Hindawi
Mathematical Problems in Engineering
Volume 2022, Article ID 5671785, 11 pages
https://doi.org/10.1155/2022/5671785

Research Article

Research on Evaluation of Art Education Effect in Colleges and Universities Based on Big Data Technology

Lianfeng Zhou

Department of Fine Arts, School of Fine Arts and Design, Xinyang University, Xinyang 464000, China

Correspondence should be addressed to Lianfeng Zhou; 3170400023@caa.edu.cn

Received 13 July 2022; Revised 8 August 2022; Accepted 16 August 2022; Published 28 September 2022

Academic Editor: Baiyuan Ding

In order to improve the automatic evaluation ability of fine arts education effect in colleges and universities, this paper proposes the evaluation research of fine arts education effect based on big data technology. We build university fine arts education effect data analysis model, considering the characteristics of the college art education effect; can reflect the effect of art education in colleges and universities' selected index system, with the effect of art education in colleges and universities of the decision about the elements of the decomposed into goals, standards, and plan level, such as university fine arts education effect evaluation of qualitative and quantitative analysis; find out the hidden representative university fine arts education effect evaluation factors; build fine arts education in colleges and universities' effect-associated distribution rules of the data, through unsupervised learning method, the effect of art education in colleges and universities' data feature extraction in the process of adaptive learning, by fuzzy comprehensive evaluation of big data; and realize the effect of art education in colleges and universities. The test results show that the fitness level of using this method to evaluate the effect of art education in colleges and universities is high, the score of the evaluation effect of art education in colleges and universities is significant, and it is in a good state in the evaluation index score table, indicating that the evaluation effect is accurate and reliable.

1. Introduction

The effect of fine arts education in colleges and universities is the key factor to measure the quality of fine arts education in colleges and universities, and the comprehensive quality of observing, analyzing, and solving problems. In the process of teaching evaluation and evaluation of art education in colleges and universities, it is necessary to combine the characteristics and index distribution of art education in colleges and universities, and adopt the method of index parameter analysis to realize quantitative evaluation of the effect of art education in colleges and universities [1]. In this paper, the optimization analysis model of college art education effect is studied, the quantitative optimization model of college art education evaluation is established [2], the big data analysis method is adopted, the big data information analysis model of college art education effect evaluation is carried out, and the big data mining and information fusion methods are adopted to make the evaluation decision of college art education effect. In the process of dynamic management of college art education effect evaluation, the dynamic evaluation and decision-making of college art education effect are realized by combining big data analysis and automatic mode evaluation and decision-making, and the research on related evaluation methods of college art education effect has attracted great attention [3].

The evaluation index system of the effect of art education in colleges and universities is helpful for the state to give macro guidance and management to colleges and universities, and provides the basis for decision-making for the management departments of art education and scientific research in colleges and universities. Scientific evaluation of art education in colleges and universities will clearly show the shortcomings of universities in some aspects and universities in some aspects and point out the direction of construction and management. At present, the evaluation methods of art education effect in colleges and universities mainly adopt the manual evaluation method and the scoring evaluation method. Combined with the development of big data information management technology, the evaluation and optimization of art education effect in colleges and universities can be realized with the aid of multimedia, the information management level of libraries and the ability of optimizing and dispatching art education resources in colleges and universities can be improved, and an automatic evaluation model of art education effect in colleges and universities can be established, combined with the innovative evaluation model of the effect of art education in colleges and universities, can realize the information management of the effect of art education in colleges and universities, and can realize the optimal scheduling of college art education resources under the fuzzy comprehensive evaluation decision of artificial intelligence big data. Based on the comprehensive consideration of the advantages and disadvantages of various methods, in reference [4], the gambling method and the fuzzy comprehensive evaluation method are combined to construct a comprehensive evaluation model of college art education decision-making. The final result of the study not only obtains the fuzzy comprehensive evaluation of each college art education evaluation scheme, but also ranks the advantages and disadvantages of each scheme. However, this method requires a lot of prior knowledge. In reference [5], four first-level indexes and 16 second-level index systems are constructed, and based on this index system, a fuzzy comprehensive evaluation model of the effect of college art education is established to comprehensively evaluate the effect level of college art education for a college student in Hunan Province, but the index evaluation system of this method is not perfect enough [6–8].

Aiming at the above problems, this paper puts forward an automatic evaluation method of college art education effect based on big data fuzzy comprehensive evaluation. A characteristic analysis model of college art education effect data, considering the characteristics of college art education effect, is constructed, an index system that can reflect the effect of college art education is selected, the elements that are always related to the decision-making of college art education effect into objectives, criteria, schemes, and other levels make a qualitative and quantitative analysis of college art education effect evaluation, and a semantic joint degree detection model of college art education effect evaluation index system data is constructed. The statistical analysis method of common factors is used to find out the hidden representative evaluation factors of college art education effect, and the fuzzy regression analysis method is used to construct the association distribution rule set of college art education effect data. The unsupervised learning method is used to carry out adaptive learning in the process of feature extraction of college art education effect data. Finally, the simulation test analysis shows the superior performance of this method in improving the ability of automatic evaluation of college art education effect.

2. Index Model and Characteristic Analysis of the Effect Evaluation of Art Education in Colleges and Universities

2.1. Index Parameter Model of the Effect Evaluation of Art Education in Colleges and Universities. The standard of the evaluation index of the effect of art education in colleges and universities is an organic whole with an internal structure, which is composed of multiple indexes representing the characteristics of the evaluation object in all aspects and their interrelation. It needs to follow the systematic principle, the typical principle, the dynamic principle, and the comprehensive principle to evaluate. In order to realize the comprehensive evaluation of the effect of art education in colleges and universities, it is necessary to construct the parameter distribution model of the evaluation index of the effect of art education in colleges and universities [9, 10]. Each index in the index system is independent and interrelated. Indicators reflect different aspects of scientific research and innovation, and each indicator should not be repeated and crossed [11–13]; at the same time, each index element describes the same ability behavior together, so it is interrelated. Each index has its own unique connotation [14]. Combined with the graph model parameter analysis, the semantic ontology graph model fusion method is adopted to construct the big data decision-making structure model of college art education effect evaluation, as shown in Figure 1.

