Research Article

Research on the Art Value and Application of Art Creation Based on the Emotion Analysis of Art

Dutao Wang

College of Fine Art, Capital Normal University, Beijing 100048, China

Correspondence should be addressed to Dutao Wang; 2181201008@cnu.edu.cn

Received 13 December 2021; Revised 1 January 2022; Accepted 3 January 2022; Published 22 January 2022

Academic Editor: Xin Ning

Copyright © 2022 Dutao Wang. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

The ultimate embodiment of the value of the art creation process is artistic value, which is the embodiment of the greatest value created by art. Art creation is a form of art culture expression. To make their works more cultural and artistic, creators incorporate their personal creative style and ideological concepts. The ultimate expression of the value of the art creation process is artistic value, which is the embodiment of the greatest value of art creation. It provides a useful method for conducting digital research on human artistic works and has important implications for the protection and innovation of such works. In order to better realize artistic work research and innovation, this article primarily organizes and analyzes the literature on art classification and sentiment analysis currently available in the United States and abroad. This paper proposes a Python-based machine learning art emotion analysis method to investigate the issue of art emotion analysis. This program can achieve better results in analyzing sentiment orientation through a large number of experiments, and it is more efficient than a traditional weighted art sentiment analysis algorithm. This paper proposes a conditional random field extraction of core sentences-based art sentiment analysis algorithm. The conditional random field is used to locate evaluation objects from which core sentences can be extracted, and an algorithm for sentiment sentence emotional polarity weight synthesis is proposed. Finally, experiments are used to compare the algorithm. The algorithm’s stability and effectiveness are demonstrated by its accuracy, recall, and F-value.

1. Introduction

The research of artistic sentiment analysis has broad prospects for exploration and application and can create huge social and economic benefits. How to analyze the sentiment tendency of long artistic works is also an extremely challenging research work, and it is also a hot spot for future artistic sentiment analysis. One of the difficulties: regardless of the aspect, the key to the analysis of public opinion is the analysis of artistic sentiment. The results of artistic sentiment analysis of works of art are usually divided into three types, namely, positive, neutral, and negative, which can also be regarded as a three-category problem. After the improvement of material living standards, people pay more attention to the improvement of the quality of spiritual life, which happens to provide art creators with more materials. At present, regarding many famous art creation masters, their works started to be integrated into all aspects of people’s lives. Art: the essence of value refers to the artistic personality and style of the author represented by a piece of art [1]. The more typical the personality, the higher its artistic value. The artistic value of modern art creation mainly includes historical value, development value, education value, and economic value, and they are relatively independent. Art works refer to flat or three-dimensional plastic works of art, calligraphy, sculpture, etc., which are composed of lines, colors, or other methods, which essentially belong to the category of art. With the rapid development of society, people’s aesthetic values have also undergone great changes, and the creation of fine art works has become more diversified [2]. In general, modern fine art works mainly involve pure fine art and practical works. Art works: these are two types of art that modern creators are actively pursuing [3,4]. The earliest art creation is limited to the guidance of research theory, and individual creation is carried out in accordance with the results of theoretical knowledge, and
finally a certain fixed form of work is generated. The pure art function refers to an independent art work that can only be viewed by people. This kind of work does not contain any other external elements. The most representative works of pure art are oil paintings, Chinese paintings, prints, watercolors, etc., all of which are intuitive expression of artistic creation thoughts [5].

This article systematically summarizes the art work database commonly used in the current art work image research; based on the stroke characteristics, color characteristics, shape and texture characteristics, and white space characteristics of the art work image, it summarizes in detail the feature extraction techniques and features of different works of art. Research status and development of classification methods briefly combed the evaluation methods commonly used in the classification model of art works, analyzed the commonly used evaluation indicators in current research, mainly from the perspective of color characteristics, and expounded the research of artistic emotion analysis of works of art Progress, providing effective ideas for the emotional analysis of traditional works of art.

