

Collaborative WEB Page Design Support System

Based on Kansei Models

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Abstract: In the wake of the diversification of goods and information, people have recently been offered more options and thus had more complicated feelings. We refer to people's feelings about things as Kansei (human sensitivity).

Hence, when several people collaborate in producing something (called co-creation), there is a limit to the understanding of one another's ideas based on each person's words and attitudes, and it takes time and effort to forge a mutual understanding.

The basic co-creation steps, including those for Web page creation, are described as follows.

Marketing, Determining the concept, Coordinating and substantiating opinions, Final decision.

In this research, we established a co-creation support system by functions employing three visual Kansei models: the filtering function that supports efficient tasks by performing individual Kansei modeling and selecting data and materials suitable for individual Kansei by using the models for voluminous tasks, such as the collection of data and materials necessary to perform marketing activities and determine concepts; the visualization function that enables the collected data and materials to demonstrate Kansei characteristics; the coordination function in which the data and materials selected from Kansei models are put together and verified by Kansei models once again.

Key words: *Kansei Model, Collaboration, Co-creation, WEB Page Production*

1. Introduction

In the wake of the diversification of goods and information, people have recently been offered more options and thus had more complicated feelings. We refer to people's feelings about things as Kansei (human sensitivity). Kansei consists mostly of vague elements that can be felt from subtle nuances of words and attitudes. That is to say, we hardly become conscious of Kansei as something that has a concrete shape. Hence, when several people collaborate in producing something (called co-creation), there is a limit to the understanding of one another's ideas based on each person's words and attitudes, and it takes time and effort to forge a mutual understanding.

In this research, we focused on collaborative works to create Web pages as co-creation and aimed to develop a support system that enables smooth Kansei

communication during co-creation by employing the mathematical modeling of Kansei, which is referred to as visual Kansei modeling.

2. Co-creation process

2.1. Basic steps in collaborative works

The basic co-creation steps, including those for Web page creation, are described in Fig. 1.

In Steps ①-③, it is difficult to readily find specific images that best describe one another's Kansei by using the current communication styles. And it takes time and effort to forge mutual understanding through Kansei exchanges, such as when we decide on a concept. A variety of methods have been proposed to support such mutual understanding.^{[1][2][3][4]}

In Step ④, i.e. determining the final form, the concept and image for which opinions are coordinated up to Step ③ are finalized. To this end, data and materials

must be combined. Namely, we have to consolidate data and materials that are suitable for the concept into one single form. However, there is a possibility that depending on consolidation methods, the consolidated data and materials are far from the concept despite each and every datum and material matching the concept.

In this research, we established a co-creation support system by functions employing three visual Kansei models: the filtering function that supports efficient tasks by performing individual Kansei modeling and selecting data and materials suitable for individual Kansei by using the models for voluminous tasks, such as the collection of data and materials necessary to perform marketing activities and determine concepts; the visualization function that enables the collected data and materials to demonstrate Kansei characteristics; the coordination function in which the data and materials selected from Kansei models are put together and verified by Kansei models once again.

2.2. Approach to co-creation

Co-creation becomes viable by person-to-person communication. Although this communication is indispensable for co-creation, making ourselves understood takes time and effort as mentioned above.

Hence, this system aims to present information that will facilitate person-to-person communication, instead of the automatic creation of Web pages by machines.

3. System application to Web page creation

Web page creation involves a creator, who actually creates Web pages, a client, who requests such creation to the creator, and targets, who the client believes are the viewers of the Web pages.

It is natural that the volume of communication is high between the creator and the client (hereinafter referred to as the collaborators). Even in communication, however, concepts and needs, which tend to become vague, may not be clearly communicated or studies may take time.

Therefore, we applied the co-creation support system, which was introduced in the preceding chapter, to Web page creation, and perform Kansei filtering, visualization and coordination using visual Kansei models (Fig. 4).

Steps of collaborative work



Fig. 1 Steps of collaborative work

3.1. Filtering

There are a great number of Web page components, such as color arrangement and fonts. It is tough to understand what best suits Kansei for each of these numerous components.