According to the decision index block big data detection model of college art education effect evaluation shown in Figure 1, under the homomorphic mapping mechanism, the adaptive scheduling and information fusion of college art education effect are realized [15–17], and the edge structure feature quantity of college art education effect is obtained. The distributed node structure model of college art education effect evaluation is constructed by using the directed graph model. According to the established evaluation index of college art education effect, a scale for evaluating the effect of art education in colleges and universities is designed. The scale items are graded according to the 25 indicators of the evaluation system [18]. Likert's 5-point scoring method is adopted, and 1~5 points are used to indicate very unimportant, not very important, average, relatively important, and very important. There are 5 grades in total. The correlation of the distribution nodes of the effect of art education in colleges and universities is expressed as follows:

$$O = \dot{X}\frac{1}{2}\|w\|^2 + \dot{Y}C\sum_{i=1}^{n}\left(\xi_i + \xi_i^*\right) + \sum_{i=0}^{k-1}\left(x_i(t) - \omega_{ij}(t)\right)^2, j = 0, 1, \ldots, N-1. \tag{1}$$

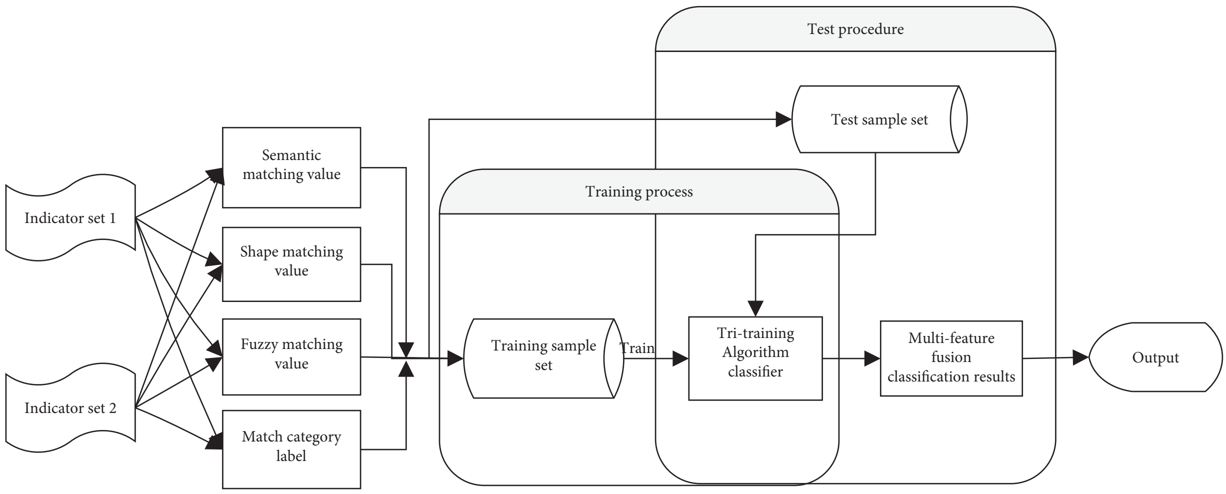


Figure 1: Distribution structure model of decision-making indicators for the evaluation of the effect of art education in colleges and universities.

In formula (1), $\dot{X}$ is the effect of art learning, w is the dimension of art learning, $\dot{Y}$ is the relative importance of influencing factors, C is the comprehensive score of art, n is the number of students, ξ_i is the original space mapping, ξ_i^* is the high-dimensional feature space mapping, k is the distance, $x_i(t)$ is the classification interval of art teaching, and $\omega_{ij}(t)$ is the weighted sum of art education courses. Assuming that the sample set ω has j category labels, the ambiguity function of the effect of college art education is established according to the distribution nodes of college art education effects, which are expressed as follows:

$$\omega_j = \sum_{k=0}^{2N-1} h_k e^{-jk\omega} + \left(\omega_{0j}, \omega_{1j}, \ldots, \omega_{k-1,j}\right). \tag{2}$$

In formula (2), N is the information gain value, h_k is the art course weight, and $e^{-jk\omega}$ is the information entropy. By completing the directional fusion clustering analysis of the useful text feature distribution in the effect of art education in colleges and universities, the edge feature component $H(x, y)$ of the effect of art education in colleges and universities is obtained. Through the design of the semantic graph model, the semantic matching judgment formula of the edge feature component $H(x, y)$ of the effect of art education in colleges and universities is as follows:

$$H(x, y) = \begin{cases} \text{text}, & \text{if}\left(GD_X(x, y) > T_X\right), \\ \text{text}, & \text{otherwise}. \end{cases} \tag{3}$$

In formula (3), the characteristic distribution dimension of the effect of art education in colleges and universities is m, and the edge distribution feature set of the evaluation of the effect of art education in colleges and universities is N_{j*}. Based on the fuzzy decision of the effect of art education in colleges and universities, if Δx is used to represent the weight of the effect of art course education, the minimum distance of node distribution of the effect model of fine arts education in colleges and universities is as follows:

$$Y = \sin\left[2\Delta x\left(t - \frac{m}{2 \times N_{j*}}\right)\right] = \min_{0 \le j \le N-1}\left\{d_j\right\}. \tag{4}$$

In formula (4), t is the test time. Since the effect of art education in colleges and universities is divided into 3×3 topology, through the statistical feature extraction method in which each principal component is the original variable, the big data fusion of the effect of art education in colleges and universities is carried out; the index system that can reflect the effect of art education in colleges and universities is selected; the elements related to the decision-making of the effect of art education in colleges and universities are decomposed into objectives, criteria, schemes, and other levels; and the qualitative and quantitative analysis of the effect evaluation of art education in colleges and universities is carried out [19–21]. This paper constructs the semantic union degree detection model of the evaluation index system data of college art education effect, finds out the hidden representative evaluation factors of college art education effect by using the statistical analysis method of common factors, and adopts the fuzzy regression analysis method to construct the fuzzy parameters of college art education effect evaluation as follows:

$$\begin{aligned} X = P &= \min\left\{\sum_{i}^{5} P_i, 1\right\} \\ &= \frac{2^{-\lambda\left(t_c - t_a + T_d\right) - 1}}{2^{-\lambda T_d} - 1} \subset R^s. \end{aligned} \tag{5}$$

In formula (5), P_i is the feature weight, λ is the feature weight, t_c is the interval mean, t_a is the interval variance, T_d is the number of features, and R^s is the membership value. According to the analysis results of association rules, the quantitative feature components of college art education effect are obtained, wherein the feature components of college art education effect attributes of samples with matched autocorrelation features are as follows:

$$x_i = GXN_0 + \frac{\widetilde{x}(t)}{\widetilde{x}(u)}. \quad (6)$$

In formula (6), $\widetilde{x}(t)$ is the fuzzy correlation degree of college art education effect data, $\widetilde{x}(u)$ is the statistical characteristic quantity of college art education effect data, N_0 is the composite parameter of college art education effect evaluation, G is the actual output value of the college art education test sample, and X is the total number of college art education test samples [22, 23].

