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Research Article

Construction of Digital Art Education Platform under the "Internet+" Environment

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With the development of society and the rapid development of the Internet, there are currently about 100 million web pages and 100 million hyperlinks, and in the future, the number of web pages and hyperlinks will also intensify. How to make this huge Internet better used by people has become a common concern of the international community. In recent years, with the acceleration of the reform of China's basic education curriculum, people have become more and more aware of the special status and superiority of art education in overall education, and the general consensus that "lack of art education is an incomplete education." Therefore, this paper proposes the construction of a platform for digital art education under the "Internet+" environment. This paper first introduces how to perform data mining in the Internet era, and proposes an interactive data fusion algorithm and model for Internet and crowdsourcing. Then, a statistical analysis was made on the preschool art education syllabus of 20 colleges and universities in different provinces and cities. The experimental results have shown that there are eight undergraduate colleges and universities that have not written syllabuses for College Aesthetic Education majors in art courses, and they still account for 40% of the total sample size. This shows that some Chinese colleges and universities have not paid enough attention to the art courses of College Aesthetic Education majors, have loopholes in curriculum management, and neglected teaching staff.

1. Introduction

The 21st century is an information age, with massive amounts of information and data coming in like a tide. In today's scientific and technological progress, the wave of informatization has promoted the modernization of society and the modernization of education. In 2015, the Premier of the State Council proposed "Internet+" for the first time at the 12th National People's Congress. Since then, the rapid development of "Internet+" has driven the reform and development of various industries. The deep integration of "Internet+" and education is an important topic in the field of Chinese pedagogy. As the center of teaching reform, the classroom has become an important research topic. As learners grow about what attracts to people and have a direct say in how their work will turn out, art education aids in decision making, increases self-confidence, and enables individuals become more self-assured. They can develop into lifelong learners that push themselves regularly and sharpen their focus on reaching their objectives. Collaboration and group study are also promoted through art education. It frequently brings individuals and kids together, allowing them to benefit from and support one another as they continue in producing anything. It enhances emotional stability and fosters teamwork in children. Kids take ownership of their errors and assume accountability for them while functioning collaboratively, which increases responsibility.

As the main way of aesthetic education for students, art course teaching is not only a simple skill and skill training, but also a cultural study. In today's environment of advocating quality education, it plays a very important role in popularizing art education for primary and secondary school students. Through the research on the meaning and function of art education, this paper draws the importance of art education. It is mainly reflected in five aspects: students' aesthetic evaluation ability, physical and mental literacy and cognitive ability, hand-brain coordination, and students' creativity. Therefore, increasing the art and aesthetic education for primary and secondary school students can bring a good promotion effect to the cultivation of high-quality talents in China. Internet data fusion combines information from different sources to just provide knowledge which is more reliable, precise, and practical than that offered by any one source of data alone. Only Internet data fusion can be used by both users and programmers to access management services provided in the live project. Digital and context-aware gadgets are used by the modern instructional paradigms, such as smart educational experiences, to speed up the learning process. Therefore, in order to merge different sources of multimedia learning data in arts integration, it is required to employ information fusion methods and approaches appropriately. Aesthetic education is a way of teaching and learning that involves students exploring, questioning, discussing, and creating art as they study about pieces of art. People who are educated in aesthetics are better able to judge beauty. It teaches how to properly feel, enjoy oneself, and manage emotions. People are encouraged to be imaginative via creating a learning environment. Meeting the requirements of perceptual, intellectual, and social learning is the goal of aesthetic education.

This paper mainly talks about the use of data mining for data statistics in the context of Internet big data. Then, the interactive data fusion algorithm and its model of Internet and crowdsourcing are proposed. This paper then makes a statistical analysis of the undergraduate course syllabus of 20 colleges and universities in different provinces. Cities and regions collect data from 12 colleges and universities and designs experiments. The innovation of this paper is to use big data algorithm to analyze and discriminate, and analyze various data of colleges and universities, so the final experimental results are also very authoritative.

2. Related Work

College Aesthetic Education is the core content of the education and teaching system, and art is an indispensable professional course. College art teachers should not only pay attention to students' learning ability, but also pay attention to their professional ability, and also pay attention to the improvement of students' aesthetic awareness and personal accomplishment from the perspective of modern innovation and entrepreneurship education. Art is an important course to improve students' aesthetic awareness and personal accomplishment. At present, many undergraduate college aesthetic education institutions have listed professional art courses as one of the compulsory courses, but there are still many problems in college aesthetic education. Yan put forward some measures to promote the innovation and entrepreneurship development of college students [1]. With the popularization of computer-aided technology, universities, as important institutions of knowledge dissemination, are actively exploring the combination mode of modern information technology and curriculum. Hanfei analyzed the innovative teaching modes and methods of art design courses in the context of information technology. In the process of art design and expression, students majoring in art design need to understand the detailed steps of painting and show their teaching results [2]. In this visual essay, cosmopolitanization is used as a method to evoke an attunement to being, being, and belonging through common experiences and emotions. Blaikie told multimodal stories composed of theory and practice that provide rethinking of fine arts, pedagogy, and scholarship as practice [3]. In this visual essay, we describe multimodal scenarios that are structured by research and models that provide reassessments of the arts, education, and research as practice, drawing on discussing the matter as method to induce sensitivity to being, emerging, and connecting through daily experiences and emotions. Discussions with Danny are presented alongside her art works and writing as piece of the overall representations of a developing self-spanning location, place, and time, contextualized by young ethnic communities, permeable visual appearances, materiality, physique control, clothes, pop culture, and social networks. Nacak aimed to identify current trends in published articles on arts education and society for a systematic review of the field. Literature analysis as a qualitative research method was used in research to achieve this goal. The data of this study comes from Google Scholar database, obtained by searching keywords such as "art education," "communication," and "society" [4]. They all explained the importance of art education very well, but they did not study in detail, and did not go to college classrooms to really analyze experimental data, which is relatively one-sided.

The Internet is supported by emerging sensing, communication, cloud computing, and big data analytics technologies, and has received extensive attention in the industrial field for its potential to be smarter and more efficient in industrial production. With the fusion of smart devices, smart systems, smart decisions, and the latest information technology, the Internet will increase productivity and reduce costs and waste across the entire industrial economy. Using data from a longitudinal survey of undergraduates at Midwestern universities, Nelson found that digital civic engagement fills the void left by the decline of more traditional forms of political engagement. It was also found that educators play an important role in developing and sustaining young people's civic engagement both online and offline. Conclusions have shown that academics and undergraduate educators need to develop curricula based on the way students currently engage in democracy [5]. In this paper, Papagiannidis et al. proposed the use of a new big data mining method and the Internet as a new source of useful metadata for industry classification. The method he proposes can be used as a decision support system for the near real-time identification of industrial clusters in a specific geographic area, which contributes to strategic cooperation and policy formulation of operations and supply chain management across organizational boundaries through big data analytics [6]. The article provides an overview of the industrial Internet, focusing on the architecture, enabling technologies, applications, and existing challenges, beginning with a survey of a brief history of the industrial Internet.

