

Kansei Structure and Visualization of Clothing Websites Cluster

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Abstract

This paper discusses results of the study of engineering emotional values in web design through the methodology of Kansei Engineering. An evaluation of visitors kansei towards clothing e-Commerce websites enable the measurement of visitors emotional impression to website design. Hierarchical clustering mechanism was used to analyzed the structure of kansei using the average value from the evaluation results. The mechanism of clustering enables the formation of tree structure plot, which helps to identify cluster of kansei and websites. Association of kansei to websites were revealed and illustration of each cluster were presented. The result is suggested to be used in the decision making process in designing Kansei e-Commerce website.

1. Introduction

The discipline of design science emphasizes the integration of cognitive, semantic and affective elements in the conception and development of designed products. Designers of IT artifacts have begun to address affective or emotional elements in their products and significant amount of work is seen in the design of mobile phones. However, the literature does not exhibit significant work on artifacts such as websites. In this paper, we report our research in the perspective of kansei cluster and visualization of website cluster to enable easy reference to the interface design of Kansei website. The clusters work as a clue to web designers, businesses and other stakeholders in employing the guideline to the design of Kansei website. Here, we demonstrate the use of Kansei Engineering (KE) to identify the emotional signature of

websites and presents our empirical findings in supporting the use of KE as a means to incorporate the affective or emotional appeal of websites. The context of web application chosen for this work is the design of online clothing e-commerce websites where emotional appeal is assumed to be significant.

2. Emotional design of e-commerce websites

HCI issues related to e-commerce applications were formerly focused on cognitive aspects of websites. Since the early work of Nielsen in the 1990s, the emphasis was on the qualities of usefulness and usability in producing good website design. Na Li and Ping Zhang [1] cited that most studies dedicated to e-Commerce website evaluation are based on two assumptions. The first assumption is that target customers spend at least a few minutes on a website and the second assumption is that good website features usually elicit positive cognitive evaluations and shopping experience. They pointed out that, obviously, these assumptions ignored the primary affective reaction or emotional responses towards the website. Echoing this concern, Na Li and Ping Zhang [1] stressed that online shopping behavior is a complex phenomena and recognized that affective reaction has been cited to be a factor that promotes online shopping. This is because e-commerce websites have gone beyond the function of conveying information to the extent of providing persuasive engagement with website visitors through the lively process of perception, judgment and action. Affect has been found to influence decision-making, perception, attention, performance, cognition and etc [2, 3].

Align with these views, we argue that e-Commerce websites should induce desirable consumer experience

and emotion that influences users' perception of the websites to extend the outreach potential of the online business. Hence, we need to consider the emergence of the dimension of desirability in e-commerce website design.

Desirability emerged from the realization of the need to have new measures of users' experience driven by emotional factors [4, 5]. Donald Norman, an advocator of emotional design discussed the notion of emotional design through elements of visceral, behavioral and reflective factors [6]. His views, parallels the view of Englested (1989, as cited in Aboulafia and Bannon [7]) who discussed three temporal categories of emotions, namely affect, emotion, and sentiment. We argue that in terms of e-commerce website emotional design for desirability, visceral factors or affect that is the emotional state that results from a response to the external stimuli is more pertinent.

Mahlke and Thüring [8] studied affect and emotion as important parts of the users' experience with interactive systems, aiming to consider emotional aspects in the interactive system design process. While admitting that emotion cannot be designed, they assert the importance of deriving a method for recognizing users' emotion from emotional evaluation procedures.

Despite the gained recognition, the subject of emotional appeal of websites or desirability is often neglected as designers tend to pay more attention to issues of usefulness and usability [9] due to the availability of established design methodology that addresses aspects of usefulness and usability. The design method that enables the incorporation of emotional design requirements is lacking. In addition, numerous studies conducted on emotional design tends to look at minimizing irrelevant emotions related to usability such as confusion, anger, anxiety and frustration [2]. Therefore, it is necessary to seek for a suitable design method to handle design requirements based on emotional signatures of websites.

