The most influential and revolutionized fashion era in Sri Lanka began after 1977, and it gradually advanced. Women have come under the power of modernity and they have adapted to appreciate that modification. Thus, Sri Lankan fashion was revolutionized, and women especially adopted most of the styles of world fashion. Looking at fashion in the urbanized sector, this is apparent. However, blindly copying the western way is shallow and self-degrading. Certain Sri Lankan women living in Britain have more concern for tradition than women living in Sri Lanka. Older Sri Lankan women living in Britain wear the sari and modern mobile women were caught between clothing systems and confusing cultural demands. As a result customized sari and hybrid attires of sari combined with western dress became apparent in fashion. The modifications of the sari have reflected this identity during late 20th century. Further, global interest in Asian dress might open new democratic forms of cross-cultural exchange. Furthermore, the sari has been globalized and celebrated within and outside Asia. This globalization allowed for multidirectional cultural exchange. Furthermore, the sari has been globalized and celebrated within and outside Asia. This globalization allowed for multidirectional cultural exchange. Additionally, the sari became combined with westernized clothes. There, the celebrities in western culture wear a strip of cloth with an elaborate design similar to the sari. They wrap it on their shoulder and it hangs down to their feet or, for some, down to their waist.

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The purposive and snowball sampling or referral methods (Flick 2009; Patton 2005) were used to identify and recruit participants with the help of local informants based on the following criteria: they own or have used a mobile phone in previous three months; and are female heads of households. Data collection was conducted between September, 2014 to February, 2015. The participants represent different categories of female heads of households such as widows (due to war, Tsunami and other reasons); divorced/separated/deserted women; never married women; and women whose husbands have migrated elsewhere and living within or outside the country for work or other reasons. Thus, the participants were a diverse group based on their socio-economic status, education, income levels, religion, employment and income-earning status, and age. The project obtained ethics clearance for high risk projects via the Deakin University Human Research Ethics Committee (DUHREC) The Grounded theory method (Corbin & Strauss 2008; Glaser & Strauss 1967;

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Enhancing And Characterizing Paintings: A Computational Aesthetic Approach

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Abstract

The recent developments of the emerging digital media technology have significantly influenced all spheres of life. Some of these technologies have enabled modern computer systems to act, or more precisely to respond as humans especially in the areas where human intelligence is essential, for example aesthetic appreciation of art, music or any other form of fine arts. In the area of Visual Arts, integration of digital images with creative works is one of the key processes. In order to improve their efficiency and achieve high quality in their creative works, designers usually embed digital images of digital paintings adapted by using digital image processing techniques. One of the major requirements that we need to satisfy in this type of applications is balancing the aesthetic quality while maintaining the other aspects such as interpretation, creativity of those creations. Information digitization has resulted in high availability of digital images of painting that belong to diverse categories in the Internet without any intellectual property restrictions. Therefore, it is very important and useful to have image processing applications to capture and to model the aesthetic quality of images, so that the human designer is aware of how the aesthetic quality is affected by different image processing techniques. As the work reported in the literature is significantly little, it is expected to explore this area further in this research with a motivation of developing a computational aesthetic model to deal with visual aesthetic quality of digital images of paintings. Computational aesthetics is the research of computational methods that can make applicable aesthetic decisions in a similar fashion as human can (Florian 2005). Based on the literature survey, Analytic Hierarchy Process (AHP) was selected as the most successful methodology to solve this problem. AHP considers both qualitative and quantitative approaches. The major outcome of the research is the suggested framework to enhance and characterize a painting in the area of computational aesthetics.

Introduction

Aesthetic characteristics are the most important concerns in several areas where human involvement plays a major role in selecting and enhancing a quality output. It is a subject area that everyone likes as it is inbuilt to human beings. With the technological advancement, the computer is used as a tool to perform different types of tasks efficiently. However, it is needed to introduce particular algorithms depending on the nature of the problem using the available techniques in Information Technology (IT).

As soon as measurement comes into concern, there are three questions to be answered: (1) what to measure; (2) how to measure; and (3) the quantitative representation of the measurement results. Unlike in many other design fields above, three questions can hardly be answered in the aesthetic design field at a first glance. There are a couple of reasons behind the situation. First, a common belief is that human mind is "intangible"; any attempt to quantify and measure human aesthetic sense is considered futile. Second, although aesthetics has been qualitatively studied in many non-engineering fields, such as psychology, sociology, philosophy and even anthropology, it has not been studied that much in computer science field. Third, there are also challenges in dealing with race, culture, religion, age, gender and so on. Fourth, a consumer's aesthetic preference contains dynamic patterns which change over the time; they are called "trend" which are difficult to measure and predict in an accurate manner. Despite the issues behind this research, major aim of this research is to find any model or approach to compute the aesthetic value of an artwork like a painting that will be of great use for the efficient and effective evaluation and enhancement of the aesthetic characteristics of such products.

