Significant Emotional Descriptors for Video-Watching Experience

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Abstract

Objectives: The objective of this paper is to report on factor analysis of 60 emotional descriptors adopted from PANAS-X scale for video-watching experience. **Methods/Statistical Analysis:** Thirty-five university students took part in Kansei evaluation to rate their feelings after having watched 5 video clips as visual stimuli. Factor analysis executed on the data obtained from the evaluation in order to ascertain emotional descriptors that best represent video-watching experience. **Findings:** Significant emotional descriptors are successfully ascertained wherein 28 emotional descriptors are retained in 3 factors; rejection, acceptance and ambivalence - that affects video-watching experience the most. The remaining factors can be ignored as the proportion of variability explained is close to zero and they can be considered as insignificant. It is also evident from the result that emotional responses are unique and that assessing video-watching experience shall require sets of emotional descriptors that best describe the field. **Application/Improvements:** With this result, the academia and other stakeholders shall gain benefit in understanding emotional response pertaining to video-watching experience and how the content influence this response in general.

Keywords: Affective Video Content Analysis, Emotional Descriptors, Emotional Experience, Kansei Evaluation

1. Introduction

Human do not become emotional about everything. There is something triggers the emotion, perhaps the visual content of the video clip. Interesting part in a video clip is the "where" and "what" attention are being focused - refers as visual attention[1]. In achieving persuasive purposes, videos must reach viewers' emotion through powerful messages, vivid images and audio feature[2]. It is beyond the experience that touches the heart and minds of the viewers. Watching video clips containing specific visual content may bring about negative or positive emotional depending on one thought process[3]. There are several gateways to measure emotion; Electro-Myo-Graphy (EMG), Electro-Encephalo-Gram (EEG), eye movement, faces expression, heart rate and words among few others[4]. In this paper, the interest is especially on words being the gateway for emotion.

Previous research highlighted on various emotional descriptors and its purpose to measure emotional response in various domains. There are emotional descriptors for different purposes such as web designing, video content analysis and garment design[5-7]. Due to uniqueness of each research domain, commonly researchers choose descriptors that are best suited to their field[5]. There is a comprehensive review by 7, whom compiled a very extensive list of affective video content analysis research and the adopted emotional descriptors. Guided by the review, it is plausible to deduce that most affective video content analysis research employed generic descriptors that may not be exactly fit to apply directly in this study.

This paper will report on analysis of the collected data to reduce emotional dimensions and ascertain significant descriptors best fitting for video-watching experience from the original PANAS-X scale. Thirty-five university students participated in the Kansei evaluation, which

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required them to do self-reporting of their emotional responses upon watching five video clips. This paper is organized as follows. In section II is the literature review of key concepts that outline the boundary of this research. Section III presents the research methodology. The results of Kansei evaluation will be discussed in Section IV. Finally, future work and conclusions are presented in the final section.

2. Literature Review

2.1 Emotional Experience

Watching videos while searching for information or entertainment purposes may influence viewers emotionally. Responses would be different when viewers watch a video clip about forest and they saw emotional item, such as a snake, as compared to if they saw a neutral item, such as a bird. Video containing emotional items inspires higher arousal of positive (awe) or negative (anger and anxiety) emotions[8]. Emotion elicited from watching the video gives rise to emotional experience[9]. Video-watching activity is similar to movie watching where good one can make us sob, applaud or even flinch. The acts are the result from viewers' emotional responses. The entire phenomena explain emotional experience.

Professor Jeffery Zacks in his book discussed about development of experience in two fundamental rules[10]. The mirror rule indicates tendency to mimic an observed action. Seeing the actor smiles, one reflects by smiling too. The success rule governs our response to stimuli based on actions that are likely to work in real life. For instance, in a movie if we see actor throws a punch at an enemy, we probably flinch as well due to reflective action that we are custom to in real life. In a more deliberate illustration, a research on Hollywood movie scene found that violence in films such as Casino Royale does cause aggressive actions[11]. It is worrisome to learn the aftereffect of negative emotional experience in video-watching. Visualize the various possibilities that can surface considering openness of video sharing provider such as YouTube. Moreover, the videos may not be suitable for public viewing but still largely available for access. This study is part of a broader research, aiming at understanding emotion in video-watching and impending emotional item associated to it.

2.2 Kansei Evaluation

The industrial world today is responding towards customer centric products in order to stay competitive. To lure customers, the product has to be good and attractive enough which requires incorporation of kansei[12]. 'Kansei' is a Japanese term generally translated as feelings, sensitivity and images that human have relating to products or environment[4]. Kansei Engineering (KE) is a customer centric technology that combines two disciplines; engineering and psychology. Professor Nagamachi found it over 40 years ago. Today, KE has greatly expanded beyond industrial domain and explored in academic world as well as other disciplines.