Therefore, this system is equipped with a filtering function that automatically selects colors and fonts that match Kansei.

3.2. Visualization

It is difficult to understand Kansei from merely looking at the elements collected through filtering. It is possible to promote the understanding of Kansei by using a visualization function that makes filtered results reflect the characteristics of a person's Kansei.

3.3. Coordination

Materials befitting Kansei that were chosen after materials, such as colors and fonts, were filtered and visualized may be suitable for Kansei when viewed individually. When they are actually used to form a shape, however, the shape does not necessarily match Kansei.

Therefore, we established a coordination function that aims to select the data and material mix for color arrangement, fonts and so on that best reflects Kansei.

3.4. Other characteristics

Although this system utilizes visual Kansei models, Kansei models can be incorporated as modules.

Information in Web pages is frequently updated due to its nature. Under this system, updates are performed by maintaining the basic system unchanged and by replacing Kansei models, thus making it possible to make timely updates that are adequately responsive to the needs of the times.

4. Establishment of visual Kansei models, layout proposals and editing work

4.1. Visual Kansei models in this system

In this system, we focused on background color, which is believed to significantly affect the atmosphere of Web pages, among a variety of Web page components and established tricolor mathematical models using the Color Image Scale^[5] of the Nippon Color & Design Research Institute Inc.^{[6][7]}

The combination of background colors is proposed according to the requests for image words. If the proposal fails to correspond to what you have envisioned, you can make the system learn what you actually required. Through learning, your Kansei becomes specific.

While referring to the Color Image Scale,^[5] we prepared 1091 patterns of the aforementioned tricolor arrangement. We displayed them as a proposal after filtering them through the learned Kansei models.

4.2 Method of establishing visual Kansei models

In this system, correspondence relationships between graphic features and subjective image evaluation values were established from the questionnaire data on subjective image evaluation as mathematical models.

For image words, we used the following 13 words according to the Color Image Scale.^[5] These words are regarded as the basic words in pattern development for color arrangement images.

Romantic, pretty, refreshing, natural, elegant, casual, cool, antique, dandy, dynamic, gorgeous, modern and wild

The subjective image evaluation values of the image words were set in seven steps from -3 to +3.

Since the goal is to make a system that could provide support in accordance with collaborative projects, we referred to earlier studies for the handling of image features and regarded a Web page as one image.^{[8][9]} In addition, we used the tricolor RGB values, color arrangement location (x, y) and color arrangement area (x*y) as image features specialized in Web pages.