Literature Review

In this research, many existing models and frameworks in the area of computational aesthetics were studied with the aim of identifying a possible approach for characterizing and enhancing a painting. Although several attempts have already been made for assessing and computing aesthetic values, the effort for the enhancement of aesthetic values is still in its infancy. Attempts have been made in the areas of landscape planning and management (Tyrvainen & Tahvanainen 1999), computer aided conceptual design (Breemen et al. 1998; Knoop et al. 1998; Machado & Cardoso 1998; Pham 1999), garment and fashion industry (Helena & Lubbe 2008; Hethorn 2005), entertainment industry (Wages et al. 2004), etc.

The three main approaches identified and proposed were the models associated with AHP, Machine Learning and Extended AHP. Ultimately, it was justified that Extended AHP method produces the most suitable solution for the current research problem.

Although computing aesthetics or aesthetic enhancement would require for several areas like product design, garment and fashion industry, our research is mainly concerning the area of paintings in the field of visual arts. This study focuses solely on the aesthetic design or preferences of the targeted population, society or human being by taking the compact view of individual's aesthetic preference.

It is therefore assumed that aesthetic preferences are either homogenous which means there are common aesthetic preferences that are universal across all members in a group, whereas each member in the group has its distinctive aesthetic preferences in addition to the common aesthetic preferences. The common aesthetic preferences are focused in this study. Distinctive aesthetic preferences which vary upon an individual consumer's profile (race, culture, religion, age and gender) are temporarily excluded in this study but it can be considered as a future enhancement of this research.

Methodology

There are two major research methods that are employed by researchers for their various problems to be worked out. They are called qualitative approach and quantitative approach. Depending on the research problem, availability of certain theories or concepts, available observations or objectives of the research, most suitable approach will have to be selected at the beginning. At the same time, it is required to balance pros and cons of those two approaches when the decision is taken. Another important point is the hypothesis to be formulated for the particular research.

Qualitative research is for exploring and understanding the meaning of individuals or groups ascribed to a social or human problem and it is especially effective in obtaining culturally specific information about the values, opinions, behaviors, and social contexts of a particular population.

Data are collected by using several research design mechanisms such as field researches, literature reviews, and informal discussions with participants, more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies. Under the qualitative approach, there can be various types of research designs like illustrative method, analytic comparison, and network analysis.

The quantitative research method involves a perfect measurement and data which is in the form of numbers and statistics (Atieno 2009). There are two methods of research designs applicable with quantitative method (Creswell 2003). Survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. Experimental design is used to test the impact of a treatment (or an intervention) on an outcome, controlling all other factors that might influence such an outcome.

Due to the inherent features of those two major approaches, one can't refrain from getting disadvantages in terms of data gathering, data analysis or generalization as a theory within a particular area of study. Since last decades, there have been some problems and dissension arisen among the research methodology which was used in educational research. Some authors have called this period an era of "paradigm wars and their aftermath" (Hammersley 1992). Consequently, there has been a criticism on the quality of the practices which make the educational research in all countries (Niglas 2004). These methodological issues have been affected directly to the nature and functions of educational researches. Qualitative and quantitative

researches often operate with a different set of assumptions about the world and ways of learning about it. These assumptions may be seen as mutually exclusive. Even though, researchers are often taught to master only one type of method, due to the methodological issues in educational research sector, there is a requirement to find an alternative approach by combining two major approaches.

AHP methodology

AHP aims at computing weights of selected elements. Weighting of elements has two major advantages: It helps to prioritize the elements to determine key elements and it can be used to make more accurate decisions. It derives ratio scales from paired comparisons. The input can be obtained from actual measurements such as price, weight, etc., or from subjective opinions such as satisfaction feelings and preference.

All steps related to AHP technique were applied with a view to finding the painting which is having the best visual aesthetic value out of the other selected paintings. Then, by applying the reverse engineering technique, it is apparent that there should be computed weights of factors (parameters) in the selected painting to achieve such quality product when compared to others. As a result of that, key factors can be identified and the weights of those elements could be utilized for the purpose of enhancing other compared digital images of paintings to the same level as to the level of selected one in terms of visual aesthetics value.

Defining the decision problem

Following first step in AHP method, problem was defined as "choose the best painting of highest visual aesthetic value". Then, the conceptual framework was established by decomposing the main objective to criteria and sub criteria (levels and sub levels).