3. Kansei Engineering

Kansei is a Japanese term that is used to express one's impression towards artifact, situation and surrounding. Deeply rooted in the Japanese culture, direct translation of kansei is difficult but means the mental state where knowledge, feeling, and sentiment are harmonized [10, 11]. When adopted by other culture, kansei is simply described as the sense and sensitivity that evoked subjective pleasurable feelings from the interaction with an artefact [11, 12].

Kansei Engineering (KE) is a technology that combines kansei and the engineering realms to

assimilate human kansei into product design with the target of producing of products that consumer will enjoy and be satisfied with. The focus of KE is to identify the kansei value of products that trigger and mediate emotional response. The KE process implements different techniques to link product emotions with product properties. In the process, the chosen product domain is mapped from both a semantic and physical perspective. In terms of a design methodology, the approach of KE is to organize design requirements around the emotions that embody users' expectations and interaction [10, 11, 12]. Since it was first introduced by Nagamachi in the seventies, KE has been successfully used to incorporate the emotional appeal in the product design ranging from physical consumer products to IT artifacts. Due to its success in making the connection between designers and consumers of products, KE is a well accepted industrial design method in Japan and Korea. In Europe KE is gaining acceptance but is better known as emotional design.

4. Kansei measurement

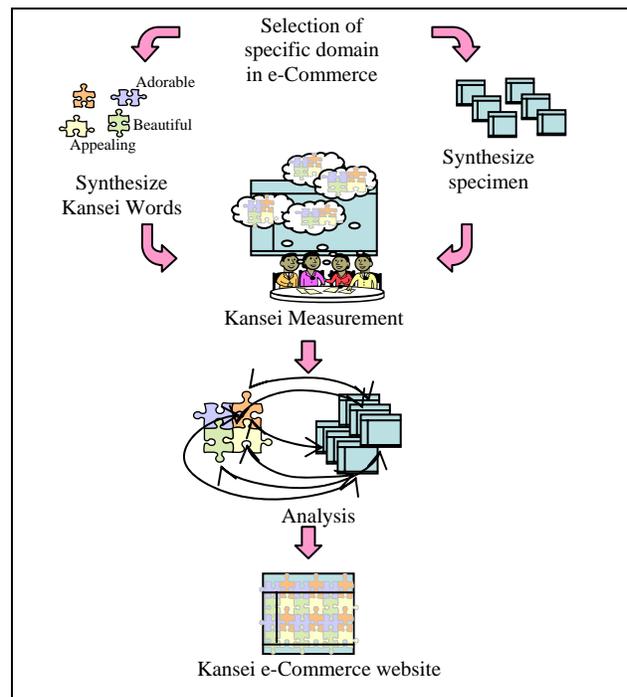


Figure 1: Research method.

We adopted the Kansei product design method in the measurement of consumers' emotional responses in e-Commerce websites.

The research begins with selection of specific domain. It is important to control the domain and

targeted subject because different domain will induce different kansei, and targeted subject must be used so that the intended kansei could be measured accurately. Failing which will lead to confusion during measurement and classification of designs. This will cause an invalid result. The following step is the process of synthesizing Kansei Words and evaluation specimen. The visitors kansei and website design were then analyzed separately. Finally, the kansei and website designs are mapped to conclude at the Kansei e-Commerce website design. The visual description of the method is illustrated in figure 1.

4.1. Research Method

We conducted two studies: the measurement of visitors' emotional feelings (kansei) towards online clothing websites and the synthesis of website specimens. For the kansei measurement, we adopted the Kansei Engineering method described in earlier section. The visitors kansei and website specimen were then analyzed respectively. Then, kansei and the website samples are mapped to determine the Kansei e-Commerce website cluster.

4.2. Research Instrument

Table 1: Specimen and code.

ID	Specimen	ID	Specimen	ID	Specimen	ID	Specimen
1		8		15		22	
2		9		16		23	
3		10		17		24	
4		11		18		25	
5		12		19		26	
6		13		20		27	
7		14		21		28	

Initially, one hundred and sixty three online youth clothing websites were selected based on their visible design differences and were analysed following predefined rules on colours, design elements, layouts, page orientations, and typography. From the analysis, 35 website specimens were finally used. The specimen

are coded numerically from one to thirty-five, and snapshot of the specimen are shown in table 1.

