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Research on the Diversified Development of Art Design and Big Data Algorithms in the Digital Age

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Abstract: *In the special historical period of Chinese contemporary art design, combined with the trend of cultural diversification, the development of art design under multicultural history and the different nature of art design have attracted the attention of artists from all over the world. This paper used large-scale data algorithms to analyze the development of art design in the digital age. It combined literature analysis, information consultation, field research and various interactive methods with the development of global art and design, as well as the contemporary Chinese art environment, to study the changes and development of contemporary art and design. This paper understood the subtle impact of art design on the lives of people in countries and different fields, and used MapReduce to match sensitive random forest algorithms. The triple parallel design is completed through the basic allocator modeling process, the attribute splitting process and the voting process, which speeds up the modeling efficiency of the algorithm. The results showed that the diversified development of art design is mainly carried out in the design direction, accounting for 65%; hand-painted accounts for 28%; the remaining 7% is the rest of the development direction. It demonstrated the reasons for contemporary art design behavior and its influence on contemporary society, and tried to explore new forms and new directions of Chinese contemporary art design art innovation.*

Keywords: *Art Design, Diversified Development, Big Data Algorithm, Digital Age*

1. Introduction

In today's world, with the slow lighting of the "tech tree", human beings are making the earth "smaller and smaller", and the global integration of economics and politics has become a huge change that has attracted worldwide attention. With the deepening of exchanges and cooperation among various countries, the world has risen to an unprecedented height in many fields such as culture. Multiculturalism is accompanying the development of the world and has a profound impact on people's lives in various fields. With the influence of the globalization of the world economy, more and more trade and cultural exports make cultures more diverse. Since the 18th century, developed countries have risen rapidly, and the process of aggression is also accompanied by the "colonial behavior" of art and culture. More and more cultural indoctrination directly leads to the gradual shrinking and disappearance of native culture in developing countries or underdeveloped countries. But as anti-colonial rule revolts around the world, the status of colonial cultural hegemony is at stake. Since 1960, the concept of elite culture has gradually disappeared from the altar along with the doubts of all parties. People have clearly realized that culture and art are not a kind of ruling behavior, but change with the development of society. Such a wave of thought has gradually made cultural and artistic contributors around the world reach a consensus on the theoretical basis of multiculturalism.

The specificity of cultural history, depending on the specific time and context, spans the significance of the era. In the context of cultural diversity, the concept of Chinese contemporary art and design is slowly emerging in the public's field of vision. Everyone was pleasantly surprised to find that with the passage of time, art design is changing silently, and the mystery and charm of it have also attracted everyone's attention and curiosity. The development in foreign countries has been more devoted to the cognition of the spiritual level since ancient Egypt. People regard art as a special form of culture, which is compared with space, religion, time and space, morality and ethics. Art works give more spirits and ideas to more art works, and create soulful works of art in the form of symbols. Since the Middle Ages, with the rise of the European Renaissance, a series of artistic styles that have influenced art and design for thousands of years, such as abstraction, Gothic, and Baroque, have shown

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explosive growth, and they are still the spiritual source of our exploration and learning to this day. To further improve China's artistic design capabilities, we must innovate while incorporating new ones, and bring out the unique Chinese elements to their extremes. Combining thousands of years of history and civilization, we must take a down-to-earth development path, and let culture and art have connotation and art design with soul. In the process of criticism and self-criticism, it is necessary to find a way of development belonging to the nation.

In the contemporary Chinese design influenced by the multicultural background, the use of the characteristic elements of contemporary art design to create artistic works with cultural characteristics is a popular reference in the design field. How to use different cultural elements in Chinese contemporary art design and combine the two to make the expression of art have cultural significance and spiritual value is a new direction that art design needs to develop. Different cultures have different manifestations in different periods, but today, not all cultural contents can be properly combined. Facing a multicultural background, we need to understand what we should do in modern times. The importance of Chinese contemporary art and design research is huge.

2. Related Work

In terms of the diversified development of art and design, many domestic and foreign experts also have many research results. Jia Q aimed to study how to provide art and design education that meets the technological needs of different eras in terms of content and concept. Based on his understanding of the concept of art, he conducts an in-depth analysis of the relationship between the continuous integration and development of art and technology [1]. Hui J proposed to analyze and extract the white balance feature of the image based on the wavelet packet decomposition method, carry out the adaptive balance design, and realize the white balance and chromatic aberration compensation of the artistic design color difference image [2]. Strimel GJ proposed and designed an important generalization of problem solving in activities. It deals across specific disciplines, describes the design as a radial category, and fleshes out the task environment of the prototype case [3]. However, the traditional research perspective and angle of art design are too traditional, and cannot be used to evaluate the current art design.

