the KANSEI model and an information processing program which a KANSEI model database fits according to a user's use purpose and situation

IP1 uses a selected process by user for information processing. This database shows a user the information on KANSEI models for supporting the determination. IP2 performs the determination of a program and KANSEI model to which this database fitted the demand of a user based on the situation rule about a situation that the user is using the machine on.

This database gives a common platform for content-based retrieval and recommendation of contents, as well as environment of control of living sphere. For example, we monitor the environment of living sphere using this system and cameras. We can acquire data such as the situation of being relaxed and the situation of being tired. We can create and retrieve KANSEI models suitable for the situation of the user at that time from this database.
using that information. This system can offer service, such as change of the lighting of the room, and BGM Service, suitable for a user's present KANSEI.

4. The system architecture of the KANSEI model database

The KANSEI model database has the following three functions.

(1) The KANSEI model database manager who manages information processing for creating, updating, and retrieving KANSEI models.

(2) The KANSEI model rule manager who manages rule which constitutes KANSEI model

(3) The KANSEI model rule base which stores the individual, situation and contents rule

We designed the KANSEI model database with the system architecture as shown in Fig. 4 with the above-mentioned 3 functions. We explain each function using example of the creation and retrieval of a KANSEI model. We consider the case where the user in twenties uses a KANSEI model database, and retrieves interior design goods. However, he is observing the cost of interior design goods.

First, this database creates the individual, the situation, and the contents rule, for modeling of KANSEI.

(1) The KANSEI model database manager performs the questionnaire about the evaluation to the user for creating the individual rule of this user. An individual rule manager stores the individual rule in an individual rule base. However, when not creating individual rule newly, this system uses individual rule of people that the profile is alike.

(2) The KANSEI model database manager checks existence of the situation rule about cost and the content information about interior design similarly by situation and content information managers.
Creation of each rule above required for creation of a KANSEI model is an end. Next, this database creates KANSEI models using these rules.

(3) The KANSEI model database manager orders the retrieval of a rule suitable for the demand of a user to each KANSEI model rule manager. Each KANSEI model information manager retrieves the rule suitable for a demand of a user according to requirement, and transmits the rule to a KANSEI model database manager.

(4) The KANSEI model database manager creates a KANSEI model based on the process explained by 3.2 using each acquired rule.

Above, creation of a KANSEI model is an end. Finally, this database performs contents retrieval using this KANSEI model.

(5) The KANSEI model database manager retrieves the information-processing program suitable for a demand of a user from a situation rule base using a situation rule manager. The KANSEI model database manager retrieves the interior design picture that is suitable for a user's KANSEI using the created KANSEI model and the program.

The KANSEI model database manager analyzes a user’s demand for retrieving a KANSEI model. Each KANSEI model rule manager retrieves rule that suits the demand. The KANSEI model database manager uses the rule as a key and retrieves KANSEI models.

5. Conclusion

In this research, we proposed architecture for the KANSEI model database. Our database performs the following three things that could not be performed in retrieval systems.

(1) Our database can manage individual, situation, and contents rules required for KANSEI modeling by the KANSEI model management space.

(2) Our database can model each user’s KANSEI by various modeling process such as creating rules or substituting rules.

(3) Our database can create and retrieve KANSEI models suitable for user’s demand using individual, situation, and contents rules.

Therefore, we can perform the information processing and information retrieval suitable for each user's KANSEI by using the KANSEI model database system. Now, we are building the prototype system based on architecture of the KANSEI model database.

References