For a larger art work, it is the key emotional words in the work that play a key role in the analysis of its emotional orientation. At present, there is no sentiment dictionary that perfectly matches all phrases and sentences in the international research on sentiment dictionaries, and there is almost no sentiment dictionary that can achieve perfect matching in this way [6]. This paper adopts the current mature sentiment dictionary to construct a new sentiment dictionary and proposes a sentiment dictionary expansion algorithm based on Stanford semantic tree. It gives a prospect of the future research trend of art sentiment analysis and puts forward the challenges of related method improvement. Therefore, how to design a high-quality emotional dictionary is an extremely important and basic work in the analysis and research of emotional tendency of artistic works. The research on this subject has important academic value and broad practical significance.

2. Related Work

Generally speaking, the historical value of art creation usually depends on the typical characteristics of a certain era and the existing quantity. The current practical application of art creation art value mainly includes the application of design, production, and creation in three aspects. Design application refers to the potential artistic value of art creation products that can provide ideas and references for subsequent artistic creations, thereby promoting similar artistic creations in the future.

The artistic sentiment analysis of English art is relatively mature. And the other is the artistic sentiment analysis based on machine learning. In the direction of artistic sentiment analysis algorithms using statistical sentiment dictionaries, previous studies [7–9] proposed a sentence meaning analysis model based on corpus data, using a set of basic words in a certain field and a related corpus as the input of the model. The final result is a sorted list of words related to the field. And they finally concluded that the accuracy rate reached 82% when each conjunction is independent. In the research of art sentiment analysis based on machine learning, commonly used algorithms in literature [10] propose that illustrations belong to art, which appeals to vision. Art and illustration are closely related. The application of art to books has created a new art form. Illustration has also extended the art of art to other fields through books. If it is separated from art and art to talk about illustration, it loses the creativity of art. Illustration art has many similarities with art in terms of tool use, technical performance, composition, color display, etc. It is also similar to art in terms of artistic concepts and ways of thinking. But the two are not exactly the same, and there are some differences.

Literature [11] proposes extracting and analyzing evaluation phrases in art, as well as using artificial correction to help machine learning create a mix of emotional words and auxiliary adverbs. To train the sentiment classification model of SVM, use website reviews as the training set and the bag-of-words model and sentiment words as features. Literature [12] constructs an emotional vocabulary using a combination of artificial and computer methods. This vocabulary focuses on the article’s structure, summarizes nine semantic features that influence the emotional polarity of emotional sentences, and conducts artistic sentiment analysis research. This is a first attempt [13]. Literature art and art design are inextricably linked, because they both follow the rules of art creation and strive for greater artistic achievement. Literatures [14,15] proposed a grammatical and semantic tree-based algorithm for calculating emotional polarity units by machines. The algorithm employs computers to automatically generate sentence grammar paths that describe the relationship between emotional words and their modification. Experiments yielded positive results. For the art emotion analysis research of Chang Art, literature [16] used the SO-PMI-IR algorithm to compare and analyze the effects of NaiveBayes and SVM in the art emotion analysis of Chang Art on film reviews on the Internet. The final experiment proved the characteristics of the art. When the extraction effect is better, the accuracy of the Naive Bayes classifier is higher. References [17,18] proposed that Jieba word segmentation still supports dictionary customization. With word segmentation, users can customize and add dictionaries according to their own needs, which can make Jieba word segmentation more comprehensive. Although Jieba word segmentation has a new word discovery function, the accuracy of manually adding new words will be higher. In this way, the previous sentiment dictionary can be added and set as a custom dictionary.

The commonly used techniques in artistic sentiment analysis mainly include the construction of sentiment dictionary, art work preprocessing technology, Stanford semantic tree, and the conditional random field used to extract evaluation objects, which are the analysis of the artistic sentiment analysis algorithm used in the subsequent artistic sentiment analysis, laying a solid foundation. This paper proposes an art sentiment analysis scheme for long art works based on CRF extraction of core sentences. First, it introduces the specific architecture of the system and then proves through experiments that the system has achieved good performance in the art sentiment analysis of long art works. Effect.
3. The Value Analysis Model of Artistic Works Based on the Emotional Analysis of Fine Arts

3.1. Emotional Dictionary Construction. For a work of art, it is the key emotional words in the work that play a key role in the analysis of its emotional tendency. At present, regardless of domestic or foreign sentiment dictionary research, there is currently no sentiment dictionary that perfectly matches all phrases and sentences, and Chinese is more complicated than foreign languages. There are polysemous and ambiguous sentences, and it is impossible to achieve perfection in this way. Matching emotional dictionary [19]; therefore, how to design a high-quality emotional dictionary is an extremely important and basic work in the analysis and research of emotional tendency of artistic works. How to design a high-quality emotional dictionary is an extremely important and basic work in the analysis and research of emotional tendencies in artistic works. The main process of the artistic sentiment analysis method designed in this paper is shown in Figure 1.