Therefore, we use big data algorithms to analyze the diversified development of art design from the perspective of the digital age. In order to improve the processing speed of big data and reduce the data collected by the Internet of Things, Xue J W proposed a method of compressed sensing sampling [4]. Kuang L believed that diversity and accuracy are two distinct characteristics of large-scale and heterogeneous data, and it has always been a great challenge to effectively represent and process big data with a unified scheme [5]. Stergiou C combined both MCC and IoT technologies with big data technologies to examine their common characteristics and discovered which advantages of MCC and IoT can improve the usage of big data applications [6]. Hensher D A believed that the digital age opens up new opportunities to improve the experience of art and design, and saw the role of art and design in the hands of customers as a new standard for providing personalized services to meet the needs and preferences of current and future customers [7]. However, the above-mentioned research is not recognized by the public because it is too superficial and the professionalism of art design is not strong.

3. Big Data and Key Technologies Based on Art Design

The research uses big data algorithms to analyze the diversified development of art design in the digital age. This paper firstly introduces Hadoop and its important component HDFS; then it introduces the MapReduce programming model and the detailed execution process of its jobs; then this paper introduces several traditional MapReduce connection algorithms, analyzes the skew problem in MapReduce, and expounds the general solution to the skew problem in MapReduce [8].

3.1 Big Data and Key Technologies

HDFS adopts the master-slave structure model (Master/Slave), and its cluster includes NameNode and multiple DataNodes. As the manager of the entire file system, NameNode is responsible for managing the file system namespace and coordinating client access to the file system [9]. If the client has a read and write request, for example, it wants to read a file and send the file name to the client, the NameNode will find the corresponding data block in the name'file, and then find the corresponding location information from the DataNode according to the data block information [10]. Then the address

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of the DataNode is returned to the client, and the client connects to these DataNodes to read and write data [11]. If it is to write a file, the NameNode returns the corresponding information of the DataNode to the client, and the client divides the files according to the information, and then transmits the data to all data replicas. When the replica receives the data, the client sends a write request, and after all replicas are updated, the primary replica returns a successful write operation signal. The HDFS architecture is shown in Figure 1.

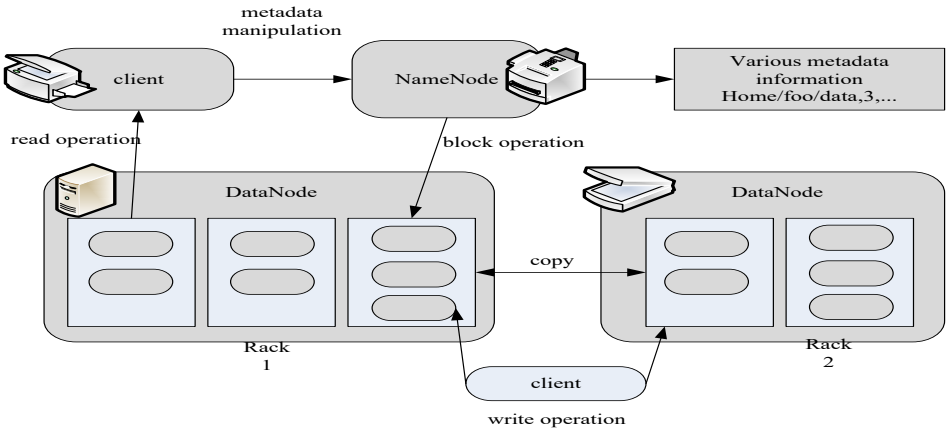

Figure 1. HDFS architecture

3.2 MapReduce Programming Framework

MapReduce is a distributed parallel computing model provided by Google, which is mainly used to process and analyze multiple data sets. MapReduce has given priority to factors such as system availability and scalability at the beginning of its design, aiming to achieve unified processing of big data through large low-cost server clusters. MapReduce technology consists of three layers, and system data is distributed in the form of (key/value) pairs. Data is stored in file blocks (64MB or 128MB per block), and the MapReduce model highly abstracts the complex computing process of data in large-scale clusters into two functions: map and Reduce. The data set to be processed is processed by the Map function in the form of <key, value> pairs, and the intermediate result <key, value> pairs are output. The Reduce function aggregates all key-value pairs with the same key value and outputs the final result.