2.2. Analysis of Characteristics of Art Education Effect Evaluation in Colleges and Universities. Teachers should make different evaluation schemes according to different types of art courses. Instead of making it simple and simple, teachers should make different evaluations according to different characteristics of art courses. In addition to teacher's direct evaluation, various forms can also be adopted. Mutual evaluation of artworks with different characteristics can not only deepen students' understanding of the diversity of works, but also deepen their knowledge and understanding of the diversity of beauty. The application of various forms, rhythms, symmetry, and balance of works strengthens students' aesthetic consciousness, deepens their knowledge and understanding of artistic expressiveness, improves their ability of appreciation and judgment, and at the same time cultivates and exercises their language description ability, as well as their ability to comment on art. In this way, students can learn the strengths of others, recognize their own shortcomings, learn from each other, and at the same time, they can see their own strengths and enhance their confidence in learning. Teachers' affirmation of works of different styles in this process can make students realize that artworks themselves are the result of people with different personalities looking at the world and life from different angles and using different methods to express them. Works embody people's ideal, desire, emotion, personality, love and beauty, and other characteristics, so "there is no uniform standard in art, and personal standards do not apply to all art phenomena." Therefore, one cannot deny the value of works that one does not like. In this process, some questions can also be designed to encourage students to participate in the evaluation, self-evaluation, and mutual evaluation, and encourage students to actively participate and actively speak, rather than a mere formality. To design the evaluation content based on the learning content and homework requirements of each lesson is conducive to consolidating the classroom teaching effect.

According to the design of a large dataset distribution model of college art education effect, combined with the distributed design of fusion characteristics of college art education effect evaluation, the realization process of college art education effect evaluation is shown in Figure 2.

The method of semantic ontology model analysis is used, the feature space distribution model of college art education effect evaluation is constructed, and the process control of college art education effect evaluation is realized by the method of block information fusion and feature matching [24]. On the basis of statistical analysis and fuzzy detection, the fuzzy evaluation set of college art education effect is obtained as follows:

$$Y(U) = \frac{1}{1 + \alpha(\partial S/\partial t)^2} + \frac{p_{i,j}(t) - sp_{i,j}(t)}{p_{i,j}(t)}. \quad (7)$$

In formula (7), α is the feature division point, ∂ is the standardization coefficient, S is the ambiguity set, $p_{i,j}(t)$ is the continuous feature distribution set, $sp_{i,j}(t)$ is the function learning set, and $p_{i,j}(t)$ is a training set for evaluating the effect of art education in colleges and universities. Under the guidance of the fuzzy evaluation set of the effect of art education in colleges and universities, the joint-related parameters of the evaluation nodes of the effect of art education in colleges and universities can be obtained as follows:

$$S_C = \frac{2n(D_1 \cap D_2)}{n(D_1) + n(D_2)}. \quad (8)$$

In formula (8), $n(D_1)$ and $n(D_2)$, respectively, represent the number of semantically directed evaluation nodes of the effect distribution of art education in colleges and universities, and $n(D_1 \cap D_2)$ represents the number of common nodes in the semantic graph of the effect evaluation of college art education. According to the above calculation results, a semantic correlation distribution feature set of the evaluation of the effect of art education in colleges and universities is formed as follows:

$$\begin{aligned} S &= S_C * (a + b * Sr) + \min\left\{\sum_{i}^{5} P_i, 1\right\} \\ &= \frac{2^{-\lambda(t_c - t_a + T_d) - 1}}{2^{-\lambda T_d} - 1}. \end{aligned} \quad (9)$$

In formula (9), $S_C *$ is the art education effect of the target colleges and universities to be evaluated, a is the regression coefficient, $b *$ is the equilibrium coefficient, and S_r is the steady-state model, while $S_r = 0$, and the similarity S of characteristic quantities of art education effect in colleges and universities depends on $S_C * a$. According to the results of feature extraction and similarity analysis of college art education effect, an optimization and innovation model of college art education effect evaluation is constructed. Through random forest optimization of big data mining results of college art education effect, the iterative equation of data disclosure audit of college art education effect evaluation is obtained as follows:

$$\begin{aligned} v_{i,d}^{k+1} &= \omega \cdot v_{i,d}^{k} + c_1 \cdot \text{rand}()\cdot \\ &\quad \cdot \left(c_3 \cdot \text{rand}() \cdot p\text{best}_{i,d}^{k} - x_{i,d}^{k}\right) \\ &\quad + c_2 \cdot \text{rand}() \cdot \left(c_4 \cdot \text{rand}() \cdot g\text{best}_{d}^{k} - x_{i,d}^{k}\right). \end{aligned} \quad (10)$$

In formula (10), ω is the mean value of course grades, $v_{i,d}^{k}$ is the mean value of course grade items, $c_1 \cdot \text{rand}$ and $c_2 \cdot$