At the present, there are 9 types of KE methods. Application of the methods very much depending on research objectives and strategies in assessing kansei of a product or environment. KE starts from decision on domain of investigation. Then the Kansei dimension stage concerning identification, measurement and analysis of the kansei. Finally is the product design dimension. Kansei evaluation takes place in the Kansei dimension stage[13]. During the evaluation, Kansei engineer assembles attributes used to articulate psychological feelings of the product or environment to be evaluated. The collections of attributes are called Kansei Words (KW), usually being identified by a panel of domain experts or other relevant sources such as users, magazines and manuals. KW takes in a form of adjective or nouns are quantified using Semantic Differential scale of positive and negative word such as "interested – not interested"[4]. It is common to have large number of initial KW. Kansei engineer will have to reduce the dimension by ascertaining important ones through qualitative and quantitative methods[14].

2.3 Affective Video Content Analysis

The prime research in affective video content analysis is probably by Hanjalic and Xu, some 15 years ago who proposed a computational framework for affective video content representation and modelling[15]. In 2011, a survey related to video content analysis discussed on affective video retrieval as one of the areas worthy for further research[16]. It would be interesting to be able to retrieve videos that produce feelings in the viewer – such as romance, pleasure, violence, sadness and anger. The development of research hitherto are noticing a flourishing interest across various fields ranging from psychology, multimedia, computer vision as well as entertainment.

Affective video content analysis is the analysis to determine videos that are capable to induce particular emotions in the viewers. Recent research in the field is using an approach to deduce affective content indirectly based on viewers' spontaneous response when watching the video[6]. It is important to highlight that affective content in a video does not necessarily exactly resemble viewers' emotional response. For example, a video about few cats wearing costumes intended to be funny (positive affect). However, it should not be confused with the exact emotion that the viewers had after watching the video. Since emotion is subjective in nature, viewers who are cat phobia may not find the video as funny as those who have no issues with cats. Additionally, the emotional response must not be confused with actor-related hallmarks. The emotional response should be originally of the viewers' rather than empathize and attached feeling to the actors in the video[17].

Affective video content can be categorized into visual and auditory categories[6]. The analysis includes extraction of appropriate features from both or either category that adequately characterizes various affective contents. This research is particularly interested in visual features of affective video content.

2.4 Emotional Descriptors

Emotional descriptors are likening to KW in KE. Researchers employ the term emotional descriptors to represent human emotion for different research objectives and fields. For example, a researcher uses 'swollen-dented' to describe body measurement[7]. Other researcher used 'angry' to describe emotional responses of viral video[8]. From the recent survey on affective video content analysis, it is noticeable that there is no mutual consensus on emotional descriptors use in specific research[6]. The same survey also concluded that Ekman's six basic emotions are the most frequently cited in this field – happiness, sadness, surprise, disgust, anger and fear. Even so, current cognitive theories suggest that emotional experiences literally extend beyond the Ekman's basic emotion[18].

Governed by theories and models of emotion, there are affect scales available for reference in choosing emotional descriptors such as Positive And Negative Affect Scale (PANAS), the extended version of PANAS (PANAS-X) and Scale of Positive and Negative Experience (SPANE)[19-21]. Kansei Affinity Cluster is a good reference for affective web design as well as general product design[5]. Besides

collections of adjective words or sentences, there are also non-verbal emotion measurement tool - Product Emotion (PrEmo) Measurement instrument and Pick-A-Mood (PAM)[22,23].

Supporting the suggestion that emotional experiences expand ahead of basic emotions and the fact that emotional experiences for video-watching are rather unique, the researchers opted to further study emotional descriptors based on PANAS-X. The goal is to identify the closest that represent emotional experience relating to video-watching activity.

3. Methodology

Kansei evaluation conducted in two separate sessions to ensure proper execution and under controlled situation. Participants who took part in both sessions were those who familiar with video-watching activity, participated voluntarily and able to do self-reported rating of their emotional responses based on given evaluation sheet.