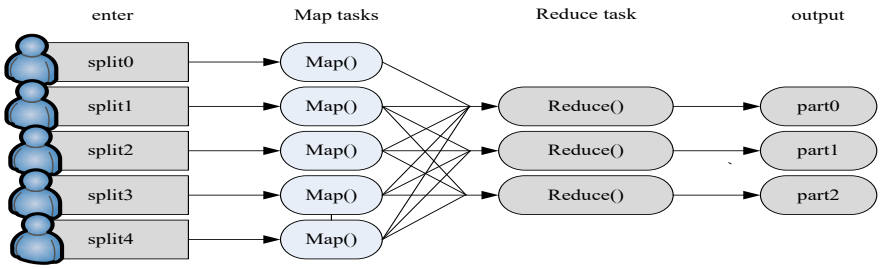

Figure 2. MapReduce parallel computing process

The execution flow of the MapReduce program is shown in Figure 2. First, the data source is decomposed into several small pieces of data and distributed to different nodes in the cluster for execution. Each Map task executes the Map function on its assigned key-value pair. After the Map function is executed, many <key, value> pairs will be obtained, and the intermediate results in the form of <key, value> pairs will also be output. The Reduce task summarizes the intermediate result set to calculate the final result and outputs it to the distributed file system. Map functions and Reduce functions are implemented by application developers. When running MapReduce programs in a cluster, programmers should only focus on how to implement Mapping and Reduce functions, and should not care about the various complexities of other distributed parallel programs]. Such as distributed storage, job scheduling, load balancing, fault tolerance, network processing and communication to solve problems that will be handled by the MapReduce framework.

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3.3 Mapreduce Scheduling Process

In Figure 3, the Master is called JobTracker, and the Slave is called TaskTracker. The job submitted by the user is called Job, which is divided into several Tasks. The MapReduce system includes the following entities:

Distributed File System Service (HDFS): Used to share job files among nodes. JobTracker: The job server JobTracker schedules subtasks running on each task server TaskTracker and monitors them. To deal with machine failures, if a TaskTracker is found to be faulty during operation, the JobTracker will assign the failed tasks on the TaskTracker to other idle TaskTrackers for execution. TaskTracker: The task server TaskTracker is where the task is executed, and is scheduled by the JobTracker to execute the corresponding task.

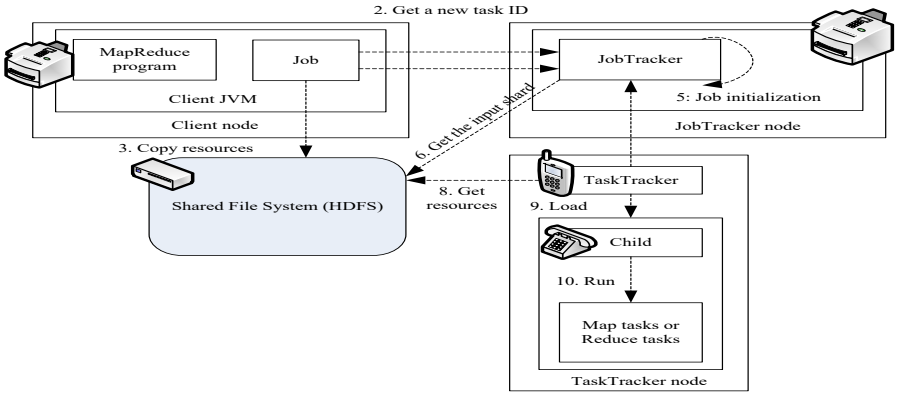

Figure 3. Processing flow of MapReduce binary join optimization algorithm

3.4 Design of Big Data Connection Algorithm Based on Key Cost

In order to calculate the load cost of each key partition, it is necessary to know the data distribution of the original connection data set in advance. However, it is a costly operation to analyze the original data set, so we sample the original data to a certain extent. The proposed solution for MapReduce data join operations in a skewed environment approximates the distribution of the original dataset. It calculates the cost value of each key partition according to the sampling analysis results, and formulates a suitable partition scheme according to the cost value information, so that the Reduce side can obtain a better load balancing effect. The algorithm flow is shown in Figure 4. In the Map stage, a new sampling function is added to sample the output results of the Map side to count the number of data records of each key value and different data sources in the same key value, and record it as statistics describing the data distribution, which are submitted to the Master node.

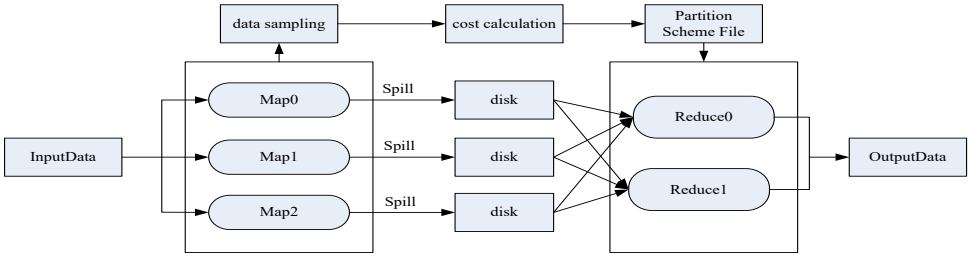

Figure 4. The processing flow of the MapReduce binary join optimization algorithm