Kansei Words, which are used to represent emotional responses were synthesized according to web design guidebook, experts and pertinent literatures. 40 Kansei Words were then selected according to their suitability to describe website. Among the synthesized words are adorable, professional, impressive and etc. These Kansei Words were used to developed checklist to rate websites. The kansei checklist developed was organized in a 5-point Semantic Differential (SD) scale.

4.3. Participants

One hundred and twenty undergraduate students from the Faculty of Information Technology and Quantitative Science, Faculty of Architecture, Building, Planning and Survey, Faculty of Business and Management and Faculty of Electrical Engineering from the researchers' university participated in the kansei evaluation. From each faculty, exactly thirty students consisting of fifteen males and fifteen females were recruited. All of them have prior experience as web users.

4.4. Procedure

The participants were grouped according to their faculties. Four kansei evaluation sessions were held separately for each group. During each session a briefing was given before the participants began their evaluation exercise. The thirty five website specimens were shown one by one in a large white screen to all participants in a systematic and controlled manner. Participants were asked to rate their feelings into the checklist according to the given scale. Participants were given three minutes to rate their feelings towards each specimen. They were given a break after the fifth website specimen, to refresh their minds. The order of checklist was also change to avoid bias. Each kansei evaluation session took approximately 2 hours to complete.

5. Results and discussions

5.1. Kansei semantic space

We analyzed the semantic space for our websites by principal component analysis using the averaged evaluation value for the evaluation session. We obtained the first principal component (PC1) (eigenvalue: 27.036, contribution ratio: 67.6 %) that implied complexity, and the PC2 (eigenvalue: 4.130, contribution ratio: 10.3 %, cumulative contribution

ratio: 77.9 %) that implied attractiveness from the evaluation. Together, the first two principal components represent 77.9% of the total variability. Thus, most of the data structure can be captured in the two underlying dimensions. This means, the structure of Kansei Words are highly influenced by the first two principle components. The remaining principal components account for a very small proportion of the variability and are probably unimportant. This means, they have very less influence to Kansei structure and probably can be ignored.

The evaluation word “old-fashion” got the lowest loadings along the PC1, “boring” was the next. To the contrary, “gorgeous,” “impressive,” “stylish,” appealing” got the highest loadings along the PC1. Along PC2, the words “plain” and “simple” had the largest loading values, and next were “neat,” and “natural.” In contrary, the word that had the negatively largest value was “crowded”.

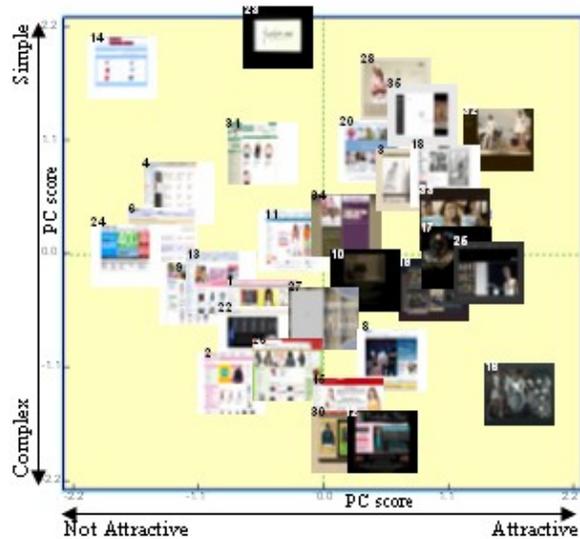


Figure 2: Principal Component Score of websites.

The principal score of each website is plotted in figure 2. The figure made possible of the identification of websites, which holds strong kansei. Those located at the edge of the corresponding kansei space, have strong meanings. For example, sample website no. 24 which is located at the very left edge, indicates very much "not attractive". Sample no. 14, at the upper-left, is "not attractive" and "plain". Sample no.16, 25 and 32 are at the very right edge, which indicates very "attractive". Sample no. 30 and 12 are at the bottom edge space, which indicates "crowded".