3.1 Stimuli

The stimuli were made from 5 video clips of various themes downloaded from the YouTube. The choices of which themes to be included in the evaluation were similar to evaluation experiment on emotional contagion in viral video[8]. The themes were; "DISGUSTING" – men eating sago worm, "FUNNY" – chubby boy dancing like a pro, "CUTE" – babies laughing loudly and "ANGER-INDUCING" – few men being tied and beaten up. A video clip showed brush-lettering tutorial was included as a control and labelled as neutral. Selection of videos based on recent popularity as seen on "view count" on YouTube, except for neutral video. All 5 video clips were compiled into a single MPEG-4 video file format with separator frame to indicate the starts and ends of each clip. This evaluation focused on visual features that only require viewing of the content. Hence, the audio being muted. The video clips were of short duration between 40 seconds to 90 seconds, coloured and realistic images.

3.2 Participants

Recruitment of participants based on familiarity to video-watching activity and convenience to spend about 40 minutes to complete the evaluation. In total, 35 students took part in the evaluation. Eighteen students were in

the first session (15 female, 3 male). Another 17 students were in the second session (15 female and 2 male). None of the participants reported of any visual impairment.

3.3 Evaluation Procedures and Setting

Participants were given briefing on consent statements and instructions. They were required to fill in pre-questionnaire asking information such as gender and age. An evaluation sheet containing 60 emotional descriptors adopted from PANAS-X were assigned to each of the video clips. The orders of the descriptors were shuffle in random for each video to avoid response bias[24].

During evaluation, researcher controlled presentation of the video file from a computer attached to LCD projector in the classroom. Participants were seated at a viewing radius similar to the usual classroom setting. Only one researcher facilitated the data gathering throughout each session. Prior commencing the evaluation, participants were asked to bring forward any concerns and be clear on the task to be completed. Following the video clips presentation, participants were required to complete self-reported ratings pertaining to their emotional responses in 4 minutes for each clip. The ratings are in a form of Semantic Differential (SD) 5-point bipolar scale. They were given statement, "I feel _____ after watching this video clip" to be assessed against all 60 emotional descriptors and responded using the scale accordingly (1="not at all"; 5="extremely"). In between viewing of each video clips there was a short break for about 30 seconds.

4. Results and Discussions

4.1 Reducing the Emotional Dimension

In KE, Factor Analysis (FA) is commonly uses in order to extract psychological structure of emotional dimension that constitute essential concept of the domain under investigation[14]. FA was executed on the data obtained from kansei evaluation in order to ascertain emotional dimensions that best represent video-watching experience. The researchers calculated average value for all 60 emotional descriptors (variables) versus the 5 video clips (observations). Through the averaged value, FA result obtained using JMP software.

Analysis work started with determining number of factors to be retained as it is important to select which concept is the most suitable – not too many and not too

few. One way is to look at factor contribution after varimax rotation for better interpretation since non-rotated factors are ambiguous[25]. Table 1 summarizes the factors contribution up to 6 factors.

In the table, the first factor explains 46.64% of the data, the second factor explains 21.9% of the data and third factor explains 18.48% of the data. It is obvious that the three factors represents majority of factor contributions with 87.02% of the variability. The research has decided to exclude the fourth factor since the three factors already suffice to represent most of the data. Proportions of variability explained by the fifth factor onwards are close to zero and considered as insignificant. Next is the interpretation of factor loadings. Twenty-eight variables are selected to retain in 3 of the significant factors. Table 2 shows factor loading results after varimax rotation.

Significant loading cut-offs were applied in interpreting all factors; .9, .6, and .7 respectively. As a general guide, for something to be labelled as a factor it should have at least 3 variables[25]. The significant variables for that particular factor are highlighted in bold. The following Table 3 presents labels for the 3 factors (emotional dimension) and 28 significant variables (emotional descriptors) associated to it.

Interpretation and labels for the factors take into consideration of two aspects – size and direction of each loading. Using the original PANAS-X description as reference, factor 1 contains mostly negative affect and therefore labelled as 'Rejection'. Factor 2 on the other hand contains mostly positive affect therefore labelled as 'Acceptance'. Factor 3 has substantial positive and negative affects reflecting uncertainty and therefore given a label 'Ambivalence'. Viewers who watch a video clip may develop specific feelings and have 'Rejection', 'Acceptance' and/or 'Ambivalence' emotional experience. It is evident from the results that the 3 significant factors identified are best fitting to represent emotional dimensions for video-watching experience.

Table 1. Factors contribution.