3.5 Random Forest Algorithm

A random forest must first train several specialists on a decision tree. During the creation of the base classifier, a training subset of each decision tree is randomly selected. If the nodes are partitioned, the function space is selected according to the given number. The algorithm must define the number of base classifiers and choose based on the specified value. The number of datasets and subsets determines the number of decision trees to make. The original random forest must use all decision trees to select test samples, which is the biggest weakness of classification algorithms. However, the researchers made several improvements to the original random algorithm in random forests, and better

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classification outperformed other methods in the performance class. In traditional process generation decisions, all components are used for modeling, and if the subregion is large, the created decision tree is complex, so it must be cut. But since there are two random trees in the random forest, there is no need to remove them during the decision process. Before modeling, bagging must first be used to get a template set with a new template set; second, all functional areas must be selected during modeling, and only the selected template subset and functional subset must be used to build the decision tree. The decision tree is to introduce randomness in sampling and function sampling, and then the random forest algorithm collects the voting results of all participating voting bases. The category with the highest score in the overall results is the category tab of the test sample. The schematic diagram of random forest is shown in Figure 5:

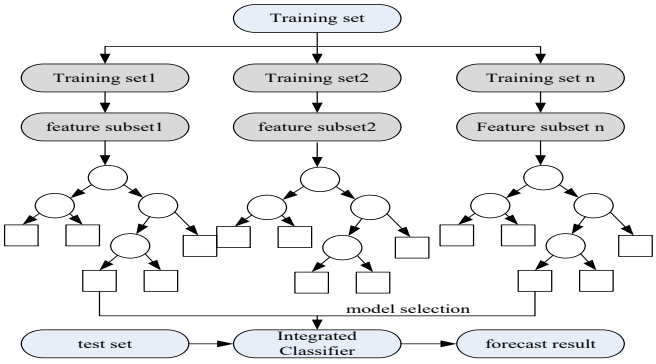

Figure 5. Schematic of random forest

In order to verify the effectiveness of the ICSRF algorithm, this paper selects 6 groups of UCI sample sets, including breast-cancer, glass, balance-scale, heart-h, wave, and diameters. Among them, most categories are composed of categories with a large number of samples. Table 1 shows the category information of each sample set in detail.

Table 1. Dataset Information

sample set	quantity	number of features	minority class	Majority class	Rare rate
Breast-cancer	286	10	85	201	52.3
glass	214	10	70	144	48.6
Balance-scale	625	5	49	576	8.5
Heart-h	294	14	106	188	56.4
wave	5000	21	1650	3350	49
diabetes	768	9	268	500	53.5

The UCI dataset is used to compare the decision tree (C4.5), random forest classifier (RF), cost sensitive random forest (CSRF) and the ICSRF algorithm proposed in this paper. During this experiment, the misclassification cost of cost-sensitive random forest is determined according to the imbalance of data categories, as shown in Table 2 and Table 3.

Table 2. Comparison of AUC values for four classification algorithms

data set	C4.5	RF	CSRF	ICSRF
Breast-cancer	0.584	0.637	0.785	0.894
glass	0.821	0.824	0.863	0.934
Balance-scale	0.489	0.499	0.592	0.765
Heart-h	0.752	0.883	0.913	0.938
wave	0.813	0.835	0.839	0.959
diabetes	0.751	0.815	0.837	0.872

Table 3. Comparison of F-measure values of four classification algorithms

data set	C4.5	RF	CSRF	ICSRF
Breast-cancer	0.671	0.713	0.854	0.845
glass	0.745	0.741	0.814	0.875
Balance-scale	0.479	0.476	0.585	0.725
Heart-h	0.826	0.801	0.849	0.857
0.wave	0.731	0.751	0.762	0.861
diabetes	0.736	0.745	0.806	0.812

Tables 2 and 3 present the AUC values in detail, and based on our data, we will compare the F performance measure of four different classification algorithms across six sets of UCI data. As can be seen from the table, the AUC value of the ICSRF algorithm is higher than other classification algorithms. Among them, the C4.5 classification algorithm is intuitive and simple, but it can easily lead

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to data overload, especially when it has many features. The classification algorithm has many advantages over decision trees, but it does not accept a minority classification strategy, resulting in lower performance on asymmetric datasets. Forest algorithms can't achieve good results even on small data, but meeting trees don't improve measurements much.

Figure 6 shows the comparison results of the AUC experiments between the NB and RF classification algorithms when the CDHI, IG, MI, and CHI algorithms are applied to the Amazon_initial sample set. The analogy is 1:9 in the test system. As can be seen from the figure, the AUC value compared with the downscaling method of CDHI measurement proposed in this paper yields higher results than the traditional method. And it can be seen from Figure 6 that with the increase of the number of selected features, the performance of the classification algorithm is significantly improved, so that the CDHI algorithm can effectively reduce the component dimension in high-dimensional imbalanced datasets. From the scale in Figure 6, random forest is a comprehensive machine learning method. Due to the randomness of function selection and mode selection, the diversity of each decision tree is guaranteed. Under the same standard reduction method, random forests perform better.