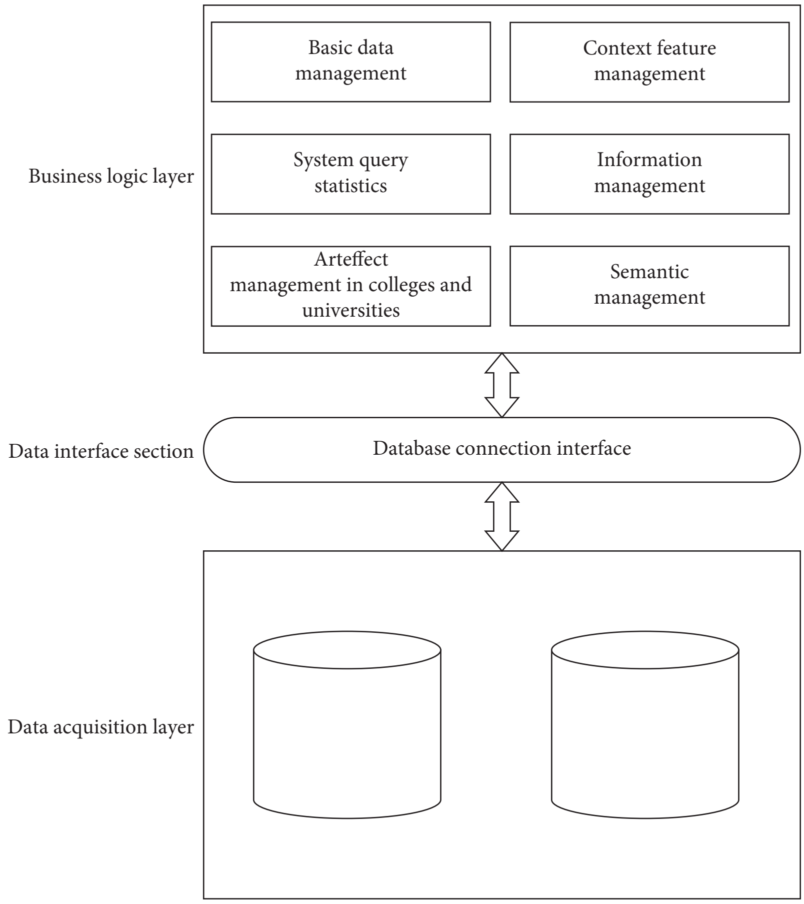


Figure 2: The implementation process of the effect evaluation of art education in colleges and universities.

rand are cryptographic hash functions, $c_3 \cdot$ rand and $c_4 \cdot$ rand are blockchain ownership operators, and their expressions are as follows:

$$c_3 \cdot \text{rand}() = \begin{cases} 1, & e_p > e_{0p}, \\ c_3 \times \text{rand}() & e_p \leq e_{0p}, \end{cases}$$
$$c_4 \cdot \text{rand}() = \begin{cases} 1, & e_g > e_{0g}, \\ c_4 \cdot \text{rand}() & e_g \leq e_{0g}. \end{cases} \tag{11}$$

In formulas (11) and (12), $\widetilde{x}_{ij} = x_{\max} + x_{\min} - x_{ij}$ represents registered uplink parameters, c_4 represents global optimization coefficient, e_p stands for the deviation of the evaluation effect of art education in colleges and universities, e_g represents the deviation between the current value and the current global optimal value, and thus, a statistical analysis model is constructed for the evaluation of the effect of fine arts education in colleges and universities.

3. Automatic Evaluation and Optimization of Art Education Effect in Colleges and Universities

3.1. Integration of Parameters and Indicators for the Evaluation of the Effect of Art Education in Colleges and Universities. According to the semantic text abstract feature components of college art education effect [25], the fuzzy regression analysis method is adopted to construct the association distribution rule set of college art education effect data, and the auxiliary decision distribution weight coefficient of college art education effect evaluation is l. Under the condition of generating dynamic evaluation text features of college art education effect, the fuzzy partition block scheduling of college art education effect is combined with the statistical information mining method, and the descriptive clustering function of college art education effect feature distribution is obtained as follows:

$$\begin{aligned} M_v &= GXN_0 + \frac{\widetilde{x}(t)}{\widetilde{x}(u)} \\ &= \sum_{i=1}^{n} l\left(\alpha_i - \alpha_i^*\right) K\left(x_i, x_j\right). \end{aligned} \tag{12}$$

In formula (12), α_i is the original feature value, α_i^* is the feature value after information mining, and $K(x_i, x_j)$ is the edge number of the effect of art education in colleges and universities. The method of block matching and self-adaptive supervised learning is used to obtain the evaluation decision-making matrix of the effect of art education in colleges and universities. Combined with the method of information fusion, the binary semantic decision-making model of the effect of art education in colleges and universities is obtained. According to the fusion results of the effect of art education in colleges and universities, combined with the method of fuzzy cluster analysis, an automatic evaluation model of the effect of art education in colleges and universities is established [26].

3.2. Evaluation and Output of Art Education Effect in Colleges and Universities. By using big data fusion and feature classification technology, a correlation fusion scheduling model of college art education effect evaluation is established. Through big data fuzzy comprehensive evaluation, the evaluation method refers to a multifactor comprehensive evaluation method when a thing is affected by multiple factors. The scope of some elements does not have clear boundaries, and the fuzzy comprehensive evaluation method can convert qualitative indicators into quantitative indicators according to the principle of maximum membership degree, so as to make a comprehensive evaluation of things affected by multiple factors. The differentiated feature parameter set of college art education effect is analyzed. Under the decision of artificial intelligence big data fuzzy comprehensive evaluation, combined with subspace fuzzy information clustering method, the fuzzy degree matching of college art education effect evaluation process is realized. If P courses are represented as $x_1, x_2, \ldots\ldots, x_p$, $c_1, c_2, \ldots\ldots, c_p$ represents the weight of each course, so the sum of the weights is $s = c_1x_1 + c_2x_2 + \ldots\ldots c_px_p$. We hope that the appropriate weight can better distinguish the students' grades. Each student corresponds to one such comprehensive grade, and N is the number of students. Assuming that the spatial distribution dimensions of current college art education effect characteristics' preference are $s_1, s_2, \ldots\ldots, s_n$, and $N_1, \ldots, N_n$, the priority control cost function of automatic evaluation of college art education effect is as follows:

$$T_i = \frac{G}{D_i^+ + D_i^-} + \sum_{i-m+1}^{n} E\left[(a_i - b_i)^2\right]. \tag{13}$$