Factor	Variance	Percent	Cum Percent
Factor 1	27.98433865	46.64%	46.64%
Factor 2	13.14027017	21.90%	68.54%
Factor 3	11.08672803	18.48%	87.02%
Factor 4	7.788663161	12.98%	100%
Factor 5	2.58713E-15	4.31188E-15	100%
Factor 6	2.57191E-15	4.28651E-15	100%

Table 2. Factor loading after varimax rotation.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Sad	**0.9736**	-0.1722	-0.1496	0.0108	-8.4E-09	-3.75E-09
Hostile	**0.9696**	-0.2090	-0.1240	0.0298	3.4E-09	-6.43E-09
Irritable	**0.9657**	-0.1032	-0.2335	-0.0474	2.4E-09	-9.56E-11
Scornful	**0.9541**	-0.2806	-0.0261	0.1009	-7.2E-09	-2.14E-09
Blameworthy	**0.9541**	-0.2243	-0.1984	-0.0040	1.1E-09	-9.84E-09
Distressed	**0.9512**	-0.1841	-0.2465	-0.0252	-3.5E-09	-1.28E-09
Loathing	**0.9425**	-0.1851	-0.2777	-0.0152	3.8E-08	-9.98E-11
Angry	**0.9342**	-0.1617	-0.3168	-0.0284	-6.6E-10	-5.44E-09
Downhearted	**0.9167**	-0.0913	-0.3647	0.1355	-4.2E-09	1.60E-08
Drowsy	**-0.9676**	-0.1636	-0.1008	0.1636	-5.3E-10	-6.25E-09
Concentrating	-0.0835	**0.9727**	-0.2124	-0.0418	-2.0E-10	-1.76E-09
Determined	-0.0911	**0.8019**	-0.3278	-0.4911	-2.4E-09	4.16E-09
Interested	-0.6085	**0.7903**	0.0323	0.0646	-1.7E-09	-1.66E-10
Enthusiastic	-0.4429	**0.6807**	0.5798	-0.0654	2.0E-09	-4.73E-09
Inspired	-0.7401	**0.6722**	-0.0021	0.0205	2.6E-09	5.15E-09
Lively	-0.4342	**0.6699**	0.5731	0.1849	6.8E-09	3.82E-09
Energetic	-0.3761	**0.6487**	0.6284	0.2070	-1.7E-09	1.68E-08
Excited	-0.6854	**0.6405**	0.3455	0.0237	-2.0E-09	-1.53E-09
Happy	-0.6011	**0.6201**	0.4612	0.2036	2.1E-09	4.59E-09
Disgusted	0.3639	**-0.8738**	-0.1319	-0.2945	1.0E-09	5.83E-09
Disgusted with self	0.1064	**-0.8979**	-0.2582	-0.3402	1.2E-09	1.43E-09
Alone	-0.1842	0.1171	**0.9698**	-0.1091	1.3E-09	-1.11E-08
Lonely	-0.3015	0.0004	**0.8756**	-0.3775	-2.1E-09	-2.33E-09
Fearless	-0.4402	-0.1636	**0.8032**	-0.3665	1.5E-08	-4.86E-09
Active	-0.4313	0.4574	**0.7320**	0.2624	-3.9E-09	9.41E-09
Astonished	0.0930	0.1827	**-0.8964**	-0.3930	2.9E-09	-1.57E-09
Dissatisfied with self	-0.3500	0.1679	**-0.8848**	0.2578	3.5E-09	8.24E-10
Bold	0.2371	-0.3420	**-0.7403**	-0.5280	9.2E-10	-8.34E-09

Table 3. Identified significant factors and its variables.

Rejection	Acceptance	Ambivalence
Sad	Concentrating	Alone
Hostile	Determined	Lonely
Irritable	Interested	Fearless
Scornful	Enthusiastic	Active
Blameworthy	Inspired	Astonished
Distressed	Lively	Dissatisfied with self
Loathing	Energetic	Bold
Angry	Excited	
Downhearted	Happy	

Drowsy	Disgusted	
	Disgusted with self	

5. Conclusion

Through factor analysis executed on the collected data, the authors have successfully ascertained representative emotional dimensions of video-watching experience. From the original 60 descriptors adopted from PANAS-X scale, it was reduced to 28 significant emotional descriptors. Three factors; rejection, acceptance and ambivalence

from viewpoint of the participants are the emotional dimensions that affecting video watching experience the most. Thirty-five participants who were all university students had evaluated five video clips from various themes; disgusting, funny, cute and anger inducing. Also included was one neutral video.

The finding upholds the uniqueness of video-watching experience and requirement of emotional descriptors that best describe the field. Majority of the participants who volunteered to participate in the evaluation are female. Although now it is not a focus in this research, future work shall take into consideration on gender differences in emotional responses. With this result, the academia and other stakeholders shall gain benefit in understanding emotional responses pertaining to video-watching experience, and how the video content influence this response in general.

6. Acknowledgment

7. References

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