Research on Filter Naming Mechanism Based on Emotional Expression and Cognitive Integration

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Abstract. With the development of information technology especially the mobile Internet, more people are using the camera in mobile phone and using apps in it to process the pictures, meanwhile a variety of filters are used of a high frequency. However, strange filter naming mechanisms bring users a bad experience and make them confused. How to establish a new filter naming mechanism that can improve the cognitive efficiency of users and verify it by experiments are the focus of this paper. Firstly, research the motivations of using filters, then extract and sort out the existing main filter naming mechanisms. Then use the analysis of text or questionnaire to extract the emotional expression of imagery words of using filters, sort out the words by cluster analysis. Through a research of correlation analysis, the emotional expression of imagery word closest to the filter are obtained, and a new filter naming mechanism is gotten. Finally, through a comparative experiment we can see that the new filter naming mechanism can greatly improve the users' cognitive efficiency and their experience. This study not only fills the blanks in the field of filter naming research, but provides a new research idea for deeper research on user's emotional expression and its stimulating factors. It can be foreseen that the research methods and results can be applied to product and visual design, sociology research and other specific areas, playing a guiding and testing role.

Keywords: Filter naming mechanism · Emotional experience
Cognitive integration

1 Introduction

With the development of information technology especially the rapid development of mobile Internet, more people are using the mobile phones' camera to take photos and post-processing the photos at the same time using the apps at mobile phones [1]. At the same time, a variety of filters are used of high frequency, Instagram, Snapseed, Meitu Xiu Xiu, VSCO and other apps almost become a necessary software of mobile terminal for everyone.

However, strange filter naming mechanisms of those apps bring users a bad experience and make them confused.

This research aims to purpose a new filter naming mechanism based on emotional expression and cognitive integration. The new filter naming mechanism not only

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analyzes from the view of the actual work of the filter, but also fully combines the user's emotional expression when using the filter. The final contrast test also shows that such a new filter naming mechanism does greatly improve the users' cognitive efficiency when using the filters.

This research creatively proposes a mechanism for the filter naming. The mechanism has the following advantages,

- Replace the original confusing way of filter naming, it greatly improves user's cognitive efficiency and experience when using the apps about filter. And users can have a preliminary cognition of the effect of filters when they see the new filters' names.
- The existing filters can be optimized according to the emotions that users want to express when using filters. At the same time, other new filters can also be designed from this perspective.
- It can be targeted to rename the same filters for users in different countries or regions by this new mechanism, in this way that we can make user's cognitive efficiency and experience better when using filters.

The rest of the paper is organized as follows. The motivations for users to use the filter of mobile terminal and current main types of filter naming methods are sorted out in Sect. 2. Section 3 presented a new filter naming mechanism. To verify the rationality of the proposed mechanism, experiments with small sample size have been done. The process and analyses are presented in Sect. 4. Section 5 is the summary and prospect.

2 Desktop Research

2.1 Motivations

A Variety of Emotional Expression Needs. Each filter software has a variety of filter effects for users to try and switch, and users can use different filters to express users' different emotions. Emotion refers to the subjective feelings or experiences of the individual [2]. Emotional experience refers to the individual subjective experience of emotion [3]. Emotion is a part of attitude. It is in harmony with the introverted feelings and intentions in attitude. It is a more complex and stable physiological evaluation and experience of physiology [4, 5].

Easy to Use. Traditional image post-processed software, such as Photoshop and Lightroom, all involve various professional vocabularies and knowledge such as curve, color balance, saturation and so on [6]. Users don't need to consider these parameters when they use these filter software of mobile terminal, it is easy to access and easy to use.

Efficient. Users only need to switch filters when they are using these filters, and choose a filter that they like. The whole process is usually less than 1 min.

Nice Effect. These filters are generated by professionals after repeated debugging according to the professional knowledge of psychology and photography. The effect is undoubtedly better than that produced by nonprofessional users.