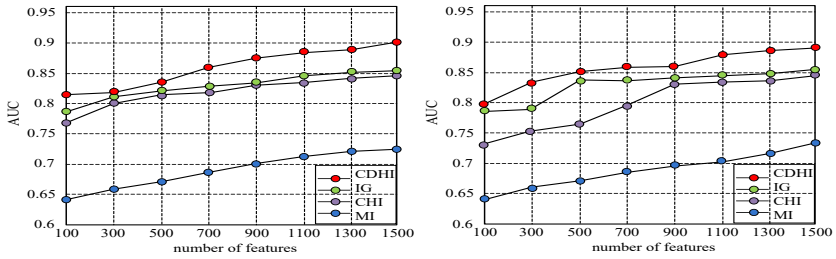

Figure 6. Comparison of AUC values of Bayesian classifiers when different feature selection algorithms are applied to the Amazon_initial dataset

Figure 7 shows a comparison of the AUC efficiency of the Random Forest Bayes classifier when four feature selection algorithms are applied to the 20 Newgroups dataset. These numbers show that the partial CDHI reduction method proposed in this paper outperforms other classical methods, and when comparing the parameters in Figure 7, Figure 7 shows that random forest outperforms Bayesian for datasets with the same number of attributes.

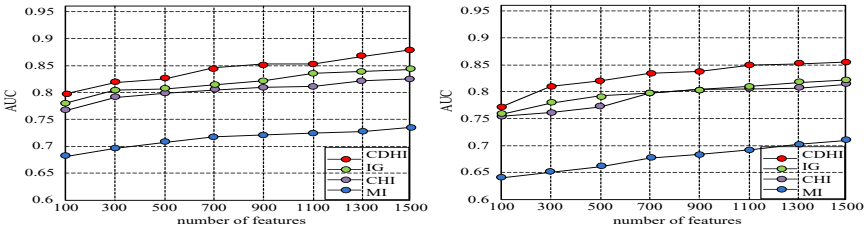

Figure 7. Comparison of AUC values of Bayesian classifiers when different feature selection algorithms are applied to the 20-Newgroups dataset

When faced with an imbalanced classification task, use the random forest algorithm to identify cost-sensitive learning algorithms to reduce the overall cost of misclassification. The misclassification cost is usually represented by dividing the decision tree attributes, and the traditional index and information increment are replaced by the discounted value of the misclassification cost, and the feature that reduces the misclassification cost is selected the fastest. The cost reduction value means that the selected feature Ai is the difference between the misclassification cost of splitting features after modeling by the allocator and the unselected Ai before splitting, as follows:

$$\mathrm{Re}\,c = Mc - \sum_{i=0}^{n} Mc(A_i) \tag{1}$$

$$\sum_{i=0}^{n} Mc(A_i) = n * FP - (FP * \sum_{i=}^{r} n_i + FN * \sum_{i=r+1}^{n} pi) \tag{2}$$

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$$H_e(x) = \arg\max \sum_k \alpha_k I(h_k(x) = y) \tag{3}$$

$$\begin{bmatrix} x_{11} & \cdots & x_{1m} & c \\ \cdots & \cdots & \cdots & c \\ x_{n1} & \cdots & x_{nm} & c \end{bmatrix} \tag{4}$$

The calculation method is to take the average value of each feature column, and the data set is expressed as the following formula. The columns in the matrix are the characteristics of the individual data, and the rows represent the data samples.

$$A_1 = \frac{1}{n}\sum_{i=1}^{n} x_{i1} \tag{5}$$

$$A_2 = \frac{1}{n}\sum_{i=1}^{n} x_{i2} \tag{6}$$

$$A_m = \frac{1}{n}\sum_{i=1}^{n} x_{im} \tag{7}$$

$$IG(x_k, c_i) \sum_{c\in\{cifi\}} \sum_{x\in\{xk,xk\}} P(x,c) \log \frac{P(x,c)}{P(x)P(c)} \tag{8}$$

For an imbalanced dataset N, there are N1 and N2 data points in each class, including the majority class c1, the minority class c0, and the γ coefficient is defined for the class ci:

$$d_i = \sqrt{\sum_{j=1}^{m} w_i (A_{ij} - \overline{A})^2} \tag{9}$$

$$\gamma_i = \frac{\sum_{j=0}^{1} N_j}{N_i} \tag{10}$$

$$F(c_i, c_j) \begin{cases} \gamma_i * \dfrac{d_i^{'}}{d_j^{''}}, d_i^{'} < d_j^{''} \\ \gamma_i * \dfrac{d_i^{'}}{d_j^{''}}, d_j^{''} < d_i^{'} \\ 0, i = j \\ 1, d_i^{'} = d_j^{''} \end{cases} \tag{11}$$

