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# Realization of Computer-Aided Art Design System Based on the Measurement and Analysis of Image Aesthetics

Xinxin Yuan
College of Art, Suzhou
University of Science and
Technology, Suzhou 215000
China

**Abstract**:This paper analyzes the computer-aided art design system based on the image aesthetics measurement, and proposes a new image salient area detection algorithm. After improving the original method, the new algorithm obtains a new adaptive pre-segmentation method, which can adaptively set the number of blocks according to the complexity of the image content, making the segmentation more uniform and reasonable. A comprehensive image aesthetics design model is calculated, which includes two parts: aesthetic classification and score prediction. The image features extracted by this model include low-level visual features, high-level aesthetic features and regional features. Using the quadratic programming optimization function to solve the optimal grid composition position point.

**Keywords**: Computer, Art Design, Image Aesthetics, Aesthetics Measurement

## 1. INTRODUCTION

Aesthetics started as a philosophical question of beauty and ugliness. In the field of art and photography, people will unconsciously judge the beauty and ugliness of a picture when viewing it. However, because the division of beauty and ugliness is subjective, everyone will have their own opinions on whether a picture looks good or not. But with long-term accumulation of observation and systematic analysis, people slowly discovered the characteristics and laws of beauty in beautiful pictures, cultivated aesthetic awareness, and gradually established the discipline of image aesthetics. Nowadays, image aesthetics, as an important subject, has important guiding significance in painting, photography, and graphic design [1-6].

For example, professional photographers will use a variety of aesthetic principles to create a variety of pleasing artistic photos. As a symbol of this rapidly developing era, it is obvious that multimedia is widespread in people's daily lives. Therefore, this era has been given the title of "image era" or "visual culture era" by many scholars because of the flood of images, video and audio. The importance of images reflects the ever-increasing situation in people's lives. It occupies a pivotal position in important fields such as communication, education, medicine, and economy. At the same time, it also allows people to enjoy more art and beauty. Images (including video and images) can not only play an irreplaceable important role in modern social life, but from an aesthetic point of view, it also has its special meaning and value. Evaluating images from the perspective of aesthetic value is a manifestation of the transformation of cultural information from material to spiritual. This has inspired many scholars and researchers to think about images from an aesthetic perspective. The aesthetic value of images has become another important aspect that people pay attention to in addition to the information attached to the image itself. With the development of related technologies such as computer vision and pattern recognition, the concept of computable aesthetics has gradually been proposed in the field of computer science [7-14].

This subject hopes to study the computable method of image aesthetics, so that computers can simulate the human self-understanding, derivation and calculation of the aesthetic value of images, and make corresponding aesthetic decisions. Aesthetics is a concept from a philosophical category. Generally speaking, things that conform to human aesthetic thinking and habits can always bring people a positive feeling. At this time, we call it aesthetic. In daily life, judgments based on aesthetic feelings are everywhere. People often make decisions based on subjective aesthetic judgments in communication, product selection, web interaction, film and television, and advertising and marketing. On social networks, the impact of aesthetic judgment is equally profound. Social networks have deeply penetrated into the lives of most young people. Uploading and sharing images can often reflect a person's aesthetic appeal and life style, and at the same time affect people's spiritual life. The research of computer image aesthetics has made great progress in the past ten years [15-21].

Since 2005, the European Society of Graphics has held the International Conference on Computational Aesthetics in Graphics, Visualization and Imaging (Computational Aesthetics in Graphics, Visualization and Imaging) and the famous International Conference on Image Processing (ICIP) every year since 2005. In 2008, I also began to pay attention to the aesthetics of images, and organized a discussion topic on image aesthetics and emotions. In recent years, more and more image academic conferences have gradually paid attention to the research of image aesthetics, including Computer Vision and Pattern Recognition (CVPR), International Conference on Computer Vision, and International Conference on Computer Vision. International Conference on Image Processing. The research reports in these conferences hope to realize aesthetic analysis by combining philosophy, psychology, applied arts and computer science, and establish a bridge between human understanding and evaluation of works of art and computer digital analysis.

Computational Image Aesthetics (Computational Image Aesthetics) is to allow computers to simulate human vision and aesthetic thinking to make aesthetic decisions on images in order to build a bridge between computers and visual art

works. This research is a branch of computational aesthetics in the image field and an important part of high-level (abstract subjective level) image semantic research. The purpose of this research is to enable computers to independently perform quantitative analysis, calculation and evaluation of the "beauty" of images, such as Evaluate the aesthetic index, judge the aesthetic style of the painting, etc. [22-24]

# 2. THE PROPOSED METHODOLOGY

## 2.1 The Image Aesthetics Analysis

Image aesthetics can be defined as the equivalence caused by people when observing images. A low-level local feature descriptor of images is designed to evaluate aesthetic interest. Computable image aesthetics is computational aesthetics in terms of image aesthetics. Upward feature extraction is an important exploration of ideas and solutions. Its research purpose is to hope that computers can study image aesthetics. Another direction is to simulate human vision and aesthetic thinking based on aesthetic rules, and then use the rule of thirds for aesthetics, image beautification, etc. Diagonal dominance and other aesthetic constructions, to build a bridge between computers and visual art works.