Developing a conceptual framework

This involves decomposing the complexity of the problem into different levels or components and synthesizing the relations of components. Specifically, decomposition of a problem refers to the aggregation of similar information into different groups while the synthesis of relations is the integration of them in a systematic way.

Setting up the decision hierarchy

This is the most critical step in this methodology as the selection of most important factors and sub factors are playing the major role in this scenario. Therefore, a preliminary survey was conducted by selecting experts in the subject area for the purpose of setting up the decision hierarchy. As a result of that, expert knowledge was gathered to establish the hierarchy of factors and alternatives. By analyzing that preliminary survey and by referring some of the research papers related to the area of study, it was able to select parameters (attributes) that are most significant to the visual aesthetics value (form) of artwork (painting). They are color, contrast, brightness, shape and texture (brushstroke) (figure 01). In addition to that, composition and style will also be another two attributes that the artist should concern at the initial designing stage of his/her painting product.

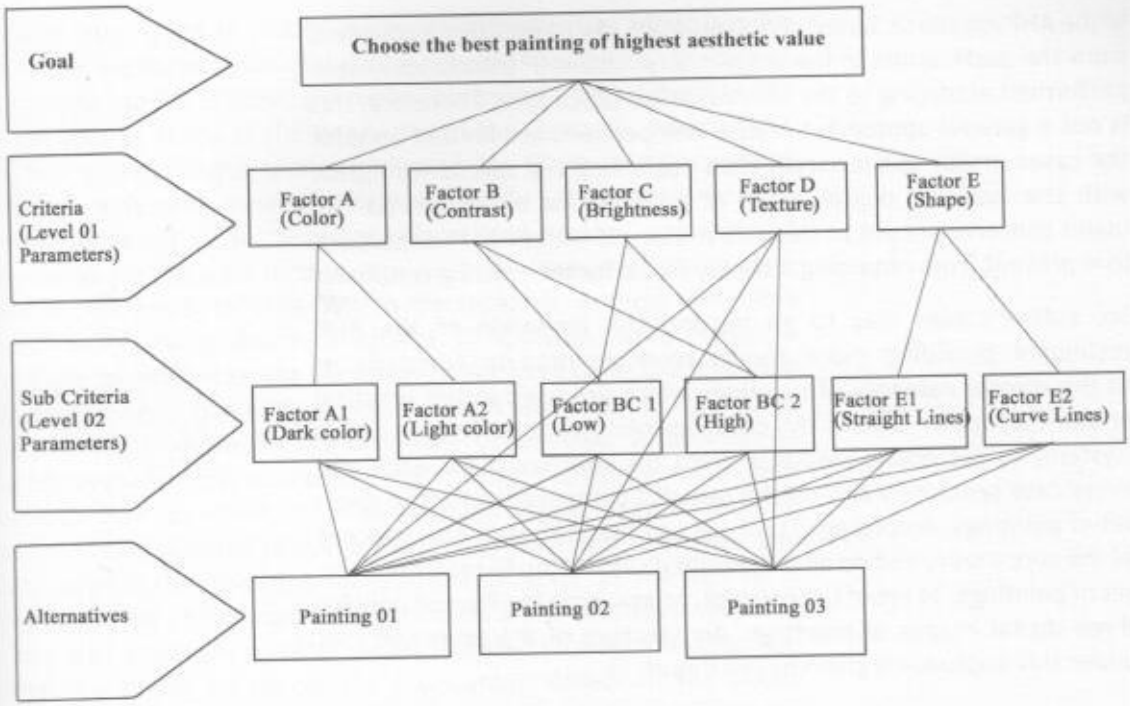

Figure 1: AHP Architecture (Assumption: comparing 3 paintings of a particular group)

This survey was useful to identify the diverse existing views on the meaning of aesthetic value and the techniques used by practitioners to enhance the aesthetic value. Specially, in the enhancement of aesthetic value, only parameters which can be adjusted as low level attributes should be considered. In addition to the above two findings, it was able to reveal that there are some aesthetic principles which can be balanced using the different contributions of those attributes. According to Pham (1999), nine aesthetic principles have been identified to fine-tune interaction between the aesthetic properties and the design parameters. Nine principles are as follows.

- Balance
- Proportion
- Alternation
- Continuity
- Solidity
- Simplicity
- Dynamics
- Rhythm
- Dominance

When these aesthetic principles are referred, it is clear that they are quite abstract level (high level) ideas and most of them are representation of a compact view of low level factors related to the form of a painting. Therefore, they are difficult to be measured or to be quantified in terms of aesthetics. Thus, it is expected that the artist should concern about this and balance them at the designing stage of his/her painting or any other artistic product. What we are really considered in this research, however, is to quantify (or to find weights) the most critical low-level attributes (factors) by using a suitable technique or approach.

