Chinese and Western Art History Based on Big Data

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Abstract. After entering the era of big data, artificial intelligence has developed rapidly, and the contradiction between technology and humanities has become increasingly prominent. World culture, technology, and art are all facing new conflicts and challenges. This article mainly studies the development and experience of Chinese and Western art history based on big data. This experiment uses an ordinary computer to build a Spark cluster environment by setting up 6 virtual hosts. Chinese artists are always more inclined to subjective creation, while the traditional Western realistic painting in the Renaissance period paid more attention to the three-dimensional painting color while achieving the harmony of the picture. Then sample the fingerprint at the reference point of the sparse density distribution to cluster the indoor area into a specific number of sub-regions, and use the sampling data of each sub-region to predict the fingerprints at other unmeasured reference points to reconstruct the complete Fingerprint database. The data shows that in the experimental cluster environment, when the processing data size is 50MB or far greater than 50MB, choosing parallel algorithms can save data processing time and improve data processing efficiency. The results show that both Chinese painting and Western modernist painting pursue the spontaneity, randomness and contingency of painting in terms of aesthetic effects. This is the common ground of the pursuit of expressiveness in Chinese and Western paintings.

Keywords: Big Data, Chinese and Western Art History, Art Comparison, Aesthetic Difference

1. Introduction

After entering the era of big data, human beings will face more impacts between big data and culture. With the rapid development of artificial intelligence, world culture, science and technology, and art are facing new challenges. The development of social civilization cannot be reduced to the victims of science and technology. The aesthetic and internal cultural beliefs of human beings are the important forces of the development of the times. The improvement of visual literacy can promote the faster and better development of civilization.

In the long history of Chinese and Western painting, due to geographical and historical reasons, there are great differences in artistic characteristics and development process between Chinese and western modern paintings, which together constitute a colorful painting world [1-2]. At the same time,
the Chinese and western modern paintings have the same performance to some extent, except for some similar elements, which is caused by the common law of art development \[3-4\]. We know that the art of foreign countries and other nations has a profound impact on Chinese art and rich nutrition; from the trace of the influence of Chinese painting on Western painting, we can see the important role and influence of Chinese traditional painting on Western painting \[5-6\]. The emergence of modernist design thought makes people pay more attention to the material needs of design, hoping that people's attitude towards design will return to rationality; post modernist design is generated under the new spiritual needs of people to realize people's unique personality and self-worth \[7-8\]. Most of the works of modern western abstract artists take black and white as the basic color. After refining and reprocessing, they can explain the essence of things from the representation of objective objects, and then analyze and compose them to get the image of new elements needed \[9\]. The abstract thinking studied in Western painting is not embodied in the traditional Western painting \[10\].

At present, most of the research on mining association rules is mainly based on a single minimum support threshold. In the process of mining frequent itemsets, a large number of candidate itemsets will be generated. Most of these candidate itemsets are redundant, so it is easy to cause the phenomenon of low mining efficiency and poor performance of the algorithm.

2. Development of Chinese and Western Art History

2.1 Big Data

According to the different speed requirements of big data calculation, big data calculation can be divided into offline calculation (also called batch processing) and real-time calculation (also called streaming calculation). Real-time calculations are usually used in e-commerce, risk control, finance and other fields that require high response time. From the perspective of data quality, the accuracy and reliability of big data will have an impact on the value of big data. When the amount of data increases and the source of the data changes, whether the correctness and reliability of the data itself are sufficient, if there is a certain amount of errors in the data itself, it may affect the analysis results of the data.