2.2 Existing Filter Naming Methods

By the Effect. This kind of filters is named with the actual effect of the filter. There is a certain correlation between the name of the filter and the actual effect of the filter. For example, Instagram's filter [Rise]: there are warm colors, a little bit of sunrise yellow, and also let the images soft, so named [Rise]; VSCO's filter [New Modern]: fashion is the main sensation to users, the color is bright and full of impact, with new modern, so it is named it. The [Bright] of Snapseed improves the brightness, contrast and saturation of the picture, giving people a sense of [Bright]. [A Picnic in The Woods] of the Meitu Xiu Xiu is green with high contrast and strong color. It gives people a sense of we are take a picnic in the woods, so it is called [A Picnic in The Woods].

By the Technology and Form. This kind of filters is named by the technology and form of the filters. The number of this part of the filters is small, but classic. They are to reproduce some classic forms of the picture effect in the history of the development of photography. For example, Instagram [X-Pro] is a kind of washing technique's abbreviation, [Cross-Processing] (cross flushing), which can achieve different film effect with different chemical solvents, and this is precisely reproducing the filter to reach the flushing technique effect; VSCO [K] is the abbreviation of Kodachrome: Inspiration from the classic Kodak color slides Kodachrome, K series of filters that follow its predecessor. Snapseed [Faded Glow] is the simulation of photography in the dark corner of a filter; Meitu Xiu Xiu [LOMO] is a kind of color reproduction in 1950s production of a special camera out of the bright effect.

No Connection. There is no connection between this kind of filter naming and the actual effect of the filter. Most of them are named by the names of the designers, or the place names related to the designers, or the names of their pets and so on. A lot of filters of Instagram's name was derived from this, for example, [Juno] was named by the designer Krieger, who had a pet called Juno. Amaro is an Italy wine, there were a lot of underground bars at that time, and Systrom and Mike Krieger, the filter's designers were obsessed with Amaro. When they drunk Amoro in a bar, the filter was born out, so the filter's name also came into being.

Through the research, we can find that the filters are lack of standardization in naming, mostly are random, just in accordance with the designers' personal willingness, which brings users bad experience, let the users very confused during using them. Therefore, it is very important to establish a set of filter naming rules which can improve the users' cognitive efficiency and improve the users' use experience.

At the same time, through the analysis of the above three types of filter naming rules we can find that the first type of naming rule has the strongest correlation between the filters' names and their effect, and can be suitable for the majority of filters, but its lack of unity and certain norms, and the name of many filters are too subtle and restrained, for example Meitu Xiu Xiu's [37.2], [After The Youth] [Yogurt], and so on, and filters of VSCO using the first letter of the name to display, which will make the user more confused when in use. Therefore, the focus of this paper is to propose a more standardized and direct filter naming mechanism which is more conducive to improving user cognitive efficiency and user experience, and verify it through a comparative experiment.

3 A New Filter Naming Mechanism

The original motivation of using the filter is to express one of the emotions at this time. Different pictures record different scenes, express different mood of users, so do filters. With the same scene and the same picture, users will use different filters to express different emotions.

On the other hand, the filter is a kind of one button to make an automatic post-processing tool for pictures, while referring to the post-processing of pictures, the main parameters involved are exposure, contrast, saturation, hue and color temperature, highlight, shadow and so on.

Therefore, this paper innovatively proposes the filter naming mechanism of "adjectives + nouns". Using the first letters of "adjectives" and "nouns", "A" and "N", so this mechanism is called "AN" (Fig. 1):

$Name_i = adj_i + noun_i$

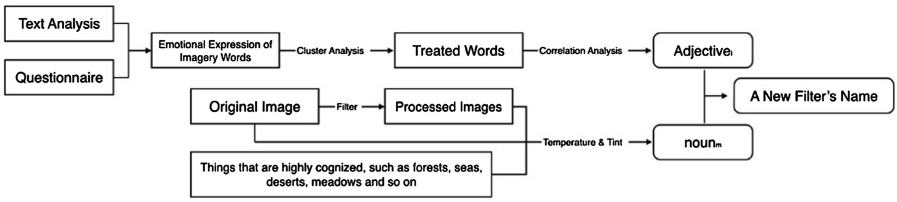


Fig. 1. Filter naming mechanism

Among them, adjectives mainly express the relationship between the filter and the emotion that the user wants to express, and the nouns mainly show the parameter information of the color temperature and color of the filter.