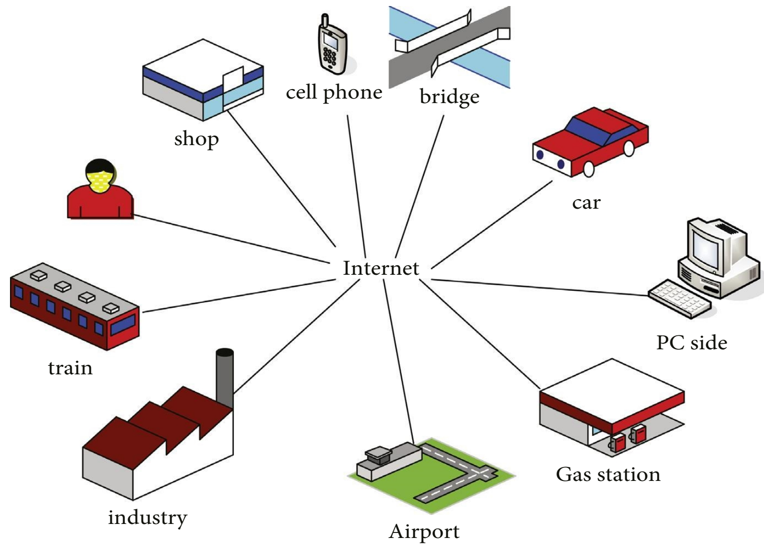

Figure 1: Internet+ model diagram.

Then, Li et al. introduced the 5C architecture that is widely used to characterize industrial Internet systems. In addition, he has carried out research on enabling technology from various aspects such as industrial network, industrial intelligent sensing, cloud computing, big data, intelligent control, and security management [7]. They have all done research on Internet technology to inform everyone about the importance of the Internet, but they have not done research in combination with digital technology.

3. Digital Data Fusion Algorithm in the "Internet+" Environment

3.1. The Era of "Internet+". "Internet+" connects everything. The networked connectivity of individuals, processes, data, and objects is defined by the phrase "Internet+ connects anything." The benefit this greater connectivity produces when "everything" comes back online and the factors which influence of making connections, processes, information, and objects are what make IoE beneficial. It connects together individuals, processes, information, and objects to make networked relationships more useful and meaningful than ever before. By transforming knowledge into actions, it gives organizations, individuals, and nations unheard-of economic opportunities. As shown in Figure 1, it always presents an open and fair attitude. The simple relationship of instilling and receiving, giving and being given in the past will no longer be used here.

The number of Internet users in China reached 710 million in June 2016, mainly mobile phones, desktop computers, and laptops. The number of mobile phone users has reached 656 million, accounting for 92.5%, far exceeding other Internet devices, which can be seen in Figure 2 [8] and Table 1.

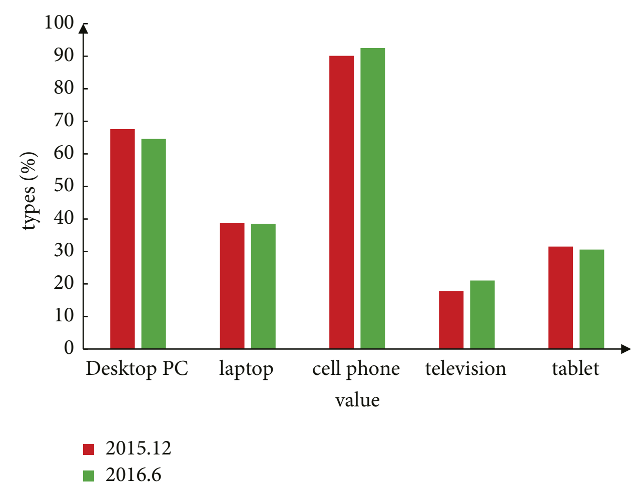

Figure 2: December 2015–June 2016 intervention and use of Internet equipment in China.

3.2. Internet Data Fusion. With the development of society and the rapid development of the Internet, how to make this huge Internet better for people has become a common concern of the international community. On the one hand, people hope to obtain information quickly, accurately, and comprehensively, on the other hand, it is difficult to make a choice due to the variety of information on the Internet. In the past, most of them were still in the very primary stage of data collection, with manual classification of web pages, machine retrieval, etc., which lacks of knowledge processing and understanding, as well as the mining and utilization of the Internet, which made its intelligence level not high.

To this end, this paper proposes an interactive data fusion technology based on the Internet and crowdsourcing. It can perform different pattern matching and physical matching in different situations to achieve better fusion effect. In this way, more information can be obtained and the potential can be better tapped. In addition, this paper presents a new model that combines the advantages of the above two methods and addresses their limitations [9].

Table 1: Usage of Internet equipment in China.

Types	Usage of Internet in December 2015 (%)	Usage of Internet in June 2016 (%)
Desktop PC	66	64
Laptop	38	37
Cell phone	90	96
Television	19	21
Tablet	30	28

3.2.1. Record Matching Likelihood Estimation. First, the logical sigmoid function is used to reduce the above complex function to a linear function, rather than completely computing the dependencies between attributes. A sigmoid function is a limited, differentiable, performs the functions that has precisely one turning point, a non-negative derivative at every juncture, and is specified for all actual input values. Only one parameter was then used to control the effect of dependencies between attributes on the likelihood of record matching. That is, the effect of attributes on the matching likelihood of records is smoothed in an interpretable way by the sigmoid function. Furthermore, in order to overcome the error accumulation problem, it is need to define a contribution function and use the logarithmic function to map the values in $[0, 1]$.

To achieve this, first all attribute pairs are assumed to be opposite to each other, so that a linear function can be used to calculate the matching probability (similar to the Noisy-All model). The only systems in this category that can forecast a specific occurrence known as static probabilities similarity are linear models. Additionally, it is demonstrated that models belonging to this class that have the additional characteristic known as marginal consistency forecast approximation probabilistic match. A damping factor is then introduced to compensate for the assumption that the properties are independent of this setting. Then, the calculation method of the matching probability of d and w can be expressed by the following formula:

$$\phi_{KN}(d, w) = 1 + h^{-\alpha \cdot W\left(X^1 \leftrightarrow Y, d, w\right)}. \tag{1}$$

An object's damping coefficient reveals whether a substance will rebound or supply energy to a system. The following are some reasons why the damping ratio matters. It is employed to assess the system's dampening degree. Among them, ϕ is the damping coefficient used to compensate for the interdependence between attributes (this coefficient can be reconciled on the data validation set) and $W(X\leftrightarrow Y, d, w)$ is the total contribution score of the matching attributes to set $\{X\leftrightarrow Y\}$, which is calculated as follows:

$$W(X\leftrightarrow Y, d, w) = \sum_{(X\leftrightarrow Y)\in\{X\leftrightarrow Y\}} \beta(X, Y) \cdot \mathrm{ctr}(d[X], w[Y]). \tag{2}$$