CSL generally uses a cost matrix to represent the cost to be paid when the classifier is misjudged, c0 is the minority class, c1 is the majority class, where F(i,j) represents the cost of misclassifying i into j, as shown below.

$$R(c_i|x) = \sum P(c_j|x) F(c_j, c_i) \tag{12}$$

$$c = \arg\min\{R(c_i|x)\} \tag{13}$$

$$H(x) = \arg\max \sum_k I(h_k(x) = y) \tag{14}$$

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$$E(S) = \sum_{i=1}^{n} p_i \log(p_i) \tag{15}$$

Supposing that it splits using feature A, which has XA distinct feature values, and Sv is the data sub-block of size v in feature A in the dataset. E(Sv) represents the size of the entropy after Sv is classified after using feature A for splitting, and E(S, A) is defined as the expected entropy after selecting feature A for splitting, as shown in the following formula.

$$E(S, A) = \sum_{v \in X_A} \frac{|S_v|}{S} E(S_v) \tag{16}$$

$$Gain(S, A) = E(S) - E(S, A) \tag{17}$$

$$Gain - ratio(S, A) = \frac{Gain(S, A)}{split - \inf o_A(D)} \tag{18}$$

$$split - \inf o_A(D) = -\sum_{j=1}^{v} \frac{|D_j|}{D} \log_2 \frac{|D_j|}{D} \tag{19}$$

$$Accuracy = (TP + TN)/(TP + TN + FN + FP) \tag{20}$$

4. Current Situation of Multicultural Development of Chinese Contemporary Art and Design

4.1 Regional Ambiguity of Culture

Since the beginning of the 21st century, China's economy, science and technology have developed vigorously, and the mass media has made information dissemination more extensive and convenient. People communicate and spread culture in this way, so that the shadows of various regional cultures continue to appear in our lives. The limitations of regional culture are gradually broken, and the regional characteristics of culture are not as distinct as they were at the beginning. Various regional cultures influence each other, blend and gather with each other. However, while absorbing Western culture, there are also some drawbacks. When we study the advanced and technological development of the West, we unconsciously accept various foreign cultures from the West. In the face of today's society where cultural and regional characteristics are ambiguous, a consensus has been formed to "pursue the spirit of innovation" in the field of culture, painting or art design. With the rapid development of mass media, culture and art design have become diversified, so it must never be given up the national character and national spirit in culture and art. In the process of the continuous transformation of cultural attributes from the initial regionality to the pluralism, while enriching our life, some cultural characteristics become gradually blurred, or even gradually disappear. With the continuous development of mass media, our way of life is also constantly influenced by foreign culture. A series of fast food such as McDonald's and KFC can be seen everywhere in first-tier cities or second-tier cities. Large and small cities almost look alike after ignoring landmarks, and even if you walk in the streets and alleys of some cities you have never been to, you will find the feeling of deja vu. With the development of economy and science and technology, this mechanized production mode has also been brought along. For example, we can always meet the same furnishings and similar products in different shopping malls in different cities, and the cities we live in are all influenced by Western culture. It can be seen that mechanization can bring us convenience, while mechanization also has some disadvantages.

4.2 Significance of the Existence of Hand-painting Art in the Digital Media Era

The widespread digitization in business and communication has sparked a desire for authenticity and manual work, and the world is rediscovering the magic of hand-painted lines. It is not only a unique form of human expression, but also a catalyst for creative ideas. This chapter will start from the context of the digital media era, and re-understand the immediacy, freshness, and the emotional response it triggers to evaluate the value and significance of its existence in the new era. The era of digital revolution, where digital media content is increasingly rich and information dissemination speed

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is getting faster and faster, which brings a new social picture to human life. In such a dramatically changing digital age, we should rationally follow the changes of the times to see more points. The first breeding cattle to solve a body, experience a gold body. First of all, it is necessary to understand and experience media, especially to understand and experience the different connotations of digital media and hand-painted art.

Traditional hand-painting art refers to the expression of design concept in the form of hand painting with the help of ruler. Modern hand-painted art presents a multi-directional and diversified pattern in its functions, materials, definitions, concepts and other aspects. Some non-painting self-made tools composed of materials such as wood, stone, plants, cloth, and the reference of innovative scientific and technological materials in new media technology. The extensive concept of hand-drawn art of environmental design has gradually transformed into two-dimensional, three-dimensional dynamic diversified forms rather than the “original single flat and static painting” connotation form. However, its original essence and connotation have not changed, which should be summed up as follows: "The designer uses the designer's brain, eyes and hands to combine the detailed descriptions and even the materialized form of a few strokes within a certain period of time or visual creative conception works produced by other technical and technological means. This form of art painting takes the integration of art and engineering technology as the premise, and uses graphic thinking as the theoretical support. It is an in-depth thinking and aesthetic interpretation of the plan in the process of inspiring creativity, scientific rationality, and artistic expression coordination, as shown in Figure 8.