Let \( f(x, y) \) be the image after noise interference, the considered pixel tone value is \( g(i, j) \), and centered on this, the output after neighborhood averaging is as follows.

\[
g(i, j) = \begin{cases} \frac{1}{M} \sum_{(x, y) \in S} f(x, y) - \frac{1}{M} \sum_{(x, y) \in S} f(x, y) > T & f(i, j) \\ f(i, j) & \text{else} \end{cases}
\]

The formula for the velocity and position of each particle is as follows:

\[
v_i(t + 1) = v_i(t) + c_1 r_1 [p_y(t) - x_i(t)] + c_2 r_2 [p_{\sigma} - x_i(t)]
\]

(2)

The formula of the GMG algorithm is expressed as follows.

\[
GMG = \frac{\sum_{i=1}^{M-1} \sum_{j=1}^{N-1} \sqrt{[g(i+1, j) - g(i, j)]^2 + [g(i, j+1) - g(i, j)]^2}}{2 (M - 1)(N - 1)}
\]

2.2 History of Chinese and Western Art

Regional differences and humanistic thoughts, as well as through different historical influences and changes of times, have created different aesthetic views. Chinese traditional painting in the picture is not as strict as the western logic, it pays more attention to the appeal of the picture. Western painting combines science and art closely, considers problems in real time through representation, draws conclusions through logical reasoning, and does things without interference from any feeling. Therefore, in Western painting creation, it pursues a more realistic and objective representation of the
object itself. Under the influence of different cultural backgrounds and aesthetic tastes of different nationalities, Chinese and Western arts have formed their own characteristics and styles. Chinese and Western painting in the use of line, color form aesthetic feeling is more significant difference. In fact, the diversity of artistic style is just a direct reflection of the artist's personality diversity. The use of lines in painting can best reflect the style of an artist different from others.

3. Comparative Experiment of Chinese and Western Art History

3.1 Experimental Environment
This experiment uses an ordinary computer to build a Spark cluster environment by setting up 6 virtual hosts, one of which is the master node (Master), and the remaining 5 are used as computing sub-nodes (Slave). The configuration of each node is as follows: i7-4 core processor, 8G memory, 1TB hard disk, Spark version is 1.4.1. The Retail data set and experimental settings are shown in Table 1.

| Data set | Number of items | Number of transactions | Minimum support | Minimum confidence |
|----------|-----------------|------------------------|-----------------|--------------------|
| Retail   | 16470           | 88162                  | 0.01            | 0.25               |

3.2 Use of Color
Chinese artists are always more inclined to subjective creation, while the Renaissance traditional western realistic painting pays more attention to the three-dimensional color of painting while achieving harmony in the picture color. Then, the fingerprints from the reference points with sparse density distribution are clustered, and the indoor area is divided into specific number of sub regions, and the fingerprint at other unmeasured reference points is predicted by using the sampling data of each sub region to reconstruct the complete fingerprint database.

4. Discussion

4.1 Comparison of Chinese and Western Aesthetics
Whether in terms of ideas or materials and techniques, China and the West are quite different. When leaving aside the surface form of Chinese and Western painting, after in-depth study, the similarities between Chinese and Western painting will gradually appear. In essence, the line in traditional painting is aimed at creating body. Therefore, modeling makes the traditional painting can not be separated from the dependence on nature. The painting of this period is basically based on the performance of objective objects, but this performance is affected by different aspects, which makes the Chinese and Western painting have differences in the performance methods. The mean value and standard deviation of evaluation reaction results are shown in Table 2. For Chinese painting and Western painting, the average value of professional subjects was significantly lower than that of ordinary subjects. Especially in the evaluation of Western painting, the average positive potency (M = 2.65) of professional subjects was 0.81 points lower than that of ordinary subjects (M = 3.46), and the mean value of negative potency (M = 3.74) was 1.13 points lower than that of ordinary subjects (M = 4.87). This shows that the professional subjects have a significantly higher degree of pleasure in these two kinds of subjective paintings, especially western paintings. When the number of nodes is 1, the time consumed is almost 7 times that when the number of nodes is 6, which fully shows that the parallel effect of the algorithm is very obvious. The distributed environment based on spark platform has obvious advantages in mining massive data.
Table 2. Mean and standard deviation of evaluation response results

| Type of work | Emotional valence | Fine Arts | General professional |
|--------------|-------------------|----------|----------------------|
|              |                   | M       | SD       | N    | M      | SD       | N    |
| Chinese painting | positive           | 2.83    | 1.438   | 60  | 3.09   | 1.336   | 30  |
|               | neutral            | 3.08    | 1.434   | 60  | 3.37   | 1.345   | 30  |
|               | negative           | 3.15    | 1.480   | 60  | 3.52   | 1.415   | 30  |
| Western painting | positive           | 2.65    | 1.466   | 60  | 3.46   | 1.464   | 30  |
|               | neutral            | 3.37    | 1.651   | 60  | 4.21   | 1.288   | 30  |
|               | negative           | 3.74    | 1.909   | 60  | 4.87   | 1.309   | 30  |