$\beta(X, Y) \in$ uses the logarithmic function to map values between 0 and 1 to the entire real axis as follows:

$$\beta(X, Y) = -\ln\left(1 - \phi_{WN}(X, Y) \cdot IdC(X\leftrightarrow Y)\right). \tag{3}$$

Among them, $\phi_{WN}(X, Y)$ is the matching likelihood of X and Y. The last $\mathrm{ctr}(d[X], w[Y])$ are the $d[X]$ and $w[Y]$ similarity contribution functions, which are calculated as follows:

$$\mathrm{ctr}(d[X], w[Y]) = \begin{cases} 0, \text{if } d[X] = \text{null or } w[Y] = \text{null}, \\ \underset{1-\varepsilon}{\mathrm{sim}}(d[X], w[Y]), \text{if } \mathrm{sim}(d[X], w[Y]) \geq 0, \\ \underset{\varepsilon}{\mathrm{sim}}(d[X], w[Y]), \text{if } \mathrm{sim}(d[X], w[Y]) > 0. \end{cases} \tag{4}$$

Among them, $\mathrm{sim}(d[X], w[y])$ is the similarity calculated by the string similarity function, such as the Levingston similarity function, $(d[X], w[y])$, ε is the turning point defined by experts to judge whether an attribute value provides a positive or negative contribution. The distance value specifies the smallest number of incisions, deletion, or replacements needed to convert the source string into the destination string. The contribution function defined in equation (4) addresses the error accumulation problem instead of directly using $\mathrm{sim}(d[X], w[y])$ as the contribution. In that case, the scores of the larger $W(X\leftrightarrow Y, d, w)$ may accumulate through the smaller similarity $\mathrm{sim}(d[X], w[y])$ among the multiple attributes $\{X\leftrightarrow Y\}$ and cause false matches [10, 11].

To sum up, the proposed model has the following two advantages: it can solve the problem of record matching probability calculation in the case of nonindependence between attributes at a small cost; it solves the problem of error accumulation. It can be found in Figure 3 that the Noisy-All model is relatively stiff and changes very quickly when x is small. The ϕ_{WN} curve is smoother and corresponds to a large area on the x-axis. In addition to this, when applying equation (4), the model does not introduce negative values like the Noise-All model, because that would be meaningless.

3.2.2. Attribute Matching Likelihood Estimation. Now, how to estimate the probability of 1 and 2 matching is discussed. When the currently matched record pair is $\{D_d\leftrightarrow D_w\} = \{(d_1\leftrightarrow w_1), (d_2\leftrightarrow w_2), (d_3\leftrightarrow w_3)\cdots(d_m\leftrightarrow w_m)\}$, the same model used in record matching is used to calculate the probability of two attributes matching. But here a damping coefficient is not needed to control the correlation dependencies between the records, because they are usually independent of each other. Unfortunately, unlike a system's mass or rigidity, the damping coefficient of a system cannot be determined intrinsically. It has an impact on the oscillator's inherent speed in addition to the progressive fading of output waveform. The formal expression for the property matching likelihood is given below:

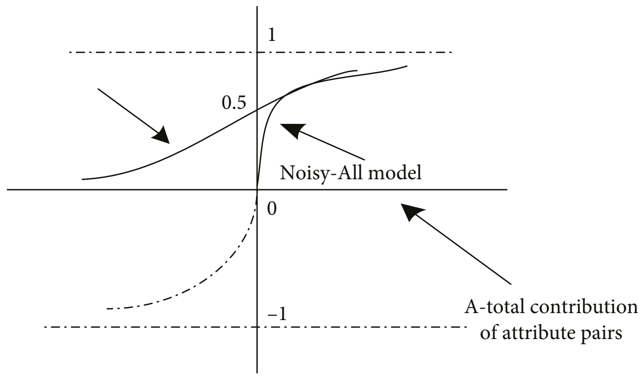

Figure 3: Schematic diagram of model comparison.

$$\phi_{WN}(X,Y) = 1 + h^{-W\left(D_d \overset{1}{\leftrightarrow} D_w, X, Y\right)}. \tag{5}$$

Among them, $W(D_d \leftrightarrow D_w, X, Y)$ is the total contribution score of matching records to set $D_d \leftrightarrow D_w$, which is calculated as follows:

$$W(D_d \leftrightarrow D_w, X, Y) = \chi \cdot \sum_{(d\leftrightarrow w)\in\{D_d \leftrightarrow D_w\}} \beta(d,w) \cdot \mathrm{ctr}(d[X], w[Y]). \tag{6}$$

As the iterative process proceeds, more and more attribute pairs and record pairs are matched together. After each iteration, the currently calculated matching probability needs to be updated, and the connected attribute pairs and record pairs also need to be readjusted.

There is a mutually reinforcing relationship between attribute pairs and record pairs. As shown in Figure 4, a bipartite graph can be used to show the relationship between attribute pairs and record pairs. The weight on the edge represents the contribution score of an attribute pair or a record pair. Specifically, if an edge is from a record pair (d, w) to an attribute pair (X, Y), the weight of their edge is $\beta(d,w) \cdot \mathrm{ctr}(d[X], w[Y])$. If an edge is from a record pair (X, Y) to an attribute pair (d, w), the weight of their edge is $\chi(X,Y) \cdot \mathrm{ctr}(d[X], w[Y])$. Then function $p(x) = 1 + h^{-\overset{1}{\eta} x}$ can be applied to the full-time sum of all edges pointing to the record pair itself. This method can also be used to calculate the matching probability of attribute pairs, and the matching possibilities of record pairs and attribute pairs are recorded as vectors $\overrightarrow{k}$ and $\overrightarrow{x}$, respectively. The above interactive algorithm is denoted as IntSRM, and the formal conclusion is given:

The IntSRM interaction algorithm is convergent, and the matching record pairs and matching attribute pairs will be uniquely determined in the end [12]. All of these hypotheses would have been in line with the idea that an arts education might increase students' motivation. One simply needs to make the case that arts education is inspiring as a result of the intricate web of variables connected to such instruction. The best way to show that there is a high likelihood that the arts increase academic performance is to randomize students to one school with an arts programmed and the other with no such programmed, then monitor their development over time.

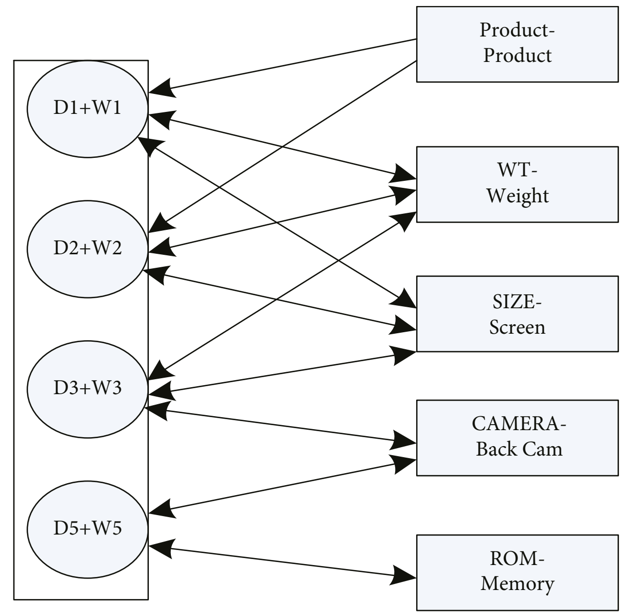

Figure 4: Two-part demonstration of the iterative process.