Websites in "not attractive" category, for instance sample no. 24 and 14 seems to have small size pictures, consist of mostly text, observable empty

spaces, and no modeling on clothing. On the contrary, “Attractive” website, such as sample no. 16, 32 and 25 are having large size picture, very less empty space, less text and model is used to demonstrate clothing. Also, sample websites with darker backgrounds are mostly sided at "attractive" category.

5.2. Kansei Words hierarchical clustering

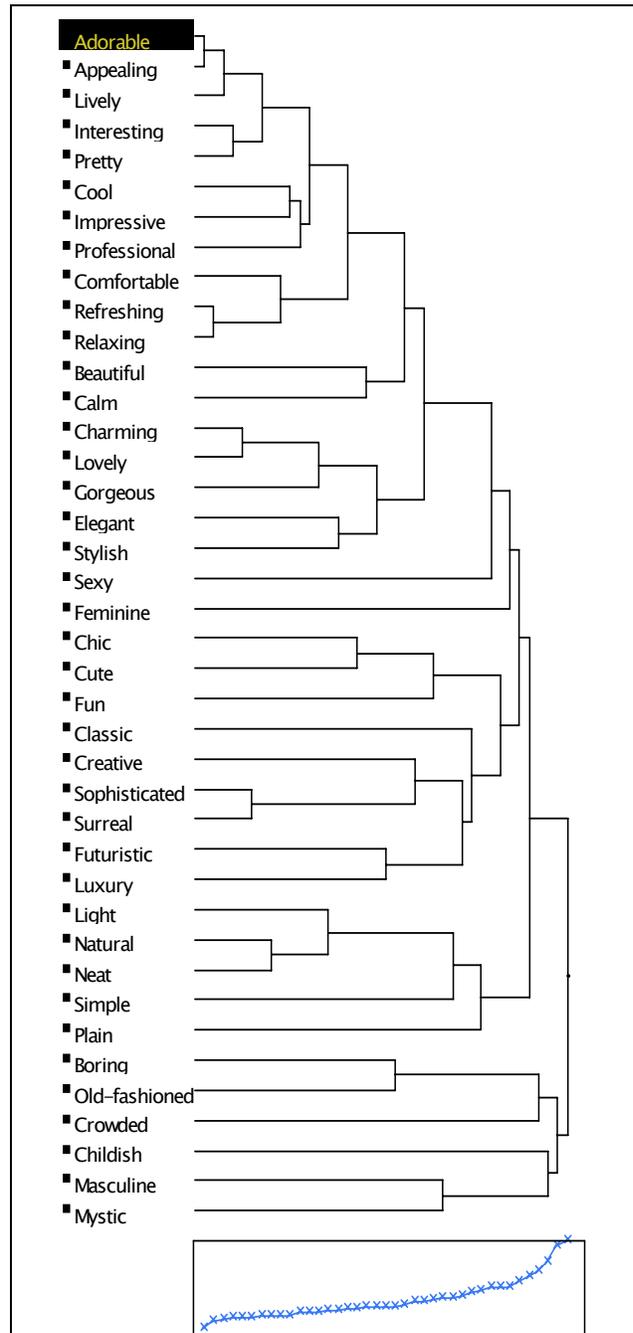


Figure 3: Kansei Words hierarchical cluster.

Figure 3 shows result of hierarchical clustering of Kansei Words using averaged evaluation results. The Kansei Words were associated to it's cluster by classifying the averaged value between subject responds in a hierarchical cluster analysis.

7-point solution using dissimilarity method were used in concluding cluster of Kansei Words. In each cluster, the Kansei Word with high evaluation value that corresponded well to the plot of the PC loading and is often used in web design practices is selected as a representative of the cluster. The concluded clusters are as shown in table 2.

Table 2: Kansei Word cluster.