3.2. Artistic Sentiment Analysis Process. Artistic value belongs to an abstract concept. It has no fixed form of expression and is completely measured by the author’s creative achievements. However, as long as the art creator is firmly committed to the inherent meaning of artistic value and guided by this profound artistic concept, he can apply the process of creative guidance. Taking practical art works as an example, they are often used in the decoration and decoration design of buildings. The shaping of such works is guided by artistic value. The designer should combine the specific style of the building body to compile the most artistically valuable solution.

Based on this, this article uses computer to check HowNet and NTUSD thesaurus to extract emotional words that are not included in DUTIR. Here, the first 10 phrases of the very file, the more file, and the most file are extracted to form three comparative thesaurus, and then using DUTIR sentiment vocabulary is based on traversing the HowNet and NTUSD vocabulary to filter out sentiment words not included in the DUTIR vocabulary. For these extracted DUTIRs that do not contain sentiment words [21], compare each of the three vocabularies separately. The word combination is searched on the Internet, and the number of search entries is counted. A crawler is written here to automatically crawl the number of search items and then compare the word in which file has the most search items in the comparison dictionary and then divide it into the phrase of the file. The specific process is shown in Figure 2:

3.3. Evaluation of Works Extraction. Scholars have conducted research on deep learning-based artistic sentiment analysis, as well as various machine learning-based explorations. The machine learning model can express complex relationships in a variety of ways, estimate posterior probability, run quickly, and perform well even when data is noisy. As a result, machine learning methods have become increasingly popular in the field of artistic sentiment analysis. On a directed acyclic network, the same weight set is applied recursively, but the input segment is a tree structure [24].

Because they explore tree structures and try to learn complex compositional semantics, convolutional neural network models [25] are language-driven. A selection tree and a dependency tree are part of the recurrent neural network’s tree structure. On one hand, leaf nodes represent words, internal nodes represent phrases, and root nodes represent the entire sentence in the selection tree [26]. In the dependency tree, on the other hand, each node can represent a word that is linked to other nodes via dependent connections. A weight matrix is used to calculate the vector representation of each node in a recurrent neural network from all of its child nodes.

4. Evaluation Method and Artistic Value Analysis Based on Art Emotion Classification Model

Art work classification models generally divide the sample data into training samples and test samples. Different sample sizes use different methods. When the sample size is large, the K-fold cross-validation method is often used. Otherwise,
the self-service method or the leave-one method is used to achieve the classification. In the actual classification task requirements, the confusion matrix can represent the real results and predicted results of the sample in 4 situations: true example (TP), false positive (FP) example, false negative (FN) example, true negative (TN) example; so, the precision rate $P$ refers to the ratio of the number of samples that are predicted to be true and that are actually true to the number of samples that are predicted to be true, that is, $P = TP / (TP + FP)$, and the recall rate $R$ means that the prediction is true, as well as the ratio of the number of samples that are actually true to the number of samples that are actually true, that is, $R = TP / (TP + FN)$. The precision rate $P$ emphasizes the proportion of correct predictions in the results that have been predicted to be true, while the recall rate $R$ focuses on the proportion of samples that are predicted to be correct in all samples that are true. Therefore, these two evaluation indicators are generally opposed to each other; that is, the recall rate is usually lower when the precision rate is high, and vice versa.

There will be one-sidedness when evaluating the prediction performance of the model with precision or recall. The $P-R$ curve can be used to measure the model more accurately, as shown in Figure 4.

Judging by the metric, the larger the value, the better. It is the harmonic average of precision and recall. In different
task requirements, the degree of emphasis on precision and recall is different, which can indicate a preference for these two indicators.