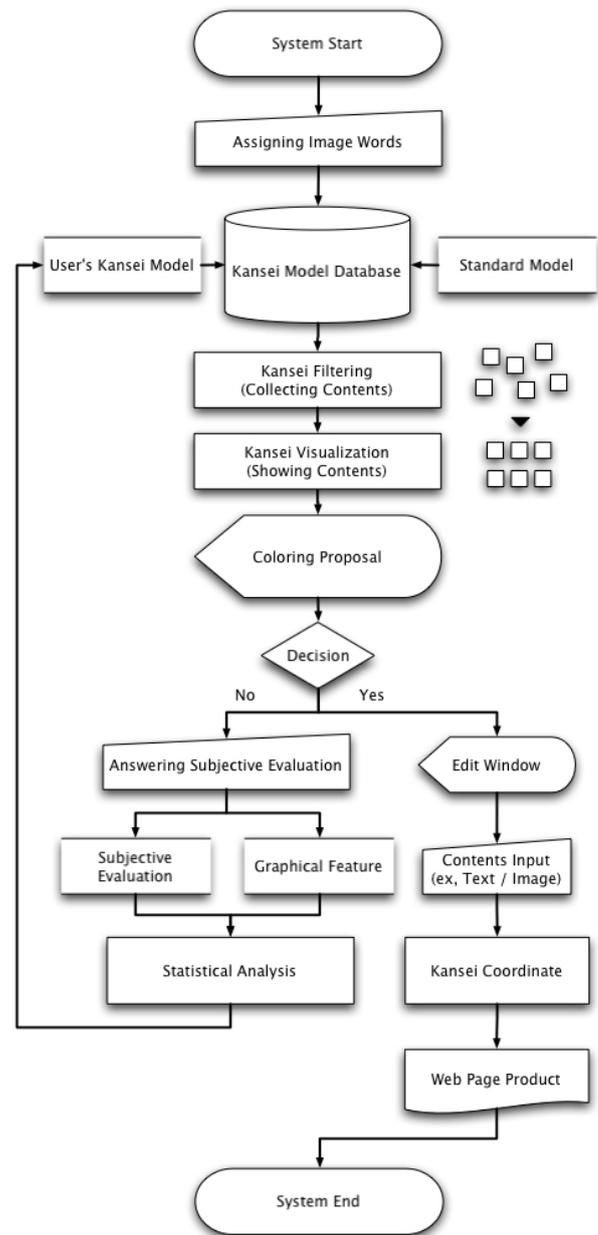


Fig. 2 Flow sheet of the co-creation support system toward Web page creation

Also for statistical analysis methods, we have been researching algorithm for accurate learning^{[8][9]}. Since large amounts of learning data are required, however, we used multiple regression analysis for this system because the subjects' relearning is fast.

4.3. Editing work

When color arrangement was determined, we began editing work, which consisted of image insertion and text editing. For this system, we made it possible to directly edit the layout using Flash in order to enhance operability.

We provide support for smoother Web page creation by displaying on the screen the proposed combination of font colors and background colors, for example, using the color scheme in general Web page creation

4.4. Flow of this system

The flow of this system is as follows (Fig. 4):

- ① Selection of image words (filtering)
 - ② Display of the first color arrangement proposal (visualization)
 - ③ Subjective image evaluation of the proposal
 - ④ Multiple regression analysis (learning)
 - ⑤ Redisplay of the color arrangement proposal
- *Repeat from ③ to ⑤ whenever deemed necessary.
- ⑥ Decision of the layout
 - ⑦ Design editing (coordination)

5. Evaluation experiment for this system

The hypothesis is that “we can provide support in accordance with the collaborative work process.” We perform the evaluation experiment of this system by collecting quantitative data on the three functions: the filtering, visualization and coordination functions.

5.1. Evaluation of filtering

In order to verify that filtering is performed by Kansei models, Subject A quantitatively evaluates images filtered by Subject A’s Kansei models to see if they match his own Kansei.

First of all, concerning the 13 image words, we had five students (subjects) repeat their learning process until they came up with satisfactory proposals.

We then surveyed the levels of their satisfaction with the proposals by their Kansei models. They performed a five-step evaluation from 1 (not good) to 5 (good).

Table 1 shows that the five subjects were fairly satisfied with the proposals, thus proving that filtering by Kansei models was carried out.

5.2. Evaluation of visualization

We evaluate to what extent we can correctly guess the collaborators’ Kansei by using qualitative data and by employing the Kansei models prepared by the filtering evaluation in 5.1.

- ① From among the top 50 models visualized by Subject A’s Kansei models, Subject B compares 10 randomly selected models with Subject A’s subjective

assessment values.

- ② Subject B estimates Subject A’s subjective assessment values for 10 models randomly selected again outside the first 10 models.
- ③ The multiple correlation coefficient of Subject A’s subjective assessment values and Subject B’s estimated values is found to verify to what extent the estimation is accurate.

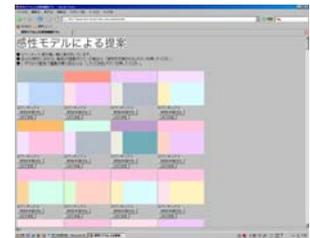


Fig. 3 Selection of image words Fig. 4 Display of proposals

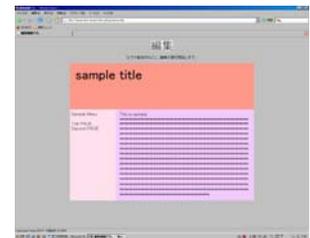


Fig. 5 Kansei learning Fig. 6 Decision/Editing

Table 1 Levels of satisfaction with Kansei models (five-staged)