In formula (13), D_i^+ is the sample whose feature value is greater than α_i^* in the set D, D_i^- is the sample whose feature value is less than α_i^* in the set D, and $E[(a_i - b_i)^2]$ is the state distribution set submodel of the effect evaluation of fine arts education in colleges and universities. The measurement data of the evaluation of the effect of art education in colleges and universities meet the main characteristic of correlation degree, and the correlation characteristic quantity is obtained as follows:

$$\mathrm{OF}(p) = \frac{|\mathrm{IS}(p)| \cdot c\_\mathrm{distance}(p)}{\sum_{o\in IS(p)} c\_\mathrm{distance}(o)}. \tag{14}$$

In formula (15), in the neighborhood of the k-th distance, the reliability of the evaluation process is searched by combining inertial parameter analysis and feature fitting, the fitness function of the evaluation of the effect of college art education is established, the weight coefficient is k, the subspace planning model of the evaluation of the effect of college art education is constructed, and the parameter optimization model is as follows:

$$\% \begin{cases} f_i(t) = \dfrac{K}{t_0 - t} = \dfrac{K/t_0}{1 - t/t_0} = \dfrac{f_{\max} f_{\min}}{f_0}\left(1 + \dfrac{t}{t_0} + \dfrac{t^2}{t_0^2} + \cdots\right), \\ |t| \leq \dfrac{T}{2}. \end{cases} \tag{15}$$

In formula (16), the subspace scheduling and random forest learning model of college art education effect evaluation is established, and the autocorrelation feature matching method is taken. The spatial block distribution function of college art education effect features is r_{ij}, and the attribute set of college art education effect evaluation is obtained as follows:

$$Y(x) = \Delta\left(\frac{\Delta^{-1}(r_{ij}, a_{ij})}{\sum_{i=1}^{n} \Delta^{-1}(r_{ij}, a_{ij})}\right). \tag{16}$$

In formula (16), a_{ij} is the set of common scoring items. The evaluation priority order of the text set Y of college art education effect is calculated, and the feature clustering model of the feature information of college art education effect by the adaptive optimization method is constructed. The quantitative parameters of the feature of college art education effect are as follows:

$$\% \; h(t) = \sum_i a_i(t)\left[x_1(k), x_1(k+1), \ldots\ldots, x_1(k+N-1)\right]. \tag{18}$$

In formula (18), $a_i(t)$ is the dimension of the feature vector. A fusion model of characteristics' preference of college art education effect is built, the statistical characteristics of college art education effect are established, and a prior decision model of college art education effect through prior data evaluation is obtained as follows:

$$\min F = R^2 + A\sum_i \xi_i, s.t.\colon \left\|\phi(x_i) - o\right\|^2 \leq R^2 + \xi_i \text{ and } \xi_i \geq 0, i = 1, 2, \ldots \tag{19}$$

$$\max \sum_i \alpha_i K(x_i, x_i) - \sum_i \sum_j \alpha_i \alpha_j K(x_i, x_j) s.t.\colon \sum_i \alpha_i = 1 \text{ and } 0 \leq \alpha_i \leq A, i = 1, 2, \ldots \tag{20}$$

In formulas (19) and (20), R^2 is the autocorrelation feature matching set of art education effect in colleges and universities, and A is the average distribution set of quantitative statistics of the effect of art education in colleges and universities. According to the above analysis, a correlation fusion scheduling model for the effect evaluation of art education in colleges and universities is established, and the effect evaluation of art education in colleges and universities can be realized through big data fuzzy comprehensive evaluation and statistical analysis methods.

4. Empirical Analysis and Testing

In order to verify the application performance of this method in realizing the automatic evaluation of fine arts education effect in colleges and universities, SPSS13.0 is used to conduct statistical analysis on the results of the questionnaire, and factor analysis is used to synthesize many original variables into few comprehensive indicators. Delphi method, entropy method, fuzzy cluster analysis, analytic hierarchy process are adopted. Then, a comparative experiment is carried out, assuming that the dimension of the sample set of the information distribution of automatic evaluation of the effect of art education in colleges and universities is 45, the data scale is 1200, the performance analysis object is the selected art major student in a college, and the experimental data is selected from iResearch datahttp://www.iresearch.cn). The distribution of evaluation grades of art education effect in colleges and universities is shown in Table 1.

According to the above evaluation grade distribution, the use of AHP first needs to select the relatively important factors from many factors and divide them into several levels according to the relationship between the factors. The relationship between the factors at each level should be marked, and the scale information definition of the evaluation grade is shown in Table 2.

According to the above parameter settings, the effect evaluation of art education in colleges and universities is carried out, and the distribution histogram of the effect of art education in colleges and universities is obtained as shown in Figure 3.

Taking the dataset of Figure 3 as the test object, the effect evaluation and optimization decision of college art education are made, and the graded evaluation results are shown in Figure 4.

According to the analysis of Figure 4, this method can effectively achieve the graded evaluation of college art education effect, and the evaluation results of each test group are better. The reason is that this method adopts big data fusion and feature classification technology to establish a correlation fusion scheduling model of college art education effect evaluation. Under the decision-making of artificial intelligence big data fuzzy comprehensive evaluation, combining the subspace fuzzy information clustering method, the fuzzy degree matching of the evaluation process of college art education effect can be realized, which is beneficial to increase the grading evaluation effect of college art education effect to a certain extent. According to the test and evaluation, the automatic evaluation results of fine arts education effect in colleges and universities are shown in Table 3.

According to the results in Table 4, the integrity score of college art education effect evaluation by this method is high. The reason is that this method adopts fuzzy regression analysis method according to the semantic text abstract feature components of college art education effect, constructs the association distribution rule set, and obtains the descriptive clustering function of feature distribution under the condition of generating dynamic evaluation text features, which is conducive to improving the automatic evaluation results of college art education effect. The accuracy of the score is tested. Different methods are used for evaluation, and the Delphi method, entropy method, fuzzy cluster analysis method, and analytic hierarchy process (AHP) method are used for comparison. The comparison results of evaluation reliability are shown in Table 4.

Analysis of Table 4 shows that the method in this paper has a significant effect on the evaluation effect of art education in colleges and universities, and the evaluation index score table is in an excellent state, indicating that the evaluation effect is accurate and reliable. On the basis of the accuracy of the evaluation effect, the time of automatic evaluation of the effect of art education in colleges and universities is tested and analyzed. The data of 600 different types of college art education courses were randomly selected as test data. By comparing and testing the time for automatic evaluation of the effect of art education in colleges and universities with the Delphi method, the fuzzy cluster analysis method, and the entropy method, the results are shown in Figure 5.