Make the rules of the calculation graph and realize the beautification of the image by adjusting the layout of the original image; the machine can automatically analyze and calculate the "beauty" of the image in a quantitative manner. Apply image aesthetics to image modification and evaluation, such as evaluating aesthetics In the reconstruction of the aesthetic style of the index and judgment, the one-third rule in aesthetics is used to change the image in the image; due to the deviation of the human individual's evaluation criteria for aesthetics, the aesthetics of each social image needs to be justified Multiple users participate in the decision. Therefore, based on the image data with a large amount of user evaluation information, this article organizes and builds the library needed for this topic. Because some key areas in the image contain the content that dominates the image theme, it is necessary to divide the image into areas to distinguish the whole and the key areas, and conduct separate research. In addition, we have classified the features, the main categories are: low-level visual features, high-level aesthetic features, and regional features. Different classifications represent the characteristics of different levels of the image. Due to the large number of features and the amount of calculation, this article parallelizes them according to certain strategies. After feature extraction, supervised training and learning of features are required to obtain a classification model.

Through the aesthetic analysis, calculation and evaluation of the image, understanding the position of the user's subject target or spatial reconstruction of the image, to enhance the aesthetic feeling of the photo, and help find the most suitable for the user's psychological needs and have a positive emotional impact on the visual beauty of the film. Goals and plans. Generally speaking, the research on image aesthetics is of great significance to computer interaction at home and abroad.

## 2.2 The Computable Image Aesthetic Measure

At present, the algorithms for extracting low-level objective features (such as color, texture, shape, etc.) from images have become more mature, but they are evaluated aesthetically. Representing the internal order of things, and the purpose of extracting image features that represent the internals of things requires a combination of art, psychology and complexity of photography (showing the basic theories related to aesthetics and the internal order and duplication of things, and finding out the perception of people It is closely related to aesthetics. It is considered to be the embryonic form of computational aesthetics. Although it lacks related related features and uses appropriate methods to describe it based on specific calculation methods, these theories have very aesthetic image feature extraction for related work. The important guiding significance of the core part of image aesthetics research the image features calculated in this article include low-level visual features, high-level aesthetic features and regional features for the image based on the high-level expression.

Because the low-level visual features are relatively simple, some implicit connections between aesthetics and features in the image cannot be expressed intuitively. Early experiments also show that the experimental results of pure low-level features are not ideal. Compared with this bottom-up aesthetic evaluation method based on low-level features, some studies have proposed the use of aesthetic rules to extract high-level aesthetic features, and more ideal results have been obtained. These characteristics are generally extracted from theories related to aesthetics, photography, and art. This article summarizes the existing research results, combining aesthetic psychology, photography rules, aesthetic measurement, etc., which are related to human aesthetic perception, and calculates a series of characteristics. It is verified by experiments that these high-level aesthetic features can better describe the aesthetic information of the image. For the image aesthetic score prediction process, training and learning are carried out based on the audience's psychological aesthetic score data, and the aesthetic score of the image is predicted.

Therefore, the prediction of the aesthetic score of the image can be achieved through a regression analysis prediction algorithm. The purpose of regression analysis is to predict the value of other variables through known variables and find the optimal model that relates input variables and output variables.

## 2.3 The Computer Aided Art Design of Image Aesthetics Measurement and Analysis

Graphic design works follow the above geometric composition principles and introduce a sense of cohesion to the work, so that every element of the work has a sense of visual belonging. These geometric aesthetic principles are not only the key to understanding a large number of graphic design works, but also the aesthetic indicators for analyzing and judging graphic design works. The paper proposes a graphic design visual aesthetics computer-aided analysis system that uses the above geometric aesthetic principles for analysis.

After extracting features from the image, add high and low aesthetic labels, and use SVM and SVR algorithms for training to obtain aesthetic classifiers and aesthetic evaluation models. The existing visual psychology research shows that the obvious area can attract most of the observer's attention, because the salient area contains most of the useful information.

# 3. CONCLUSIONS

This article realizes the aesthetic analysis of images, and the research results can be applied to semantic-based image retrieval, image aesthetic quality evaluation, photography aesthetic prediction and correction, artistic work style analysis, human-computer interaction, and design,

photography, Advertising and other fields. For example, a picture aesthetic analysis and evaluation system can be built on the Android platform of a mobile phone to realize the automatic evaluation of the aesthetic value of photos or pictures by the aesthetic thinking of a machine simulating humans. First, the watershed segmentation algorithm is used to segment the image, and then the segmented areas are merged according to the brightness and color characteristics.

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