The ROC curve is called the receiver operating characteristic curve, as shown in Figure 5.

To create the ROC curve, the FPR and TPR values are calculated separately. The study discovered that the closer a model’s ROC curve is to the upper left corner, the better the model, and the more generalizable it is. For different models, if the ROC curve of the curve model in Figure 4 can completely cover the ROC curve of the curve model in Figure 5, the curve in Figure 4 is better than the curve in Figure 5; if the curve in Figure 4 and the curve in Figure 5 intersect the ROC curves of the two models, comparing the area under the ROC is a more reasonable judgment method. The model’s performance improves as the area grows larger. This region is known as AUC [27].

The two major error rate and accuracy indicators, precision rate $P$ and recall rate $R$, are used to evaluate the classification of art works. The majority of studies yielded positive classification results. The accuracy or confusion matrix is used to evaluate Western art classification: because the total number of sample data for Chinese traditional art is small, most studies rely on precision and recall indicators to assess their findings. Furthermore, the image database used in the various research documents of Chinese and Western art is different, as is the total number of samples. As a result, more research is needed to accurately assess the classification model’s benefits and drawbacks.

5. Analysis of the Tendency of Artistic Value
Based on the Emotional Analysis of Fine Arts

5.1. Logistic Regression Analysis. Logistic regression is also known as Logistic regression analysis. The classification method is to use an optimized algorithm for classification. Because of the simplicity and efficiency of the algorithm, it is widely used in practical applications. It is to directly establish a model for the possibility of classification, without assuming the data set in advance, so as to avoid the problems caused by the assumption of the distribution error, because it is modeled for the possibility of classification, so it can not only predict out of the category, you can also get the probability of belonging to the category [28].

The classification function required by Logistic regression should be able to accept all inputs and then get the classification results, for example, output 0 or 1 in the case of two classes. The Sigmoid function has similar properties, and its formula is as shown in the following formula:

$$\sigma(Z) = \frac{1}{1 + e^{-Z}}.$$  \hspace{1cm} (1)

The above function is shown in Figure 6 in the coordinate system:

The Sigmoid function will resemble the Heaviside function if the abscissa increases significantly. As a result, when designing the Logistic regression art sentiment analysis system, multiply each feature by the corresponding regression coefficient, add and sum their values, and finally enter the value into the sigmoid function to get a value greater than zero and less than one as a number, data greater than 0.5 is divided into one category, and other data is divided into categories, so logistic regression analysis is actually a probability estimation.

5.2. Naive Bayes. The use of probability theory for artistic sentiment analysis is the basis of many machine learning artistic sentiment analysis algorithms, and the naive Bayes classifier is one of them. The basis of this algorithm is that there is a large uncertainty factor in subjective human judgment, which was opposed by many statisticians at the time. The basis of Bayesian decision theory is conditional probability. Conditional probability refers to the probability of event A occurring when event B is known to occur. If you know the probability of event A under the premise of event B, you can use Bayesian probability to calculate the probability of event B when event A occurs; the formula is as follows:

$$P(x|y) = \frac{P(y|x)P(x)}{p(y)}.$$  \hspace{1cm} (2)

The naive Bayes algorithm assumes that all feature conditions are independent of the classification algorithm based on Bayes’ theorem. In general, the principle of the Naive Bayes algorithm is that, under certain conditions, if there are more data classified into this category, it is judged that it is most likely to belong to this category.

In the actual use of Bayesian classifiers to perform artistic sentiment analysis on documents, document data needs to
be preprocessed. Here, all words appearing in the document can be used as the data feature vector, and the number of entries in each text can be counted as the data vector, so that a text can be processed into a list of integers, and the length is the number of all entries.

6. Evaluation Experiment of Art Value Model Based on Art Sentiment Analysis

6.1. Experimental Data Source. A web crawler system was used to create the corpus for this article. The system makes use of the Scrapy framework, which includes features like filtering and checking for duplicates. Different crawling rules are formulated for each website’s design mode by customizing CrawlSpider’s crawling rules. Despite the high workload, it can effectively filter out the useless information on a web page, such as advertising, special characters, and address links. Wait: the research included 4,000 works of art, as well as news and commentary on science, technology, economics, and society. The table displays the total number of different art works. The content of the works of art varies; some contain the entire work of art, while others are filtered by crawlers to remove only a portion of it. The specific number is shown in Figure 7.