According to Figure 5, the method in this paper adopts the fuzzy regression analysis method to construct the association distribution rule set of the effect data of college art education and generate the correlation fusion scheduling model of the effect evaluation of college art education, so as to improve the effect of college art education, so the automatic evaluation time is shorter, only 5s can effectively predict the effect of 600 different types of high-efficiency art education courses, the efficiency is significantly higher than the other three methods, and it has strong applicability.

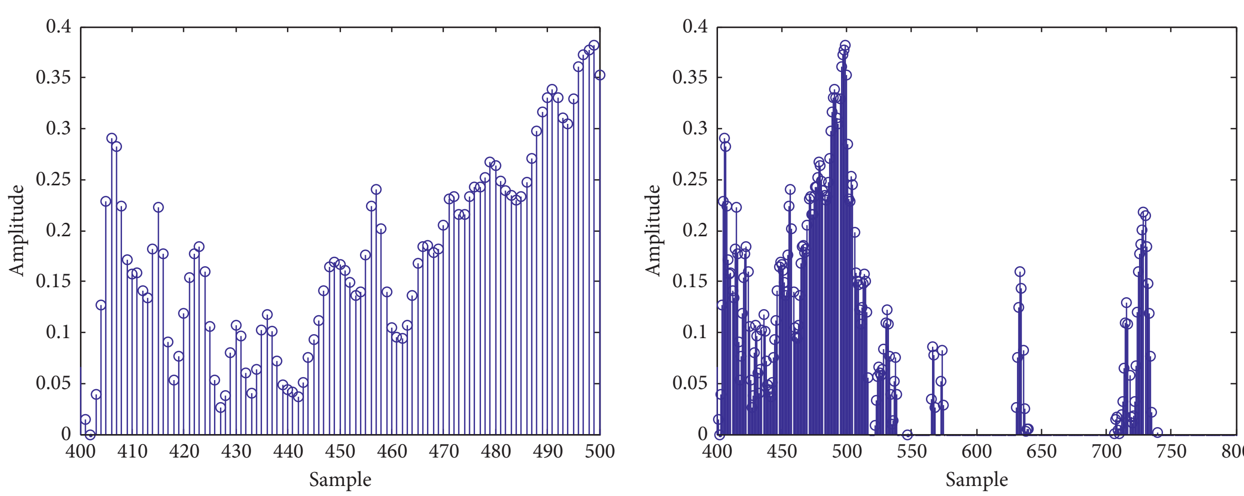
To sum up, this method can effectively achieve the graded evaluation of the effect of art education in colleges and universities. The evaluation effect of each test group is good. Using this method to evaluate the effect of art education in colleges and universities, the integrity score is high; the evaluation effect score of art education in colleges and universities is significant; and it is in a good state in the evaluation index score table, indicating that the evaluation effect is accurate and reliable. Only 5s can effectively predict the effect of 600 different types of efficient art education courses, which has strong applicability.

Table 1: Grade distribution of evaluation on the effect of art education in colleges and universities.

Evaluation grade	Semantic constraint coefficient	Text constraint	Similarity index
Grade 01	0.410	0.521	9.9646
Grade 02	0.459	0.607	5.4624
Grade 03	0.456	0.762	2.9528
Grade 04	0.426	0.754	0.3609
Grade 05	0.412	0.496	0.8896
Grade 06	0.430	0.797	9.0462
Grade 07	0.450	0.851	1.1769
Grade 08	0.439	0.506	7.3216
Grade 09	0.415	0.677	7.6317
Grade 10	0.410	0.855	4.0680
Grade 11	0.467	0.742	0.6409
Grade 12	0.464	0.448	7.5907
Grade 13	0.477	0.567	0.8189
Grade 14	0.412	0.519	5.9693
Grade 15	0.459	0.660	2.3849
Grade 16	0.430	0.647	3.2810
Grade 17	0.425	0.746	6.3253
Grade 18	0.470	0.837	5.6985
Grade 19	0.428	0.768	6.6322
Grade 20	0.445	0.984	2.0046

Table 2: Scale information of evaluation grade.

A	A_1	A_2	A_j	...	A_n	Reference value
A_1	a_{11}	a_{12}	a_{1j}	...	a_{1n}	1
A_2	a_{21}	a_{22}	a_{2j}	...	a_{2n}	1
...	...	...	...	...	...	1
A_i	a_{i1}	a_{i2}	a_{ij}	...	a_{in}	1



(a) (b)

Figure 3: Histogram of the effect distribution of art education in colleges and universities. (a) Test set. (b) Training set.