Kansei Cluster	Kansei Word
Impressive	Adorable, Appealing, Lively, Interesting, Pretty, Cool, Impressive, Professional, Comfortable, Refreshing, Relaxing, Beautiful, Calm, Charming, Lovely, Gorgeous, Elegant, Stylish, Sexy, Feminine
Sophisticated	Chic, Cute, Fun, Classic, Creative, Sophisticated, Surreal, Futuristic, Luxury
Simple	Light, Natural, Neat, Simple, Plain
Old-fashion	Boring, Old-fashion
Crowded	Crowded
Childish	Childish
Masculine	Masculine, Mystic

5.3. Kansei evaluation to each website

Table 3: Kansei and website by strong rating.

No.	Kansei
3	Classic,Feminine
16	Cool,Futuristic,Gorgeous,Impressive,Interesting,Luxury,Pretty,Stylish
17	Cool,Gorgeous,Impressive
33	Cool,Refreshing,Relaxing,Stylish
12	Elegant,
25	Elegant,Feminine,Impressive,Luxury,Pretty,Professional,Sexy,Stylish
32	Elegant,Impressive,Luxury,Professional,Sexy,Stylish
35	Elegant,Sexy,Simple
29	Feminine,Sexy
19	Impressive
23	Simple

We observed the subjects' kansei that are strongly rated (averaged value > 4.0) from the evaluation. As results, e.g. website no. 3 is rated as "classic" and "feminine", website no. 29 is "feminine" and "sexy". The complete set of the observed kansei are as shown in table 3.

Figure 4 shows the result of hierarchical clustering of website using averaged evaluation results from the experiment.

The websites were associated to their cluster by classifying the averaged value between subject responds in a hierarchical cluster analysis. 11-point solution using dissimilarity method was used in concluding cluster of websites. The concluded clusters are as shown in table 4.

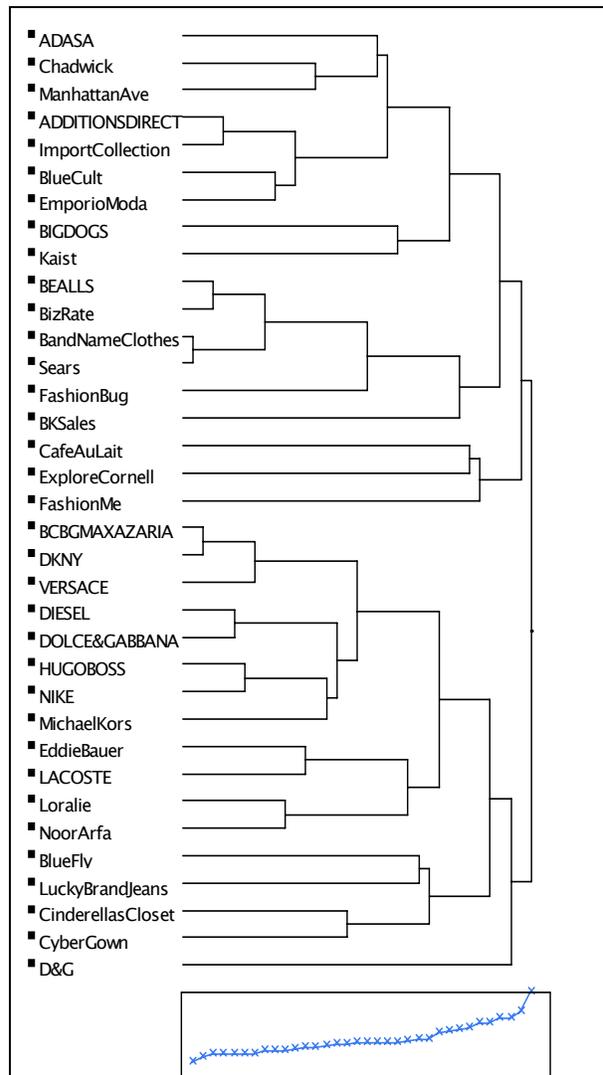


Figure 4: Websites hierarchical cluster.