6.2. Evaluation Standard. The evaluation criteria for this article are time efficiency, precision, recall, and F-value, also known as comprehensive metrics. In this experiment, a thorough evaluation of the experimental results is critical. In the fields of artistic sentiment analysis and text processing, the time efficiency, accuracy, recall rate, and F-value selected are the most common and popular. Everyone recognizes the evaluation index. These four indicators are all based on the artificial emotion polarity judgment labeling results. The artistic emotion analysis method is better if the final calculation result is closer to the artificial judgment data. Accuracy, recall, and F-value have all been widely used in previous studies on natural language processing to reflect the effect of realization, so these indicators are used in this study as well.

6.3. Experimental Results and Analysis. First of all, this article uses HowNet and NTUSD thesaurus to replace the thesaurus used in this article for comparative experiments, and finally the result shown in Figure 8 can be obtained.

As can be seen from the figure, after using the sentiment dictionary designed in this article, compared with HowNet and NTUSD thesaurus, the accuracy, recall, and F-value have been significantly improved. The traditional HowNet sentiment dictionary does not grade the intensity of sentimental polarity of sentiment words. When judging simple sentences, because the emotion expression in simple sentences is single, the effect will not be too bad, but the accuracy and recall rate will decrease in complex sentence patterns a lot.

Because the number of words in the NTUSD thesaurus is insufficient to cover all of the emotional words in the data set, it performs slightly worse in terms of accuracy and recall than the emotional dictionary proposed in this article. The article then uses a sentiment dictionary, SVM, Naive Bayes, and Logistic regression to test all of the sentences in the experimental data, with a training set of 4000 artificially labeled sentences. The goal of this study is to compare various art sentiment analysis algorithms in the field of art. The accuracy, recall, and F-value of the four types of artistic sentiment analysis algorithms in the current data set can be obtained more clearly using the advantages and disadvantages of sentiment analysis.

The longer the sentence, the longer it takes in terms of time efficiency. The sentiment dictionary-based artistic sentiment analysis algorithm takes the least amount of time. A sentence takes 5–10 seconds to complete on average, with an efficiency of 8 words per second. The three machine learning algorithms for artistic sentiment analysis all take more than 15 seconds. Among them, the support vector machine’s artistic sentiment analysis algorithm takes the longest. On average, it takes 30 seconds to process and analyze a sentence, with a time efficiency of 3 words per second. However, the artistic sentiment analysis algorithm based on the sentiment dictionary is still more accurate than the HowNet and NTUSD dictionaries in terms of overall accuracy. The comprehensive
The index of the sentiment dictionary designed in this article is higher than that of social and technological articles, and it has a higher accuracy rate in economics and party building. A comparison with the above method based on the sentiment dictionary is shown in Figure 9:

It can be concluded from Figure 9 that, in addition to scientific and technological sentences, the art sentiment analysis algorithm based on the sentiment dictionary is better than the SVM art sentiment analysis algorithm based on machine learning in terms of accuracy, recall, and $F$-value.

In general, the sentiment dictionary expanded by the sentiment dictionary expansion algorithm is more suitable for the data set of this article, the comprehensive index $F$ value of the artistic sentiment analysis algorithm based on the sentiment dictionary can be improved, and the artistic sentiment analysis performance of the algorithm has been significantly improved. Then, this article also compares the accuracy, recall, and $F$ value of the artistic sentiment analysis method based on the sentiment dictionary for every 10 new words added in the sentiment dictionary, as shown in Figure 10.

Figure 10 shows how, as the emotional dictionary expansion algorithm progresses, new emotional words are continually added to the article’s emotional dictionary. It can be seen that the accuracy rate of the artistic sentiment analysis algorithm based on the emotional dictionary has decreased, while the recall rate and $F$ value have significantly improved. The $F$ value has improved by 1% as a comprehensive indicator of the quality of the artistic sentiment analysis algorithm, indicating that the algorithm is more adaptable to the sentiment dictionary of the data set in this article. Furthermore, the emotional dictionary expansion algorithm has a higher time efficiency than the machine learning algorithm when the algorithm is increased, so it can increase the number of emotional words in the emotional dictionary and improve the indicators of the artistic sentiment analysis algorithm based on the emotional dictionary.

