

Family Emotional Decorative Paintings: Interaction Design for Communication

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Abstract: This paper describes an approach applied to decorative home paintings: an emotional interaction approach. The study utilizes the theory of constructed emotion and the Wizard of Oz research methodology to extend the user's emotional experience in home scenarios with emotional self-reflection and regulation. Family Emotion Decorative Painting uses the family-shared photo library as the image base data, obtains the emotion type through facial expression and voice emotion recognition, and correlates the moment's emotion with the emotion reacted in the picture. Through qualitative research, we found that family emotional decorative painting can bring emotional arousal and soothing to participants. Family Emotional Decorative Paintings also provoked reflection on technology in and around the home. These findings suggest several opportunities, such as designing for anticipation, better supporting reflection on the past. The study also allowed the team to question the traditional interaction design view that more frequent and prolonged human-computer interactions are a measure of good design. The team will next focus on ways for users to engage in novel and meaningful ways outside of the application.

Keywords: Affective Computing, Smart Home, Interaction Design, Communication

1. Introduction

Artificial intelligence technology has brought about a change, turning the "thinking machine" from science fiction into reality. The role of intelligent products is changing from improving work efficiency to deeply satisfying human emotional needs. What comes along with it is the transmutation of human-machine relationship. On the one hand, people are forced to look for the presentation of objects in digital space [1]; on the other hand, people are forced to ask, from the perspective of new materialism, whether intelligent objects can participate in the construction of the relationship between human beings [2].

Since Licklider, the founder of modern human-computer interaction, put forward the concept of man-computer symbiosis in 1960 [3], the goal of human-computer interaction (HCI) has shifted from emphasizing "Usability" to "Naturalness" to "Emotionality", and the research scope and methodology of HCI design have also changed in this context.

To study these issues, this paper introduces the conceptual product "Family Emotional Decorative Painting", which facilitates people's emotional reflection and establishes emotional connections with their loved ones across time and space through emotional data recording and continuous human-computer interaction.

2. Research and Proposal

From the cave paintings of ancient Greece to the tapestries of ancient Rome, to the murals of the Tang Dynasty in China, to the decorative artsⁱ of the Renaissance, decorative paintingsⁱⁱ are nowadays believed to enhance the well-being and quality of life of family members and have made their way into millions of homes [4]. Under the Artificial Intelligence Generated Content craze, decorative painting has become a popular interface element in research and commercial fields. In the future, decorative paintings will go beyond static devices to open interactive interfaces promoting continuous engagement.

2.1. Desk Research

2.1.1. Affective Computing

For decades, science fiction has often attempted to give machines human consciousness; however, it was only at the turn of the century that researchers first endeavoured to incorporate emotions into the development of artificial intelligence.

In 1986, Prof. Marvin Minsky asked, "The question is not whether intelligent machines can have any emotions, but whether machines can be intelligent without any emotions." [5] In 1997, Picard published a monograph, "Affective Computing", in which he defined affective computing as the computation of emotions, the generation of emotions, and the influence of emotions. The idea is to facilitate more natural interaction between humans and machines [6].

Even though, for a long time, emotions were considered anachronistic in civilized societies, in the last two decades or so, a growing number of theorists have argued that emotions are indispensable for adaptive behaviour [7], have empirical effects on several aspects of physiological development, learning, and decision-making, and are essential elements of credible AI. By one estimate, the emotion recognition industry will grow to US\$37 billion by 2026. For this reason, affective computing as a tool for measuring human emotions (by dividing them into emotional categories) is also opposed by some scientists [8]. The Theory of Constructed Emotion provides a new perspective on the theoretical model of emotion categorization [9], which suggests that emotions are "reactions" to the world rather than "reflections" of it.

2.1.2. Interactive Approaches to Affective Computing

In recent years, Affective Computing has emerged in the field of interaction design, which collects and analyzes users' feelings about products or services through emotional perception, proactively identifies overlooked problems in design to facilitate improvement, and is still most often used in emotion classification theoretical models and dimensional emotion models. However, emotion in interaction design often encourages users to project their emotional connotations on the information they see rather than labelling emotions. TCE will change our understanding of emotion perception and expression in interaction, shifting the focus from accurately "measuring" emotion to "constructed" systems that allow humans to understand and reflect on their complex emotions [10].

Elastique has designed an immersive interactive media installation, Unhate, which recognizes derogatory and hurtful comments on the internet and transforms them into contemporary visual art

ⁱ In the West, "decorative art" appeared as a concept and category of art in the early 18th century, and "decorative art" was mainly used to refer to the field between "fine arts" and "nonarts".