The website and kansei were associated by classifying the averaged evaluation value in a hierarchical cluster analysis. We used the correlation coefficient as the similarity and the group average method (unweighted pair group method with arithmetic mean) to make the clusters. 11-point clusters were concluded where fluctuation of values is evident.

Table 4: Website cluster.

Cluster	Website
1	AdditionsDirect, ImportCollection, Chadwick, ManhattanAvenue, BlueCult, Emporio Moda, ADASA
2	BigDogs, Kaist
3	BEALS, BizRate, BrandNameClothes, Sears, FashionBug
4	BKSales
5	CafeAuLait
6	ExploreCornell
7	FashionMe
8	BCBG MaxAzaria, DKNY, Versace, DIESEL, Dolce&Gabbana, Hugo Boss, Nike, Michael Kors
9	Eddie Bauer, Lacoste, Loralie, NoorArfa
10	BlueFly, Lucky, Cinderella, Cybergown
11	D & G

The followings illustrate the website cluster and respective Kansei.

1. Cluster of “simple”, “feminine”, “comfortable” website.

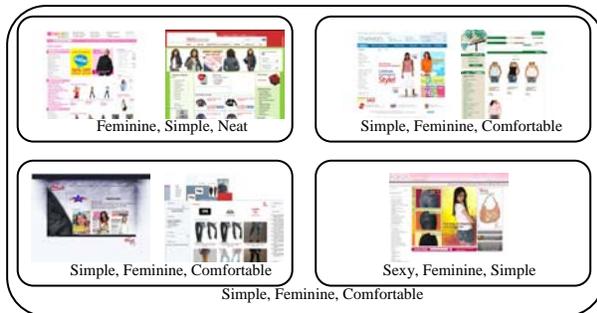


Figure 5: Simple, feminine, comfortable.

2. Cluster of “cute”, “interesting”, “childish” website.

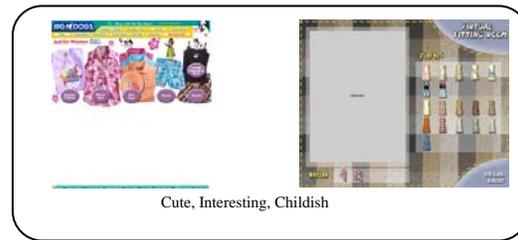


Figure 6: Cute, interesting, childish.

3. Cluster of “boring”, “simple”, “old-fashioned” website.

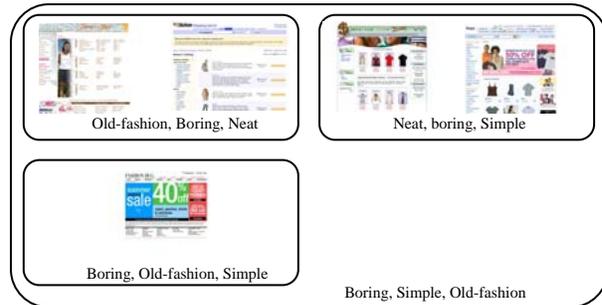


Figure 7: Boring, simple, old-fashioned.

4. Cluster of “simple”, “boring”, “Plain” website.



Figure 8: Simple, boring, plain.

5. Cluster of “cool”, “impressive”, “masculine” website.



Figure 9: Cool, impressive, masculine.

6. Cluster of “futuristic”, “professional”, “impressive” website.



Figure 10: Futuristic, professional, impressive.

7. Cluster of “simple”, “plain”, “calm” website.

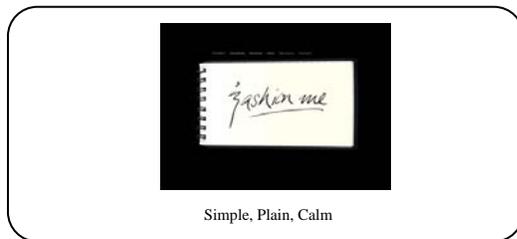


Figure 11: Simple, plain, calm.