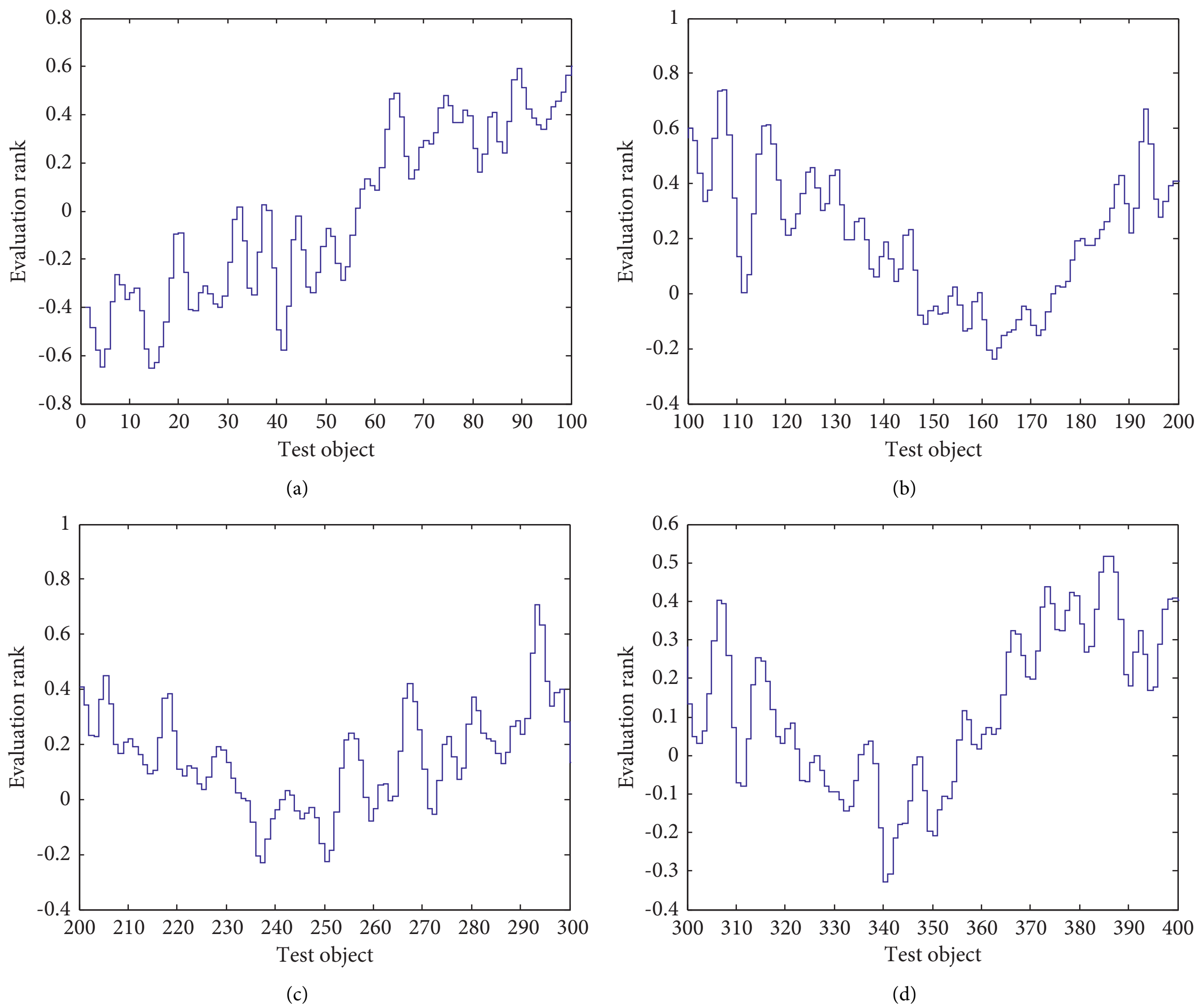


FIGURE 4: Graded evaluation results of the effect of art education in colleges and universities. (a) Test sample 1. (b) Test sample 2. (c) Test sample 3. (d) Test sample 4.

TABLE 3: Results of automatic evaluation of the effect of art education in colleges and universities.

Evaluating indicators	Integrity score	Statistical characteristic quantity	Equivocation	Distribution difference
Sample 1	12.747	0.410	0.416	3.0412
Sample 2	12.638	0.424	0.522	0.0669
Sample 3	13.242	0.437	0.476	6.3569
Sample 4	12.048	0.414	0.868	1.1505
Sample 5	12.525	0.407	0.485	5.2021
Sample 6	11.955	0.459	0.535	0.0170
Sample 7	14.479	0.477	0.588	5.4217
Sample 8	12.234	0.480	0.814	2.7214
Sample 9	12.301	0.423	0.857	3.0256
Sample 10	11.830	0.453	0.475	3.9617
Sample 11	14.475	0.427	0.651	7.2505
Sample 12	14.266	0.469	0.675	7.4756
Sample 13	13.868	0.416	0.698	2.7666
Sample 14	11.785	0.431	0.811	2.7352
Sample 15	13.631	0.450	0.835	0.7911
Sample 16	0.327	0.475	0.778	5.3509
Sample 17	0.332	0.418	0.463	5.5651
Sample 18	0.358	0.431	0.828	6.5161

Table 4: Evaluation reliability comparison.

Test time	Methods of this paper	Delphi method	Fuzzy cluster analysis method	Entropy method
10	99.79	73.35	85.02	42.55
20	94.58	71.22	82.79	41.88
30	92.16	71.21	81.76	41.97
40	96.16	71.94	83.47	42.12
50	103.60	72.86	86.65	42.22
60	101.65	71.73	85.82	41.83
70	104.63	73.41	87.09	42.40
80	97.28	72.25	83.95	42.20
90	99.42	70.48	84.86	41.42

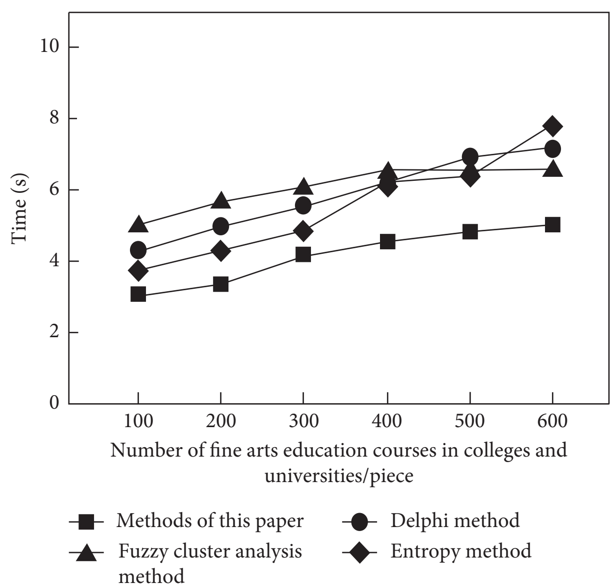


Figure 5: Time results of automatic evaluation of the effect of art education in colleges and universities.

5. Conclusions

In this paper, an automatic evaluation method of college art education effect based on big data fuzzy comprehensive evaluation is proposed. A data characteristic analysis model of college art education effect is constructed; considering the characteristics of college art education effect, an index system is selected that can reflect the effect of college art education. By using big data fusion and feature classification technology, a correlation fusion scheduling model of college art education effect evaluation is established. Through big data fuzzy comprehensive evaluation, combined with the statistical analysis methods, college art education effect evaluation is realized. The test results show that the fitness level of this method is high, and the score of the evaluation effect of college art education is significant. The evaluation index score table is in excellent condition, which indicates that the evaluation effect is accurate and reliable. The test shows that this method has high accuracy and little difference in realizing the automatic evaluation of college art education effect.

Data Availability

The raw data supporting the conclusions of this article will be made available by the author, without undue reservation.