Proof: The bipartite graph of the algorithm is denoted as $F = F_1 \cup F_2$, where $F_1 = \{U_2, H_2\}$, $F_2 = \{U_2, H_2\}$. U_1 is the node set of all record pairs, and U_2 is the combination of all attribute pairs of nodes; H_1 is a combination of edges in F_1, and H_2 is a set of edges in F_2. Let denote X and Y denote an adjacency matrix of (U_1, H_1), (U_2, H_2), respectively. For the convenience of expression, the values in X and Y need to be redefined. If there is an edge from a node in U_1 to a node in U_2, then the corresponding value in the adjacency matrix X is defined as the contribution value in equation (4). If there is an edge from the node in U_2 to the node in U_1, then the corresponding value in the adjacency matrix Y is also defined as the contribution value. In j-step iterations, the matching possibilities of attribute pairs and record pairs are vectors $\overrightarrow{k}_j$ and $\overrightarrow{x}_j$, respectively. Now the following four functions on matrices are defined.

(1) $F_1(N)$ is the operation of applying function $p_1(x) = 1 + h^{-\overset{1}{\eta} x}$ to each x value in matrix M;

(2) $F_2(N)$is the operation of applying function $p_2(x) = 1 + h^{-x}$ to each x value in matrix M;

(3) $E_1(N)$ is to apply function $q_1(x) = -\ln(1 - c - x)$ to each x value in matrix M where c is a constant

(4) $E_2(N)$ is to apply function $q_2(x) = -\ln(1 - x)$ to each x value in matrix M. In addition, denote $X^{(r)}(N)$ as applying the rth function X to the matrix N, where $X = \{F_1, F_2, E_1, E_2\}$ is used, and the following two formulas can be obtained:

$$\overrightarrow{x}_j = F_1\left(X^D \cdot E_1\left(\overrightarrow{k}_j^D\right)\right), \tag{7}$$

$$\overrightarrow{k}_j = F_2\left(Y^D \cdot E_2\left(\overrightarrow{x}_{j-1}^D\right)\right). \tag{8}$$

After substituting equation (7) into equation (8), and then substituting equation (8) into equation (7), it can be gotten:

$$\begin{aligned} \overrightarrow{x}_j^D &= F_1\left(X^D \cdot E_1\left(F_2\left(Y^D \cdot E_2\left(\overrightarrow{k}_{j-1}^D\right)\right)\right)\right), \\ \overrightarrow{k}_j^D &= F_2\left(X^D \cdot E_2\left(F_1\left(X^D \cdot E_1\left(\overrightarrow{k}_{j-1}^D\right)\right)\right)\right). \end{aligned} \tag{9}$$

To get a more explicit expression, some conversions need to be done. Similar to the method of series convergence proof, the following formula can be obtained:

$$\begin{aligned} \lim_{r \longrightarrow +\infty} \left(E_1 F_2\right)^{(r)}(N) - N &= \Delta_1, \\ \lim_{r \longrightarrow +\infty} \left(E_2 F_1\right)^{(r)}(N) - N &= \Delta_2. \end{aligned} \tag{10}$$

Therefore, the following expressions for 1 and 2 can be obtained:

$$\begin{aligned} \lim_{r \longrightarrow +\infty} \overrightarrow{x}_j^D &= \Delta_1' + F_1\left(X^D Y^D\right)^{r-1} \cdot \overrightarrow{x}_1^D), \\ \lim_{r \longrightarrow +\infty} \overrightarrow{k}_j^D &= \Delta_2' + F_2\left(Y^D X^D\right)^{r-1} \cdot \overrightarrow{k}_1^D\right). \end{aligned} \tag{11}$$

Δ_1', Δ_2' is a constant vector.

3.3. Interactive Data Fusion of Internet and Crowdsourcing. Due to the high number of missings in both datasets, interactive algorithms often fail to complete. However, specific pattern matching or entity matching can be performed through the network and crowdsourcing to fill in a small amount of missing data, or directly determine the matching of attributes and records [13, 14]. Then it may make the interaction process better, so as to achieve a better data fusion effect. To characterize the art education data and each sublayer, pattern matching utilized data fusion analysis and pattern recognition methods. This allows for the merging of multisource information, and running operational data on the sublayer scale. The outcomes demonstrate that the multisource sublayer information fusion method using pattern recognition can acquire the multidimensional characteristics of each sublayer, saving a significant amount of manually analysis time, lowering the subjective nature and one-sidedness of analysis, and offering expert and data assistance for the accurate determination of corresponding variables [15].

First, the missing values of attributes under a certain number of record pairs are filled with the help of the Internet, and then the matching model proposed above is used to recalculate the possibility of matching attribute pairs or record pairs. If the matching possibility of the recalculated attribute pair or record pair still does not reach the specified threshold, there are only two possibilities. The first is that missing values crawled on the Internet are unreliable, and the second is that the two attributes do not actually match. The second reason is that due to the limitation of the data itself, it cannot be changed. For the first reason, it can be tried to solve it with crowdsourcing. Thus, the strategy is to use the Internet-based method in preference, and if it does not work, use the crowdsourcing-based method. If the crowdsourcing-based method has no more attribute pairs to match in the current pattern matching, the interaction process is considered to be over. The difficulty of collecting and understanding task outcomes is embedded inside the framework when developing crowd-based processes, which include learners engaging with simple actions that pertain to homogenous entities.

3.3.1. Filling Framework Based on Internet and Crowdsourcing. This section introduces the matching framework on how to use the Internet and crowdsourcing. As shown in Figure 5, the basic flow of the framework can be illustrated by the following steps: First, the grouper groups the missing values of the currently matched records, so that the same data can be used to fill the model in the same group. Then, the data that needs to be populated is selected and an Internet-based population model is used to help populate the data. If the use of these padding values is not sufficient to continue the interaction process, a crowdsourcing-based approach is used to directly perform attribute or record matching. The Packetizer and Internet-based data filling model in this framework are described in detail next.

The data are once again analyzed to be a part of better matching patterns and extracted using packetized from various data restriction process. Once the data are extracted, the values are inquired with the analysis of pattern with the usage of Internet. Further, validation process is carried out in the crowd-sourcing platform and finds the pattern matching with trained data of maximum probability.

Grouper: The grouper will pad some records with missing values into different groups. It is mainly based on the following two points: the distribution of missing values in each tuple; data constraints such as FDs, CFDs, and some user-defined rules. Through this grouping, it is hoped that records with missing values in the same group can use the same query method to obtain data from the Internet. Each of these query modes uses a collection of attribute values and an associated schema to form a query. Thus, records within the same group can use the same Internet-based population model.