Figure 8. Hand-painted art form in the digital age

In the era of digital media, hand-painted art has been continuously enriched and developed, and the forms of expression have become more diverse. Different artistic expression forms have their own characteristics. Traditional hand-painted art is irreproducible, and designers can express their ideas freely and without any scruples in the design. However, in the period of rapid development of science and technology, as the medium of hand-painted art is becoming more and more extensive, whether it is in terms of material selection or use of tools, the choice of hand-painted carrier. It not only depends on the designer's inspiration and creativity, but also conforms to the requirements of the times, showing the characteristics of randomness, randomness and randomness, as shown in Table 4.

Table 4. The creative forms of traditional hand-painted art

creative type	advantage	Expression method	percentage
Hard pen and its line performance	Rich forms, fast and convenient, rich and varied lines, strong expressiveness	Density, superposition, etc.	22.55%
watercolor rendering	Color is spiritual, transparent, fixed, rich in layers, and easy to improve color perception	Debounce, Flatten, Overlay, Render, etc.	12.65%
gouache performance	Bright and full color, easy to modify, strong coverage, easy to express details	Overlay, Flatten, Cover	32.25%
Marker + color pencil performance	The two complement each other, with simple operation, easy to carry, bright and vivid colors, and a wide range of applications.	Point pen, line pen, row pen, stacking pen, random pen, etc.	13.2%
Inkjet performance	Simple operation, color fusion, delicate materials, realistic patterns, subtle changes in light, etc.	spray	7.56%
Comprehensive innovation performance	Combine different artistic techniques and media means to make new explorations and innovations, reduce stylized expressions, and have different styles	Drawing indefinite, according to personal preference and proficiency	6.35%

With the maturity of digital production technology, although the creation method of hand-painted art still relies on traditional hand-painted art tools, designers have also begun to use digital technology to simulate and draw hand-painted graphics, as shown in Table 5.

Table 5. Digital technology to simulate and draw hand-drawn graphics

creative type	Creation features	Numerical value
Drawing with a digital base	A good digital medium becomes a time-saving shortcut for building the "skeleton" of a real scene	22.556%
Using aerial photography	In the "creative" stage of the initial stage of the project, while constantly accepting customer opinions, designers can quickly record the evolution of ideas and present the richness of this exciting stage in the creative process.	12.652%

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Use digital photos	Helps to save a lot of time and helps skip the time-consuming process of manually constructing perspectives, live photos provide accurate layout and context	8.356%
use google earth	As a base for hand-painting, it is possible to explore ideas and create drawings in a dynamic perspective of space	6.652%
Utilize SketchUp	In the early stages of design, a rough 3D model can be generated in just a few minutes, providing an instant analysis tool for designers to evaluate building blocks, spaces, etc.	2.235%

The trend of contemporary culture and art has a profound impact on the development of art design. Art design is not only limited to the absorption of consumer culture and practical design, but also adds a sense of interest and characteristics of the times on this basis. Concepts affect the expression of its behavioral art, so it may be a trendy culture or an expression of a marginal culture with a special personality, which provides a new direction for exploring contemporary art design. In recent years, some designers have used their own unique expressions to endow these frontier cultures with new design methods. They pay more attention to expressing people's spiritual needs, combine unique design concepts with market needs, and show avant-garde and unique artistic design, such as "street art". Figure 9 Shows the analysis trend of the diversified development of big data algorithms in the digital age of art design.

Due to the refinement of design classification, environmental art design is highly specialized in the field it faces. From urban planning and design to residential interior design, there is no unified model for the design and implementation process. But starting from the process of artistic thinking evolution, it has strong procedural characteristics. First, the environmental design process has a certain time limit, which is similar to general technical labor, and establishes clear goals and tasks in each part of the design; second, the best decision for environmental design cannot be achieved just by expressing instant inspiration. It is necessary to add rational and perceptual analysis and optimization to achieve the best state according to the sequence. According to the concept of Luddell, the father of Western design methods, the evolution process of design thinking can be divided into the following ten parts, as shown in Figure 10.