In a simple art sentiment analysis algorithm experiment, it was confirmed that the system had been trained with a large amount of data and that new sentiment words had been added to the sentiment dictionary. The $F$-value of the sentiment dictionary-based art sentiment analysis algorithm has also been improved. Similarly, the sentiment dictionary of the artistic sentiment analysis system for long texts has been extended. As a result, when the artistic sentiment analysis algorithm is increased by 500, this article calculates the various indicators of the system, as shown in Figure 11:

It can be seen from Figure 11 that although the change is small, its various indicators have been improved, and the accuracy rate has increased by 0.2%. The performance is better, which also proves that the emotional dictionary expansion algorithm is also used in the long text artistic sentiment analysis algorithm based on the conditional random field to extract the core sentence. Since the number of samples in the test set is not large enough, the effect is not obvious enough. I believe that if the number of test sets continues to increase, the sentiment dictionary will become more and more perfect. Through the above experimental verification, the long text art sentiment analysis algorithm based on machine learning CRF proposed in this paper has a high accuracy rate for the art sentiment analysis of Chinese long texts, and the algorithm can self-update the sentiment dictionary to improve the sentiment dictionary to the data set Adaptability.

The emotional tendency analysis of different works of art is compared with short works of art. The works of art can be regarded as a collection of short works of art. Therefore, the basis of the emotion analysis algorithm is the emotion analysis of short works of art.
Figure 9: Various indicators of the art sentiment dictionary under different works.

Figure 10: Changes in various indicators of the emotional dictionary expansion algorithm.

Figure 11: The influence of the sentiment dictionary expansion algorithm on the sentiment analysis of different arts.
7. Conclusions

This article mainly introduces some commonly used algorithms in the current direction of sentiment analysis, compares the advantages and disadvantages of the algorithms based on the data set provided in this article, obtains that the artistic sentiment analysis algorithm based on the sentiment dictionary is the most suitable for the next research work of this article, and puts forward a sentiment dictionary expansion algorithm. The computer can automatically update the sentiment dictionary. Experiments have also proved that the algorithm has improved the effect of sentiment analysis algorithms based on the sentiment dictionary.

This article summarizes the art database commonly used in the current art work research; it is based on the brushstroke characteristics, color characteristics, shape, and texture characteristics, and white space characteristics of artistic images. Analyze the different representation methods of Chinese and Western art and the reasons for their formation, summarize the commonly used machine learning methods in the classification of art works such as support vector machines, decision trees, artificial neural networks, and deep learning, and outline the pros and cons of various methods; focus on art works feature extraction and classification, and artistic sentiment analysis and systematically analyze and summarize the current literature.

In addition, the research is more about the emotions contained in art, and there is little analysis of the artistic emotions of traditional art. Chinese art has its own unique artistic style, such as the brushstrokes of ink painting, the intensity of ink, the white space, and content in art. Features can convey the thoughts and emotions expressed by different painters. The use of image feature extraction methods, combined with cognitive and psychological knowledge, can realize the analysis and extraction of artistic emotions. The emotional analysis method of art works is proposed in this article. The overall system architecture idea is to simplify as much as possible the core works that can express the emotions of the whole article. For these works, perform an emotional analysis of short works of art, and get the results of each sentence. After the emotional polarity, comprehensively consider the intensity of the emotional polarity of each sentence in the article, and introduce the concept of emotional polarity weight to distinguish the influence of works with different emotional polarity strengths on the entire article, and the entire system architecture. The foundation is still based on sentiment analysis based on sentiment dictionary. In the core sentence sentiment analysis, the sentiment dictionary will be self-expanded to update the sentiment dictionary, making the model of the system more suitable for the data of the test set.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The author does not have any possible conflicts of interest.

References

[22] Z. Rajabi and M. Valavi, "A survey on sentiment analysis in Persian: a comprehensive system perspective covering