Internet-based data population model: This model fetches data from the Internet by entering the population query generated in the previous steps. The model not only fetches relevant data from the Internet, but also selects more accurate data from multiple return values to help us complete high-quality pattern and entity matching. As shown in Figure 6, two sets of parameters need to be considered in this model: the accuracy of the relevant website and the accuracy of the crawler (corresponding to each query style) [16].

3.3.2. Internet-Based Quality Control of Missing Values. In order to ensure high-quality data fetched from the Internet for better interactive fusion, a probability model is used to estimate the correct rate of attribute values fetched from the Internet. To make it easier for people to understand, first a website s and a crawler h are considered as a whole, which is denoted as (s, h). Then, using (s, h) to provide a fill-in value for a missing value, the probability that (s, h) provides a value d to y can be obtained as follows:

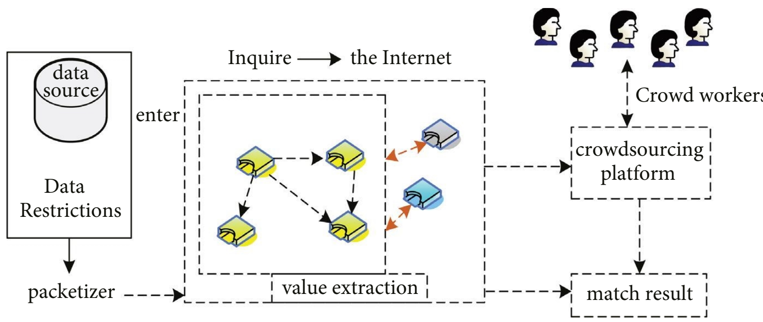

Figure 5: Internet- and crowdsourcing-based matching framework.

$$qk(s,h) \longrightarrow d\Big|(y) = \begin{cases} q(s,h), & \text{if } d_c^y = d, \\ \eta(s,h,y,d)\cdot(1-q(s,h) & \text{otherwise} \end{cases}. \tag{12}$$

$q(s,h)$ is the accuracy of (s,h), d_c^y is the correct value to fill in b, and $\eta(s,h,y,d)$ is the probability that (s,h) provides a wrong value for y and the wrong value is d. However, it is not known which value is correct, so equation (12) cannot be calculated for the time being. Here, an iterative EM method is used to estimate the accuracy of each combination of (s,h), that is, estimate $q(s,h)$. A strategy for carrying out maximum likelihood estimation in the context of latent constructs is the expectation-maximization method. To achieve this, the models are first optimized, then the latent constructs values are estimated, and so on until convergence. The Gaussian Mixture Model and other clustering methods frequently use this efficient and all-encompassing method for densities estimate using incomplete information.

$\overrightarrow{D}^y = [d_{1,1}, \cdots d_{j,i} \cdots d_{n,m}]$ is represented as a padding y vector of all filled values (including duplicates) scraped from the website, where $(s_j, h_i)(1 \le j \le n, 1 \le i \le m)$ is the value returned by site-crawler combination 3, then the joint distribution for all filled values for y is:

$$qk\left(\overrightarrow{D}^y | d_c^y = d, (y) = \prod_{(s_j,h_i)\in WH} qk\left((s_j,h_i) \longrightarrow d_{j,i} \,|\, d_c^y = d, y\right). \tag{13}$$

The goal of the EM method is to find a v that maximizes $qk(\overrightarrow{D}^y | d_c^y = d, y)$. Specifically, the derivation steps are as follows:

E-step: At the E-step, given the set of filled values $\overrightarrow{d}^y$ for each missing value y, the probability of $d_c^y = d$ can be calculated by the following Bayes rule:

$$qk\left(d_c^y = d|\overrightarrow{D}^y, y\right) = \frac{qk\left(\overrightarrow{D}^y|d_c^y = d, y\right)\bullet qk(d_c^y = d, y)}{\sum_{D'\in\left|\overrightarrow{D}^y\right|} qk\left(\overrightarrow{D}^y|d_c^y = d, y\right)}. \tag{14}$$

$\left\{\overrightarrow{D}^y\right\}$ is the set of all distinct values in D^y. In the first E-step, all $qk(d_c^y = d, y)$ are given a uniform prior probability so that we do not need to consider prior knowledge of the correct value.

M-step: During the M-step, the value of y is updated to replace the value of d_c^y, and then $qk(\overrightarrow{D}^y|d_c^y = d, y)$ is maximized among all alternative values, which is:

$$\widehat{d}_c^y = \operatorname{argmax} qk\left(d_c^y = d|\overrightarrow{D}^y, y\right). \tag{15}$$

Then, the following formula is used to update all $q(s,h)$.

$$q(s,h) = \frac{\sum_{((s,h)\longrightarrow d_c^y|y\in Y} qk\left(d_c^y = d|\overrightarrow{D}^y, y\right)}{\sum_{((s,h)\longrightarrow d_c^y|y\in Y^1}}. \tag{16}$$

This formula represents the average probability that treating (s,h) as (s,h) provides the correct value for Y. E-steps and M-steps are performed alternately until all $q(s,h)$ have reached a stable value.

$$qk((s,h) \longrightarrow d|y) = \begin{cases} q(w)\cdot K(h), & \text{if Trube} = d \\ \eta(s,h,y,d)q(s)(1-q(h)), & \\ +\eta(s,h,y,d)k(1-q(s), & \text{otherwise} \end{cases}. \tag{17}$$

Among them, $q(s)$ is the accuracy rate of website s, $q(h)$ is the accuracy rate of crawler h, and $K(h)$ is the recall rate of crawler h.

4. Sampling Experiment of Digital Art Education in the Environment of "Internet+"

4.1. Data Sampling of College Art Course Syllabus

4.1.1. Data Collection and Teaching Staff. This study adopts the method of purpose sampling, and collects the syllabus of College Aesthetic Education major art courses in major colleges and universities through Internet search, direct access to teachers and families, and indirect access to friends. According to China's regulations on curriculum setting, all courses in the teaching plan should have corresponding syllabus. However, in fact, in the process of collecting the syllabus of art courses for College Aesthetic Education majors in major colleges and universities, this article found that some formal undergraduate colleges did not write curriculum teaching in the compulsory art courses specified in the College Aesthetic Education curriculum teaching plan, that is, there is no course syllabus written in text form [17, 18].