4.2 Experimental Results

The angle of view chosen by painters is not rigidly confined to one form, but usually presents different states with different themes. When expressing heroes, they usually look up, and when they express secular life, they usually look up. The above features all reflect the distinct theme of Western painting, which is perfectly reflected in the works of the Renaissance. Both Chinese traditional painting art and Western oil painting use the combination of lines and light and shade changes. The difference is that in Chinese painting creation, lines are often used to outline the outline of objects and show the physical space of objects, while the change of ink color is often used to show the natural space outside. The former is real, the latter is virtual. The application of lines and ink color gives the painting the charm of the combination of virtual and real. The comparison of test results is shown in Figure 1. It can be seen from the figure that the efficiency of the serial algorithm is higher when the data scale is small with fixed cluster size. With the increase of the number of data sets, the superiority of the algorithm increases. In the experimental cluster environment, when the processing data scale is 50MB or much larger than 50MB, choosing parallel algorithm can save data processing time and improve data processing efficiency. Otherwise, the serial algorithm can meet the requirements. The form and content of Chinese landscape painting and Western landscape painting are not the same. The reason is that different national temperament and different cultural traditions are reflected in painting. Therefore, what western landscape painting shows is the original appearance of nature, which is simple and pure natural beauty, while Chinese painters place a lot of personal consciousness on landscape painting. What landscape painting reflects is not the true natural landscape, but the inner realm of the painter, which is the internal and external manifestation of the artist's aesthetics, which has great subjectivity.

Figure 1. Comparison of test results

The performance results of each model after training are shown in Figure 2. From the perspective of model effect, ESRNN algorithm outperforms traditional credit risk control algorithm represented by LR and big data risk control model represented by XGboost in different indicators of the two datasets.
The decision tree models represented by DT and RF do not perform well in both data sets because they fail to prevent over fitting. As the benchmark algorithm of neural network, ANN also has good performance. GBDT approaches the target value of the sample by the idea of gradient lifting algorithm, and achieves good results. XGboost model achieves the best effect of gradient learning algorithm, and is also the most widely used big data risk control model. This fully shows that the degree of aesthetic feeling, liking and acceptance of most painting works of various styles are significantly higher than that of ordinary students. That is to say, for all the Chinese paintings, western paintings and two-thirds of the photographic works presented to the subjects in the experiment, the degree of recognition and perception of beauty from the works of professional students is higher than that of non professional students, that is, their aesthetic understanding, aesthetic perception and appreciation ability of different types of art works are better than those of ordinary majors. In essence, the lines in traditional painting are all for the purpose of creating body. Therefore, modeling makes the traditional painting can not be separated from the dependence on nature. The painting of this period is basically based on the performance of objective objects, but this performance is affected by different aspects, which makes the Chinese and Western painting have differences in the performance methods.

![Figure 2. Performance results of each model after training](image)

### 5. Conclusions

Both Chinese and Western painters are striving for spiritual freedom and performance freedom, which is developed under the common feelings of the whole human being. Therefore, Chinese and Western paintings have a lot of communication. The integration of Western modeling concept and expression mode makes the creation of modern Chinese painting have a broader space.

Nowadays, great changes have taken place between the new art forms and the traditional art forms. Generally speaking, the interaction ability between people and computers is becoming stronger and stronger.

Both Chinese painting and Western modernist painting pursue the spontaneity, randomness and contingency in aesthetic effect, which is the common ground of Chinese and Western painting in pursuit of expressiveness. Compared with Chinese painting, it retains some national differences, but also shows the eugenic effect of the combination of different places.

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