Subject →	A	B	C	D	E
Romantic	4	3	3	3	4
Pretty	3	4	4	2	3
Refreshing	3	2	3	4	4
Natural	4	3	5	4	4
Elegant	3	4	4	3	3
Casual	3	4	4	5	4
Cool	4	5	4	3	3
Antique	3	4	3	2	4
Dandy	4	3	2	4	3
Dynamic	2	3	3	1	2
Gorgerous	3	4	3	3	2
Modern	2	2	3	2	2
Wild	4	4	5	4	5

We used the multiple correlation coefficient because different people have different evaluation criteria and we thus thought we could conclude that we would be able to understand the collaborator’s Kansei if the distribution of the estimated evaluation of 10 color arrangements was similar.

Table 2 Visualization evaluation results

Kansei models	Collaborator	Multiple correlation coefficient
Subject A's Kansei models	B	0.59
	C	0.79
	D	0.83
	E	0.80
	F	0.65

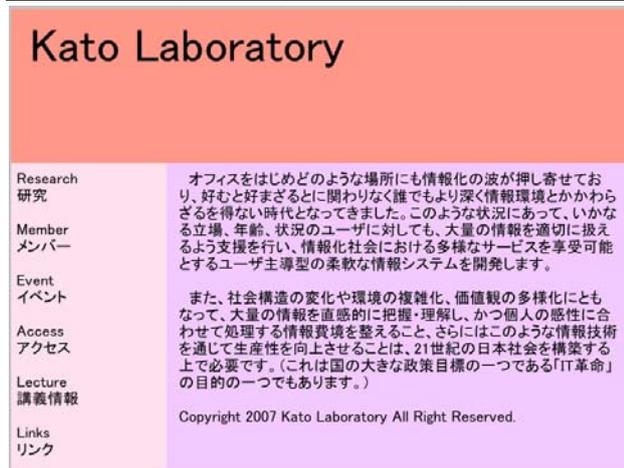


Fig. 7 Example of coordinated screen

Table 2 shows the multiple correlation coefficients between Subject A's Kansei models and estimated values by Subjects B-F. As for Subjects B-F, the multiple correlation coefficients were high, thus indicating accurate estimation.

Namely, we found that Subjects B-F significantly understood Subject A's Kansei through visualization by Subject A's Kansei models.

5.3. Evaluation of coordination

As for the evaluation of coordination, the number of combinations of visualized data and materials makes up the parent population, and the number of acceptable combinations among them can be quantitatively evaluated.

Under the present circumstances, if materials, such as font colors, fonts and photographs, are combined, there will be a large number of combinations. Hence, we will perform evaluation experiments by additionally establishing the after-mentioned assisting function.

6. Summary

In this research, we focused our attention on the fact that concepts and needs are susceptible to vagueness depending on each person's Kansei, and assumed that we can clearly transmit Kansei by expressing it in a concrete form.

As a method of expression, we established a system equipped with three functions employing Kansei models, i.e. filtering, visualization and coordination, and presented the collaborators' Kansei and the target Kansei as a specific layout.

(1) The filtering function established under this system has made it possible to accurately filter a large amount of content based on Kansei models.

We will verify relationships among image words and strive to develop a system in which model construction for one image word will lead to the reflection of learning results in other image words.

(2) As for the visualization function, color arrangements filtered on the basis of Kansei models are currently displayed on the monitor in the order of evaluated values. Since we can keep track of evaluation levels, it became possible for us to understand mutual Kansei more concretely.

We would like to proceed with our research by taking into account the possibility of understanding Kansei characteristics more accurately by displaying subjective assessment values after removing the most significant, median and least significant values, for example.

(3) As for the coordination function, a variety of verification tasks are readily available because we can immediately enter text to the selected color arrangement.

We will establish and install into the system a monitoring function that prevents the system getting deviated from the intended image when many elements are incorporated by acknowledging Web pages as images and performing evaluation based on Kansei models, in addition to the assisting function that proposes font colors based on the Web color scheme according to color arrangement, highly readable fonts and so forth.

Based on the evaluation experiment, we will improve the aforementioned three functions.

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