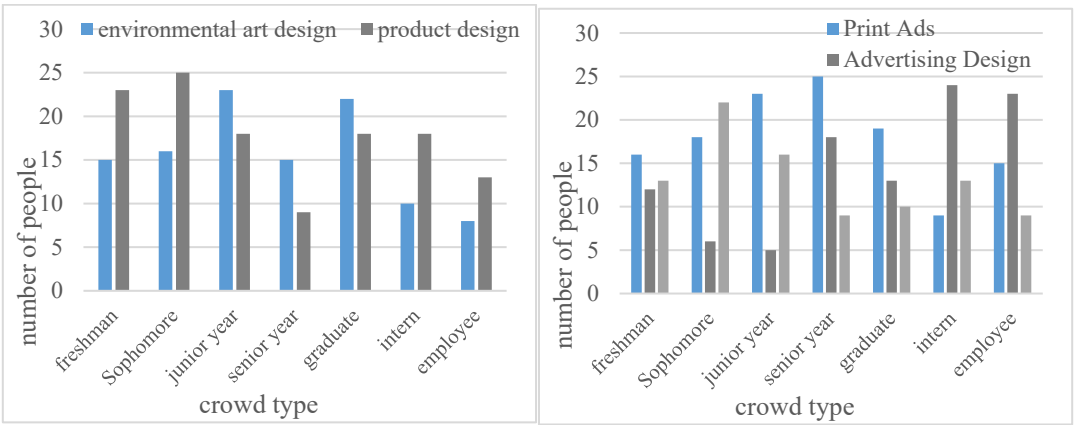

Figure 9. Trends in Diversification

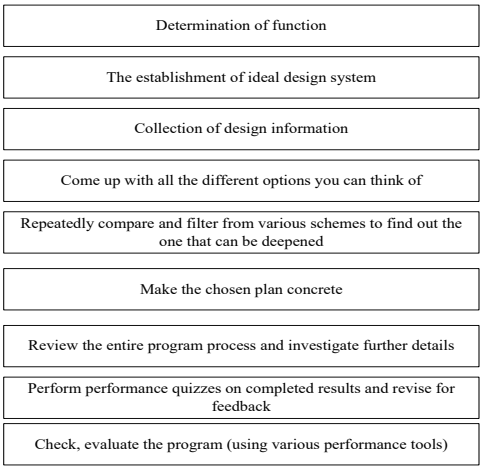

Figure 10. Design thinking evolution process

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5. Discussion

In real-life fields, data is often characterized by high-dimensional, unbalanced and massive data. If the traditional classification algorithm is used to classify it directly, the performance of the classifier will have large errors. These three characteristics are often studied separately, considering mass and imbalance in high dimension, or directly studying imbalance and high dimension, while ignoring mass. This paper combined dimension reduction, cost sensitivity and MapReduce programming model to solve high-dimensional, unbalanced and massive data problems. Therefore, the cost-sensitive random forests need to be adapted to the classification of unbalanced big data. This paper parallelizes the cost-sensitive random forest and effectively deals with the unbalanced big data, so it plays a key role in the diversified analysis field of art and design in the digital era. For example, Chinese traditional philosophy and art have made a very unique comparison of diversified art issues, which also has practical significance to contemporary design. The contradiction of global diversity is a topic of concern to many first-class scholars. The macro-social influence level of Chinese contemporary design is an important development direction, especially through the value of artistic design to solve the global problems brought by modern technology to mankind.

China's art education design started late, more or less affected by the developed countries and regions. In the modern historical period, ten years of internal and foreign troubles led to the fault of Chinese art and design education. The present views and habits or examinations passed down by many ancestors cannot cater to the present or disappear in the change of times. We constantly reflect on the past to understand the details and changes made by the development of contemporary art and design. In the development history of Chinese cultural design education, artists have found the importance and necessity of the popularization of art design, which have played a pioneering role in its promotion. The second generation of the third generation of art and design predecessors has also made excellent contributions to the transformation of educational concepts and discipline construction. These contributions let the later younger generation see a gradually systematic art design education concept, making them already stand on the shoulders of giants.

6. Conclusion

In contemporary Chinese design influenced by multicultural background, it is a popular design reference to use characteristic elements in contemporary art design to create artistic works with cultural characteristics. How to use different cultural elements in Chinese contemporary art design and combine it with contemporary art design to make art expression have cultural significance and spiritual value is a new direction that art design must develop. The research uses big data and the status quo of the digital age, analyzes the different development directions of art design, and uses the method of big data to analyze and research related data. In this paper, the idea of MapReduce program is used to adapt the design and modeling process of ICSRF algorithm, the calculation of divided features, and the triple parallelization of voting process, which further improves the implementation speed of the algorithm. The experimental results show that the ICSRF algorithm with the help of MapReduce programming idea can improve the performance of the algorithm by default and improve the speed at the same time. Art designs and contemporary creations that anticipate the form and language of modern or postmodern Western art may be immediately ineffective due to significant changes in the artistic context. Different cultures have different manifestations in different periods, but not all cultural content can be properly integrated today. Faced with such diverse cultural attributes, what should we do in modern times? The perfect combination of contemporary art and design, where is this direction placed? These are issues that must be considered by the China Contemporary Art Design Institute. With the technical support provided by the digital media era, rethink how to bring hand-painted art to the extreme of creativity and artistry. Through the practice of painting, the mind, eyes and hands are reconnected, the chains of various thoughts are untied, and they are driven on the fast lane of creative expression and design.

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