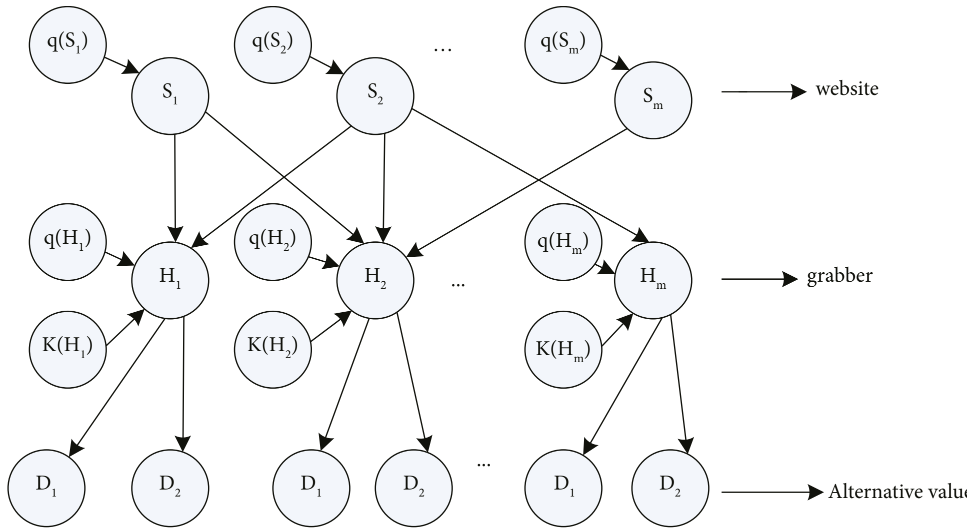

Figure 6: Internet-based data quality control model.

This paper selects colleges and universities in different provinces and cities as samples for collection. During the collection process, about 20 undergraduate colleges and universities with College Aesthetic Education majors were learned. However, among these 20 undergraduate colleges and universities, this paper only collects 12 undergraduate colleges and universities that have written syllabus texts for art courses in College Aesthetic Education, accounting for 60% of the total sample size. Relevant personnel from eight undergraduate colleges said that the school did not write a textual syllabus for College Aesthetic Education majors in art courses, accounting for 40% of the total sample size.

This paper finds that among the eight undergraduate colleges that have not compiled the syllabus of art courses for College Aesthetic Education (Note: School names are coded with numbers), there are 1985 colleges, 1211 colleges, 4 first-level key colleges, and 2 ordinary second-level colleges. As shown in Table 2, the locations of these eight undergraduate universities are: East China, North China, Northeast China, Central China, and Southwest China. It can be seen that there is a phenomenon that undergraduate colleges and universities at different levels in different regions of our country do not pay attention to the text compilation of art courses in colleges and universities, as shown in Table 2.

4.1.2. Types and Distribution of Schools. According to the type and distribution of these 12 undergraduate colleges and universities, this study will conduct statistics on the types and regions of the 12 colleges and universities obtained by sampling, as shown in Figure 7. The sampling subjects of this study are 12 undergraduate colleges and universities, and the selected sample is the syllabus of art courses for College Aesthetic Education majors in 12 colleges and universities.

From the perspective of regional distribution, among the 12 colleges and universities, 2 normal universities are located in North China, 2 normal universities, and 1 comprehensive university are located in East China. There are 2 normal universities, 1 normal college, and 1 comprehensive university in central China. There are 2 normal universities in Southwest China and 1 normal university in South China. From the perspective of distribution area, the 12 institutions of higher learning are mainly in Central China and East China. This is not intentional, but is completely selected according to the convenience of collecting samples, the pertinence of sampling and the mature years of colleges and universities to cultivate College Aesthetic Education majors. It is not collected according to the status quo of economic development in various regions of China and the overall distribution of colleges and universities enrolling College Aesthetic Education majors [19].

In terms of school types, among the 12 institutions of higher learning, there are 9 normal universities, 1 normal college, and 2 comprehensive universities. The sample conforms to the training units in China that recruit undergraduates majoring in College Aesthetic Education, with normal colleges and universities as the main body. The syllabus of art courses for College Aesthetic Education undergraduates in 12 colleges and universities can basically represent the current situation of the syllabus of College Aesthetic Education undergraduate art courses in Chinese colleges and universities. Therefore, the sampling of this study is representative and typical, which also lays the foundation for further in-depth analysis of this study [20].

4.1.3. The Length and Form of the Syllabus. From the perspective of detail, the art courses of each school are different, so the number and size of the collected syllabus documents are also uneven. In this paper, 12 colleges and universities are coded in the form of A–L letters, and they are sorted and analyzed, as shown in Figure 8. It can be seen that the total number of words in the syllabus of the College Aesthetic Education major art courses in these 12 undergraduate colleges and universities is quite different. For example, the number of words in school J is the largest, reaching 10,953 words, while the total number of words in the syllabus of art courses in school E is only 560

Table 2: Eight undergraduate colleges and universities without preschool art course syllabus.

School name	1	2	3	4	5	6	7	8
School grade	985	Second	First	Second	First	First	First	211
Whether the school	No	Yes	Yes	Yes	Yes	No	Yes	No
Your area	Huadong region	North China	North China	North China	North-east area	Central China	South China	Southwest region

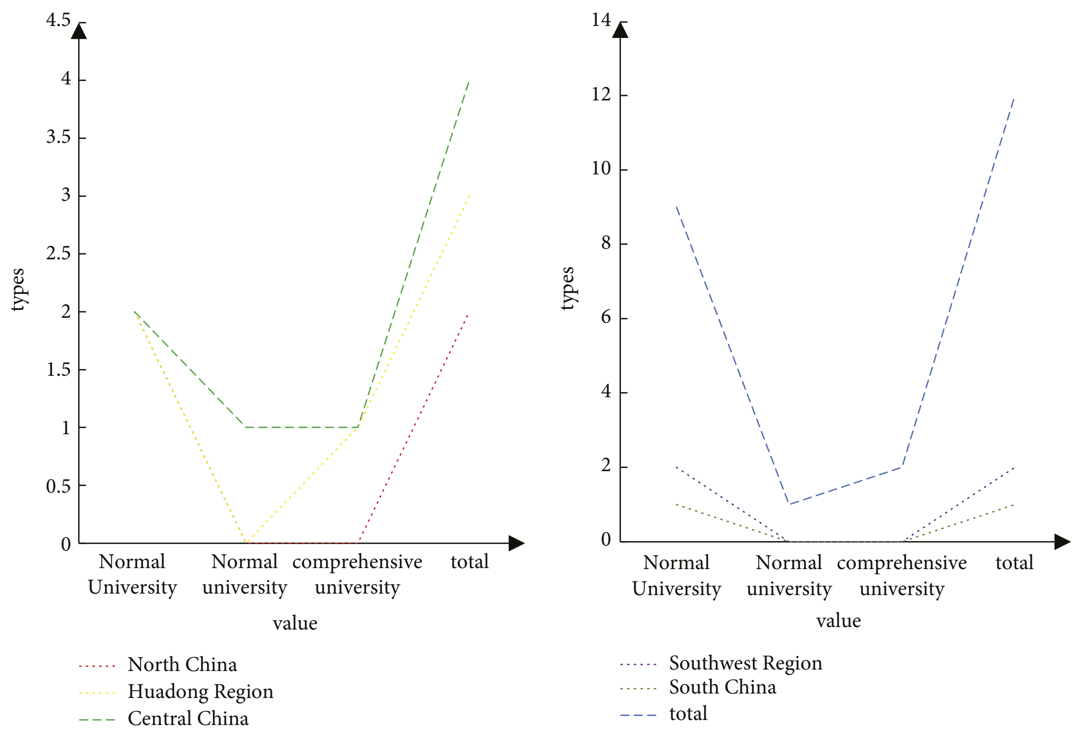

Figure 7: Statistical chart of types and distribution of 12 institutions of higher learning.

words, the J school is about 19 times that of the E school. Due to the difference in the opening time of each school's curriculum, the number of syllabus documents in each school is also different, such as A, I, H, D, B, C, the number of documents is consistent with the number of semesters in which the course is offered. Of course, there are exceptions, for example, the preschool art courses for K, B, and G are all two semesters long, but they are all written as one document.