ⁱⁱ The concept of decorative painting first appeared at the end of the 19th century (around 1880) in the Western Arts and Crafts Movement. People put forward "Decorative painting", that decorative paintings are independent creations made by people for the purpose of beautifying the living room or public space. The concept was not limited to style, which could be either classical and traditional or modernist.

that enhances visual stimuli and allows people to reflect on the negative impact of cyberbullying. The Interactive Healing Arts System (IHAS) provides a healing experience through audio-visual art. The system uses facial recognition to understand the user's emotions and, as a result, generates visual artwork accompanied by music and words that relate to the meaning of the emotion. Emotional design involving the body in regulating emotions has become a trend in gaming and interactive art. Jiang uses movement-engaged emotional design to increase the potential of smart textiles to assist users in regulating their emotions.

In these cases, affective computing is applied to emotional interfaces, including emotional engagement, emotional loop interactions, and experience-centred somatic design.

2.2. Design Proposal

2.2.1. System Architecture

After placed a hidden camera and video monitor behind a wooden frame, whose image can be seen through the screen, the image will be activated when approaching the decorative painting. The system estimates the current mood through facial expression recognition and voice emotion recognition and displays a response image until someone approaches the decorative painting again.

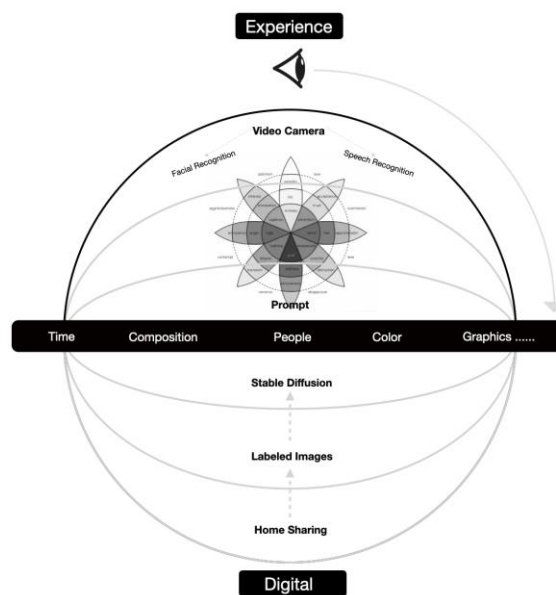


Figure 1: System of Family Emotional Decorative Paintings

2.2.2. Image Data Collection and Labelling

The convergence of social, cloud and mobile computing allows people to have a digital wealth. An example is the photograph. It emerged in the late 19th century to record family history, providing a visual reminder of what they once were and how they have changed. As data scales up and becomes increasingly invisible, how to manage personal and family digital legacies becomes a human-computer interaction design challenge.

Research team recruited three groups of families (12 people) to participate in the study and obtained 24,018 photos from Family Sharing. Research team filtered out screenshots, website downloads, and other photos (8,037 photos), retained only photographs (15,981 photos), and the photos with strong emotional relevance, such as food, travelling scenery, group photos of people, etc.,

were randomly selected (2,400 photos) for style adjustment. Family members were asked to annotate the photos with their emotions. This method has limitations, and the team would like to focus on a smaller range of families in the first stage to learn the understanding of the relationship between photos and family members' emotions in the family unit.

Research team asked the annotators to choose one of the eight emotions to indicate their primary reaction and to provide a detailed explanation of their choice in free text, which included information such as what kind of memories they evoked.

2.2.3. Validation and Evaluation

Research team hoped that conceptualizing users' emotional states and matching them with emotionally evocative images would stimulate emotional reflection and a sense of companionship, especially during negative emotions.

Research team conducted this study through flyer campaigns, recruiting 15 participants to record their experiences. By analyzing the questionnaires, the team found that the interface could bring meaning to the user. However, research team were related to the time of day the participant viewed the decorative paintings, the mood of the moment, and whether the event in the picture had been present. Research team also found that the decorative paintings facilitated connections with loved ones.

3. Conclusions

One research focuses on improving people's ability to express and communicate emotions through emotion recognition, facilitating users' emotional reflection, and stimulating continuous interaction with intelligent products. The second is to explore the emotional value of digital heritage and design ways to categorize and use them through interaction.

Ultimately, it expands the emotional experiences available to people through emotional decorative paintings for the home. A limitation of this study is that the small sample size made it difficult to obtain more prosperous and convincing results.

In the future, team hope that the images in home sharing can be used as a database for Artificial Intelligence Generated Content and generate more creative stylized images by understanding users' personalities through continuous learning of emotional feedback.

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