3.1 Adjective

First, through text analysis and questionnaire, the emotional expression of imagery words while the users are using filters are collected. Then carry out the clustering analysis of the emotional expression of imagery words collected.

Clustering Analysis. Clustering is a common data analysis tool and a basic algorithm for data mining. The essence of clustering analysis is to divide data into several clusters according to the relevance. Therefore, it has high similarity within clusters and big difference between clusters [7] (Fig. 2).

Based on the semantic relevance coefficient in the matrix to build N-dimensional space, the Euclidean distance formula (1) can be used to calculate the spatial distance of two tags. The closer, the more similar tags can be considered.

$$\text{Euclid}(1, 2) = \sqrt[2]{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2} \quad (1)$$

Word / Word	w_1	w_2	w_3	⋯	w_n
w_1	1	6	9	⋯	3
w_2	2	1	4	⋯	6
w_3	4	2	1	⋯	7
⋯	⋯	⋯	⋯	1	⋯
w_n	3	8	5	⋯	1

Fig. 2. Semantic correlation matrix of emotional expression of imagery words

The shortest two clusters are merged into a large cluster until all small clusters are merged into a large cluster. The whole process can be shown in a form of a tree structure. Any number of semantic groups can be got through hierarchical clustering analysis [8–10] (Fig. 3).

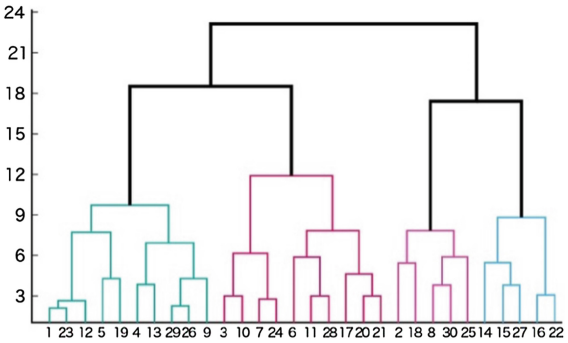


Fig. 3. Hierarchical clustering

Through clustering analysis, we can get the emotional expression of imagery words m after screening. Then, we randomly select high resolution l images from the Internet. The selected categories include portrait, scenery, still life and documentary. When choosing, avoid obvious emotional bias. At the same time, the scope of the selection is from the global scope, to ensure that the selection of pictures is comprehensive, rich and random. The l images are all processed by filter i, and the images of the l group are obtained (two pictures before and after processing are a group). Then, find a certain number of ordinary users to score the correlation between the filter and the emotional expression of imagery words [11, 12] (Fig. 4).

Word / Image	W_1	W_2	W_3	⋯	W_m
I_1	C_{11}	C_{12}	C_{13}	⋯	C_{1m}
I_2	C_{21}	C_{22}	C_{23}	⋯	C_{2m}
I_3	C_{31}	C_{32}	C_{33}	⋯	C_{3m}
⋯	⋯	⋯	⋯	⋯	⋯
I_l	C_{l1}	C_{l2}	C_{l3}	⋯	C_{lm}

Fig. 4. A word-image matrix

Average the scores of all users and a correlation matrix is obtained. Then select the minimum of the average value of every column. The emotional expression of imagery word in that column is taken as the adjective we want.