Extended AHP method for painting comparisons

In the AHP approach, based on the problem identified, data is collected from the participants in the subject area and AHP calculations were performed according to the mathematical procedure. Therefore, this is not a general approach because comparisons are limited only for the cases similar to the survey data neglecting the specialties inbuilt with the available digital image of paintings to be compared. So, major concerns set out to the core reasons identified in thisapproach that prevent from obtaining a steady result for the existing problem.

So, author's plan was to go beyond the limitation of the AHP technique providing more rooms to accommodate comparisons to the diverse category of paintings which are used in the practical artwork creations. One of the possible solutions is to develop a tool (system) to get online response from the user/users for each and every case separately and do the relevant comparisons for the given set of paintings. Accordingly, tool will use the proposed AHP concept as the core theory and do all the required calculation to rank the given set of paintings. To proof the concept, comparison has limited only for three digital images of paintings. Architecture of the proposed tool under this approach is given below (figure 2).

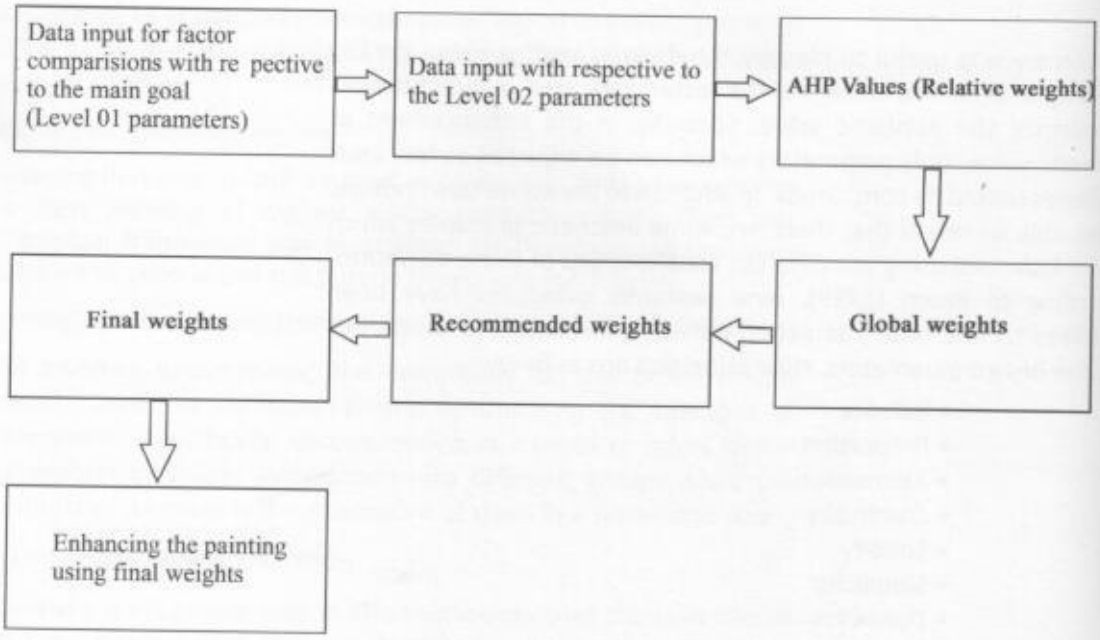

Figure 2: Architecture of extended AHP model

Using this extended AHP method AHP values can be calculated. Based on the values final weights can be calculated to enhance the paintings.

Discussion & Conclusion

Authors attempted to justify the most critical set of attributes for the visual aesthetic value of a digital image of a painting. Therefore, they conducted a preliminary survey by using a set of participants in the area of study at the beginning of the research. Additionally, another three surveys were conducted for three selected groups which have dynamic views in this area of study. Ultimately, they were able to come with a decision that color, shape, texture, contrast and brightness are the main factors required to be considered in the high-level for the aesthetic area. Within the research, Authors were able to develop a new approach called AHP. By applying this technique, a hierarchy of attributes was set up and data were collected following the procedure of the AHP theory. Finally, it was possible to identify the individual parameter contributions of selected parameters in the hierarchy to achieve the painting which is having the best visual aesthetic value compared to other paintings. Then, an extended AHP approach was selected to utilize the strengths of AHP technique and to go beyond the limitation up to a realistic level for the benefit of user. Following an extended AHP approach, a tool was developed and it was able to obtain a set of weights related to selected attributes which are based on theoretical foundation. Based on the above justification, it can be concluded that the authors have achieved a good quality result for the research problem. This work is mainly meant to provide a new framework to characterize a painting in terms of visual aesthetic quality. Further, it aims to inspire more interests in this new fundamentally important and challenging research area.

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