In addition, it can also be seen from Figure 9 that the 12 undergraduate colleges and universities have different durations for preschool professional art courses [21]. For example, A only offers one-semester art courses, while H, E, D, B, L, and C all offer two-semester art courses, while I, G, F, J, and K offer three-semester fine arts program. This also shows that each school pays different attention to the art courses of College Aesthetic Education majors.

Based on the above, it can be seen that there are still huge differences in the art courses of preschool majors in Chinese undergraduate colleges. From the difference in the structure and length of the syllabus, it can be seen that some colleges and universities have written relatively detailed and explained the requirements and standards for the course content as clearly as possible. However, some colleges and universities are relatively perfunctory, and there is insufficient attention to the course. It can also be seen from the way of writing that Chinese preschool art courses are generally divided into a combination of theoretical knowledge and practical skills, and the opening hours and semesters are different, which also reflects the reform of preschool teachers in colleges and universities. The learning of art courses is a process of time accumulation and skill training. It not only allows students to understand systematic art knowledge, but also requires students to strengthen the learning and training of skills on the basis of understanding knowledge. Art courses for College Aesthetic Education majors are to train preschool teachers who will be engaged in College Aesthetic Education in the future. They should also learn basic art system knowledge and basic art skills, which also require a certain amount of training to master.

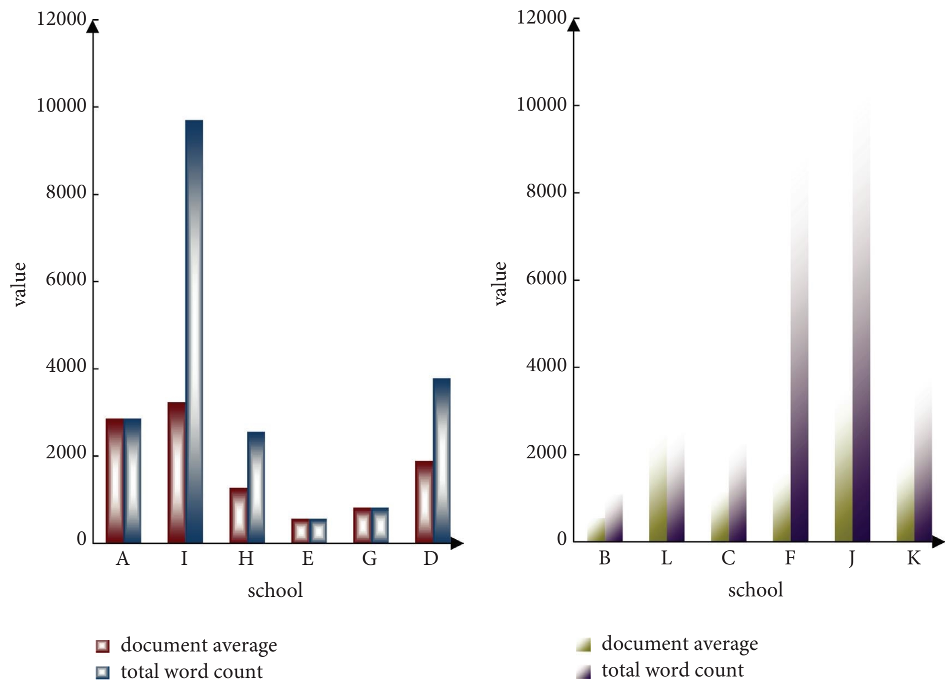

Figure 8: Word count chart of 12 pre-undergraduate professional art course syllabus documents.

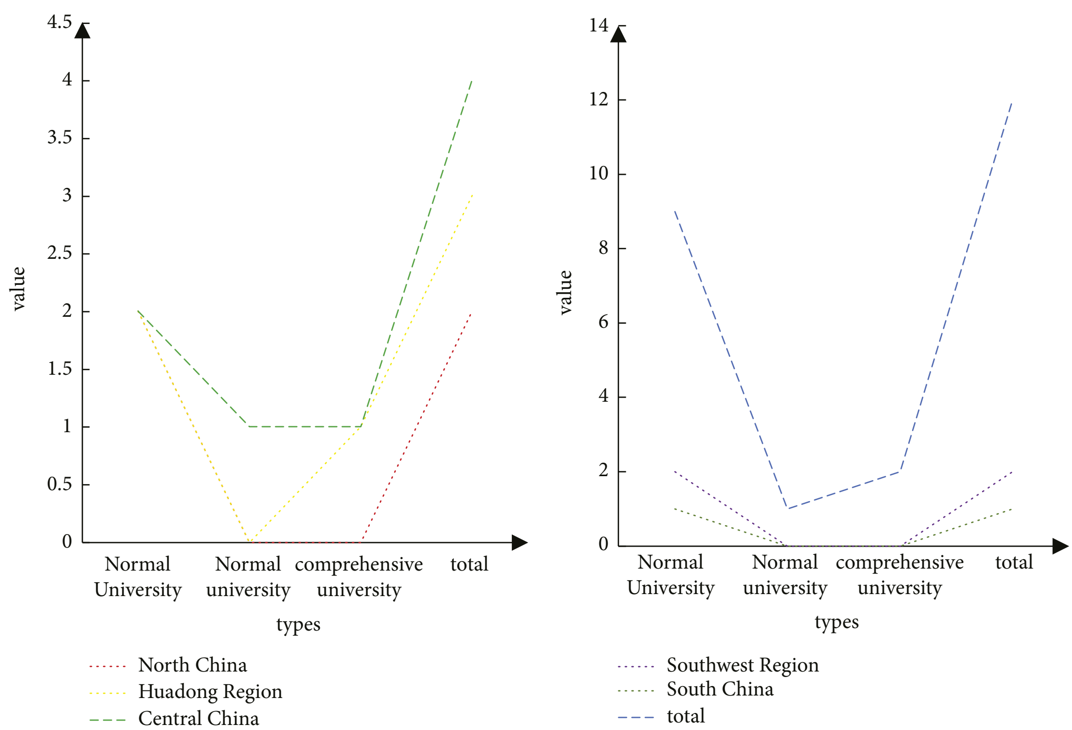

Figure 9: A line chart of the semester opening of 12 pre-undergraduate professional art courses.