3.2 Noun

The effect of each filter is with a unique tint or color temperature, or to make the image brighter or darker. In a word, they adjust the parameters of the pictures, such as color temperature, hue, high light, shadow, saturation and so on.

These changes in color temperature or tint are apparent, can let us think of something in daily life. For example, blue will let us think of the sea and the sky; Green will let us think of grassland, forest; Yellow will let us think of the desert, the sun, gold and so on [13].

Therefore, from the perspective of parameters related to post processing, combining with the effect of the filters, choose the corresponding items from things that are highly cognized, such as forests, seas, deserts, meadows and so on as the noun we want [14].

4 Experimental Verification

According to the filter naming mechanism "AN" mentioned above, we firstly got 44 emotional expression of imagery words of 105 users (48 male and 57 female) by questionnaires. Then, 10 emotional expression of imagery words were obtained by clustering analysis. We randomly selected 20 images through the Internet to analyze the correlation between the filter effect and 10 emotional expression of imagery words. Finally, the [RISE] and [Gingham] of Instagram were renamed as [Relaxing Wood] and [Cool Stone]. Twenty images are shown in Fig. 5. And part screen shot of correlation score is shown in Fig. 6.

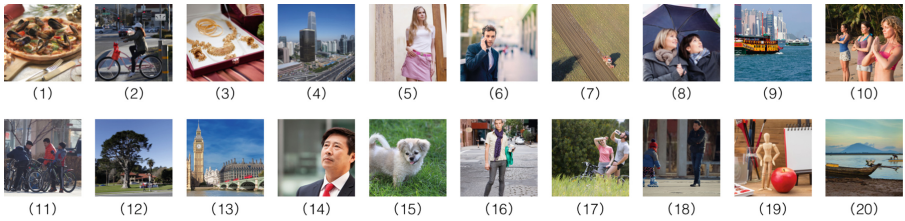
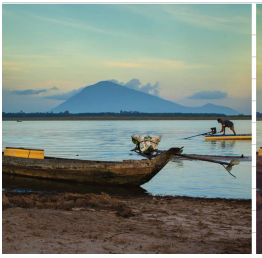


Fig. 5. Random 20 images

Then, we randomly selected other 30 images through the Internet, processed them with two filters, the 60 sets of images were obtained. And then we found out 30 ordinary users (14 male and 16 female), let them associate the images with the names, the names in A group were [RISE] and [Gingham], B group were [Rise Wood] and [Cool Stone]. The results of the experiment showed that the correct rate of the A group was 63.7% and the B group was 86.1%.



Testers / Words	1	2	3	4	5	Average
Happy	8	2	3	8	8	5.8
Warmly	7	3	8	9	7	6.8
Relaxing	2	1	3	3	1	2
Sad	3	7	5	2	3	4
Lonely	3	8	9	2	4	5.2
Deep	3	6	3	7	3	4.4
Frightening	8	9	9	9	9	8.8
Confusing	9	9	8	9	9	8.8
Cool	9	7	7	8	8	7.8
Athrob	9	8	8	7	9	8.2

Fig. 6. Part screen shot of correlation score

The experimental results showed that the new filter naming mechanism did greatly improve the users' cognitive efficiency in the filters' name when using the filters.

5 Conclusion

This paper initially envisages a new filter naming mechanism based on emotional expression and cognitive integration. Its core idea is to construct a model by using the association between the effect of the filter and the emotional expression of imagery words of the user, and the integration of the user's cognition.

The new filter naming mechanism proposed in this paper is finally verified by a preliminary experiment, which is of great help to improve user's cognitive efficiency when using filters. Meanwhile, the new filter naming mechanism makes the current messy filter naming rules more unified and standardized.

However, because of the differences in culture, language and semantic expression of each country, the model proposed in this paper can be targeted to improve closer to the cultural and linguistic environment of every country, and make the model more representative.

It can be foreseen that the research methods and results can be applied to product and visual design, sociology research and other specific areas, playing a guiding and testing role.

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