Conflicts of Interest

The author declares no conflicts of interest regarding this work.

Acknowledgments

This work was supported by the Art Creation Supported Project "Chinese Painting" New Year Wood-Block Prints of Zhuxian Town (2022-A-03-(015)-209).

References

[1] G. Zhai, Y. Yang, H. Wang, and S Du, "Multi-attention fusion modeling for sentiment analysis of educational big data," *Big Data Mining and Analytics*, vol. 3, no. 4, pp. 311–319, 2020.
[2] F. Welzel, C. F. Klinck, Y. Pohlmann, and M Bednarczyk, "Grid and user-optimized planning of charging processes of an electric vehicle fleet using a quantitative optimization model," *Applied Energy*, vol. 290, no. 1, pp. 116–127, 2021.
[3] Jh Burgher and H Hamers, "A quantitative optimization framework for market-driven academic program portfolios," *International Journal of Educational Management*, vol. 34, no. 1, pp. 1–17, 2020.
[4] Na Xie, W. Tan, Y. Cao, and Z. Lu, "Modeling and analysis of security information flow in mobile edge computing[J]," *Computer Engineering*, vol. 48, no. 5, pp. 35–42, 2022.
[5] X. Jing, G. Sun, S. He, and Y. Liao, "Time-varying channel estimation method based on sliding window filtering and polynomial fitting[J]," *Journal of Computer Applications*, vol. 41, no. 9, pp. 2699–2704, 2021.
[6] A. H. Sodhro, M. S. Obaidat, Q. H. Abbasi et al., "Quality of service optimization in an IoT-driven intelligent transportation system," *IEEE Wireless Communications*, vol. 26, no. 6, pp. 10–17, 2019.
[7] K. Li and J. Li, "Structure-fuzzy multi-class support vector machine algorithm based on pinball loss[J]," *Journal of Computer Applications*, vol. 41, no. 11, pp. 3104–3112, 2021.
[8] X. Zhang, C. Wang, Y. Lv, and Y. Lin, "Hierarchical classification online streaming feature selection algorithm based on ReliefF algorithm[J]," *Journal of Computer Applications*, vol. 42, no. 3, pp. 688–694, 2022.
[9] G. Li, Y. Zhao, L. Zhang, X. Wang, Y. Zhang, and F Guo, "Entropy-based global and local weight adaptive image

segmentation models," *Tsinghua Science and Technology*, vol. 25, no. 1, pp. 149–160, 2020.
[10] W. Zhang, Y. Liu, Z. Liu, S. Wang, Z. Zhen, and Y Li, "Research on fault monitoring technology of distribution network based on fuzzy association rules mining," *Journal of Physics: Conference Series*, vol. 1626, no. 1, pp. 012072–12122, 2020.
[11] N. Kikuchi, H. Uojima, H. Hidaka et al., "Prospective study for an independent predictor of prognosis in liver cirrhosis based on the new sarcopenia criteria produced by the Japan Society of Hepatology," *Hepatology Research*, vol. 51, no. 9, pp. 968–978, 2021.
[12] Y. Zhou, "Research on the quality evaluation of innovation and entrepreneurship education for college students based on grey correlation algorithm[J]," *The Science Education Article Cultures*, vol. 35, pp. 2–4, 2020.
[13] J. Chen, Y. Xing, J. Li, Z. Yangi, and W. Lu, "In-depth exploration of talent-based QEABM education evaluation system[J]," *Journal of China West Normal University(Natural Science)*, vol. 41, no. 3, pp. 331–340, 2020.
[14] Yu Du, "The evaluation and studies of students online learning behavior based on CART classification algorithm[J]," *Journal of Yunnan University of Nationalities(Natural Sciences Edition)*, vol. 29, no. 4, pp. 390–395, 2020.
[15] W. Xi, "Research on dynamic early warning system of ideological and political education based on improved SVM [J]," *Microcomputer Applications*, vol. 36, no. 9, pp. 27–31, 2020.
[16] P. Liu and W. Jia, "The teaching quality evaluation model of the RBF neural network based on particle swarm optimization [J]," *Modern Computer*, no. 19, pp. 12–15, 2020.
[17] Y. Wang and Z. Song, "Analysis on public physical education teaching and evaluation of college students under decision tree algorithm," *Journal of Microcomputer Applications*, vol. 36, no. 10, pp. 15–17, 2020.
[18] H. Ding, T. Di, Y. Lin, and X. Gu, "Evaluation research on the randomness of pseudo-random number generator algorithms [J]," *Journal of Shanghai Dianji University*, vol. 23, no. 1, pp. 44–49, 2020.
[19] H. Dong, "Analysis of education data in online education[J]," *Shaanxi Radio and TV University Journal*, vol. 22, no. 1, pp. 15–18, 2020.
[20] X. Wang, "On construction of budget performance evaluation index system in applied undergraduate colleges[J]," *Vocational and Technical Education*, vol. 41, no. 11, pp. 59–62, 2020.
[21] Yu Zhang, Bo Ai, and J. Yuan, "Innovative research and practice of an evaluation method of course effectiveness in the context of Moocs[J]," *China Higher Medical Education*, no. 5, pp. 73-74, 2020.
[22] R. Qi, X. Guo, J. Meng, and Y. Li, "Application research of data mining technology in teaching evaluation in university [J]," *Journal of Shijiazhuang University*, vol. 22, no. 3, pp. 65–68, 2020.
[23] H. Xu, "Research on the prediction and evaluation of online education examination results[J]," *Modern Informationn Technology*, vol. 4, no. 3, pp. 28-29, 2020.
[24] X. Zheng and X. Yang, "Architecture design of comprehensive quality evaluation system for students based on blockchain technology[J]," *Modern Distance Education Research*, vol. 32, no. 1, pp. 23–32, 2020.
[25] Y. Chen, "Optimal allocation of the innovation and entrepreneurship education resources in universities based on the PSO algorithm[J]," *Journal of Xi'an University of Posts and Telecommunications*, vol. 26, no. 3, pp. 105–110, 2021.
[26] Li Kun, "Evaluation model of ideological and political education reform in colleges and universities based on SVM[J]," *Techniques of Automation and Applications*, vol. 40, no. 12, pp. 164–167, 2021.