4.1.4. Structural Elements of the Syllabus. Due to the different training conditions and goals of various colleges and universities, the elements of each part of the syllabus of art courses for College Aesthetic Education majors are also different. Statistics were made according to the first-level titles and their word frequencies in the 12 syllabuses of art courses for College Aesthetic Education majors in undergraduate colleges and universities. For "Course Introduction," "Course Basic Information," "Course Nature and Tasks," "Teaching Purpose, Course Objectives, Teaching Purpose and Tasks," the statistical results are shown in Table 3. The statistical results of "teaching content and requirements, and arrangement of teaching chapters" are shown in Table 4 [22].

Table 3: Main content words and frequency statistics of the syllabus of art courses for college aesthetic education majors in 12 colleges and universities.

First-level title	Syllabus and alias	Frequency of use	Total
Course nature	Basic course information	6	8
	Course nature and tasks	2	
Teaching objectives	Teaching goals and tasks	5	11
	Teaching purpose and requirements	3	
	Teaching purpose, course goal	3	

Table 4: Main content words and frequency statistics of the syllabus of art courses for college aesthetic education majors in 12 colleges and universities (b).

First-level title	Syllabus and alias	Frequency of use	Total
Teaching content	Teaching chapter content	2	9
	Teaching content and arrangement	4	
	Teaching content and requirements	3	
Teaching method	Teaching requirements and methods	2	8
	Suggestions on teaching methods and methods	2	
	Teaching methods and means	2	
	Teaching organization and arrangement	2	

Table 5: Main content words and frequency statistics of the syllabus of art courses for college aesthetic education majors in 12 colleges and universities.

First-level title	Syllabus and alias	Frequency of use	Total
Class hour allocation	School hours	7	8
Assessment method	Course assessment and evaluation	4	11
	Teaching assessment methods and grades	6	
	Learning process record	1	
Other	Link to related courses	2	2

Among the 12 syllabuses of art courses for College Aesthetic Education majors in colleges and universities, only 8 syllabuses explained the “basic information and course nature” of their courses; 8 syllabuses mentioned “teaching methods and means”; the 11 syllabuses all involve the positioning of “teaching objectives,” and only 7 syllabuses clearly stipulate the specific “hour allocation” of art courses; 11 syllabuses stipulate their “reference lists,” and 7 syllabuses clarify the connection with related courses, the relationship with other courses, teaching equipment and facilities, teaching week assignments, syllabus instructions and other details. All the syllabuses clearly pointed out the description of “the method of performance evaluation and assessment,” and the statistical results are shown in Table 5.

The above data show that the syllabus is formulated by the colleges and universities themselves, and each college has its own opinion on the content that should be involved in the syllabus of art courses for College Aesthetic Education majors and has its own emphasis on the elements, which makes the elements of the current syllabus of art courses for undergraduates majoring in College Aesthetic Education not completely unified, even incomplete and systematic. However, most syllabuses can still cover some core elements of the syllabus, such as course nature, teaching objectives, teaching content and time allocation, teaching methods and means, and assessment methods. Although it can reflect the training characteristics of undergraduates majoring in College Aesthetic Education, it still needs to be further standardized and improved.

4.2. Contents of the Syllabus of Art Courses for College Aesthetic Education Majors in 12 Undergraduate Colleges and Universities. As can be seen from Figure 10, in the College Aesthetic Education major art courses offered by 12 undergraduate colleges and universities, the knowledge and skill objectives appear most frequently, that is, to master art skills and techniques (11 times). Followed by the process and method goals, namely practical ability (6 times), creative ability (6 times), and appreciation ability (5 times). The goals of emotion, attitude, and values were the least frequently used among all goal statements, almost only passing by. For example, “to form a correct aesthetic view, develop a healthy personality, show a positive interest in painting, like to use art to express children’s life, and cultivate the morality of truth, goodness and beauty through art courses.” These goals appear only once in the syllabus of individual colleges and universities. It is not difficult to find that the teaching objectives of art courses in College Aesthetic Education are still to focus on knowledge and skills and ignore emotions,

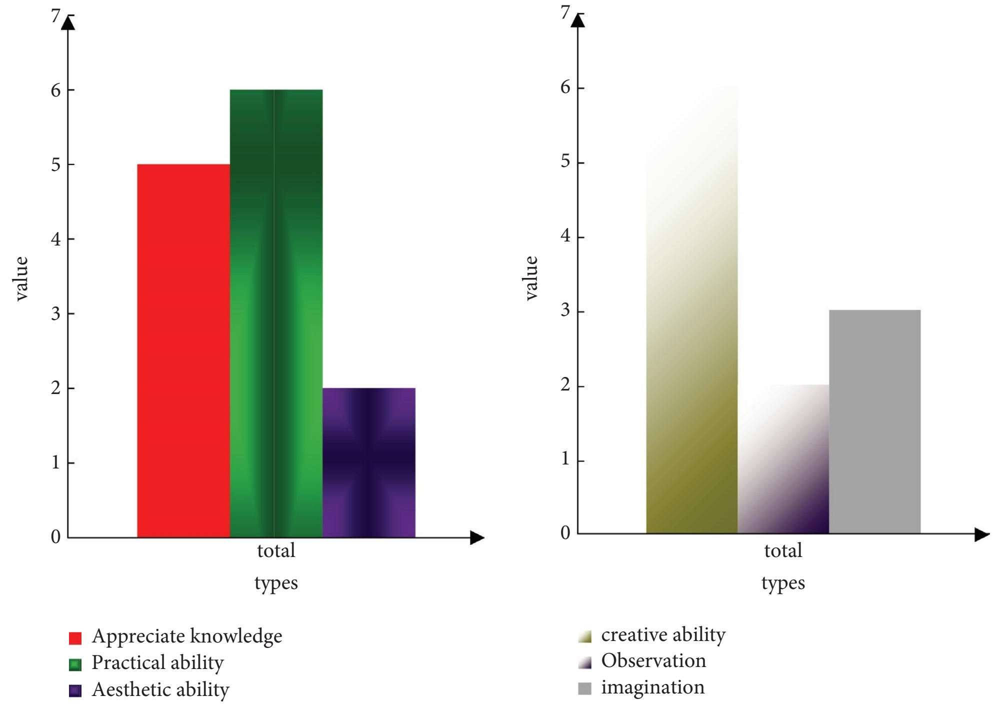

FIGURE 10: Coding summary of teaching objectives of art courses for college aesthetic education majors in 12 colleges and universities.

attitudes, and values. As stated in the nature of the course, the fine arts course is a practical course for the training of skills and skills for the College Aesthetic Education major.

5. Conclusions

Collecting the syllabus of art courses in 12 colleges and universities for investigation and analysis, from the perspective of static text, it reflects the current value orientation and problems of art courses for College Aesthetic Education undergraduates in China's higher normal colleges and universities. The study found that due to the influence of many factors, the syllabus of art courses for College Aesthetic Education majors in colleges and universities has some practical problems such as deficiencies and functional deficiencies in terms of course objectives, course content, course implementation, and evaluation. However, with China's concern for education, scholars' appeals, and the updating and improvement of the educational concepts of higher education institutions, these problems will be solved, and China's College Aesthetic Education will continue to develop and grow.

Data Availability

The data used to support the findings of this study can be obtained from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgments

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