8. Cluster of “stylish”, “impressive”, “elegant” website.

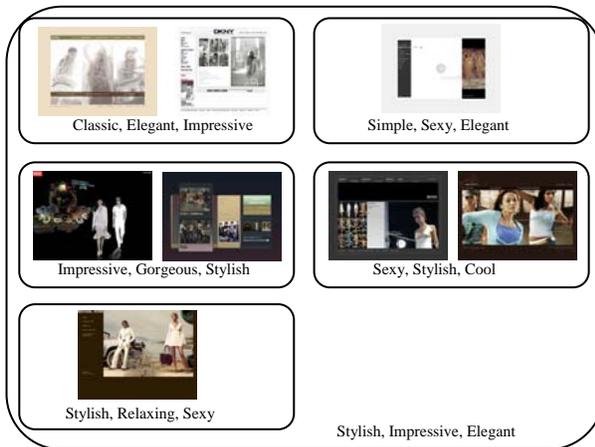


Figure 12: Stylish, impressive, elegant.

9. Cluster of “refreshing”, “simple”, “natural” website.

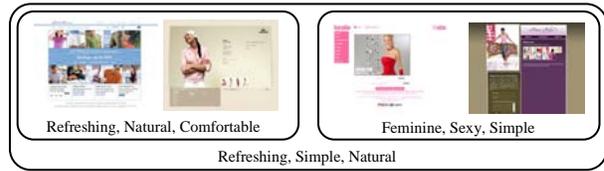


Figure 13: Refreshing, simple, natural.

10. Cluster of “creative”, “impressive”, “elegant” website.



Figure 14: Creative, impressive, elegant.

11. Cluster of “impressive”, “gorgeous”, “futuristic” website.



Figure 15: Impressive, gorgeous, futuristic.

6. Conclusion

From the cluster result, website number 2, 26, 11, 31, 7, 21 and 1 have emotional value of “simple”, “feminine” and “comfortable”. Website number 5 and 27 are having emotional value of “cute”, “interesting” and childish”. Website number 4, 6, 9, 13 and 24 are having emotional value of “boring”, “simple” and “old-fashion”. Website number 14 has emotional value of “simple”, “boring” and “plain”. Website number 10 has emotional value of “cool”, “impressive” and “masculine”. Website number 22 has emotional value of “futuristic”, “professional”, and “impressive”. Website number 23 is having emotional value of “simple”, “plain” and “calm”. Website number 3, 18, 35, 17, 19, 25, 33 and 32 are having emotional value of “stylish”, “impressive”, “elegant”. Website number 20,

28, 29 and 34 are having emotional value of “refreshing”, “simple” and “natural”. Website number 8, 30, 12 and 15 have the emotional value of “creative”, “impressive” and “elegant”. Website number 16 is having emotional value of “impressive”, “gorgeous” and “futuristic”.

The cluster shows designs of websites that stimulate different kind of emotional impressions. In designing website that would induce targeted emotional value, these results are suggested to be a reference in addition to design guidelines. The study provides systematic method of evaluating consumer’s emotional responses to e-Commerce websites and presents correlations within kansei responses to e-Commerce website. The result will contribute to the formulation of guideline to the design of Kansei website.

Further analysis to detail design elements need to done to enable translation of consumer’s kansei and website design, to materialize the design guideline. The guideline will reveal which design elements elicit what kind of kansei to website visitors, enabling e-retailers, researchers, web designers and other stakeholders to design website that induce the intended kansei. Thus, enable them to devise strategies to improve website affective qualities, whereas positive affective qualities are proven to influence visitor’s affective and eventually cognitive judgment [2, 7, 10]. Ultimately, the design of Kansei website will result in a paradigm shift from WYSIWYG (What You See Is What You Get) to WYSIWYD (What You See Is What You Desire).

Nonetheless, the study was performed focusing on young consumers as target market group. Subjects used in the study were youngster, aged 20-25 years old, and specimen were limited to e-Commerce targeting young consumers. Thus, the result may not produce globally applicable features. Universal and localized Kansei features will be considered in our future work.

Acknowledgement

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