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Retraction

Retracted: Optimization of the Rapid Design System for Arts and Crafts Based on Big Data and 3D Technology

Complexity

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] H. Zhou, "Optimization of the Rapid Design System for Arts and Crafts Based on Big Data and 3D Technology," *Complexity*, vol. 2021, Article ID 7906047, 10 pages, 2021.

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WILEY Hindawi

Research Article

Optimization of the Rapid Design System for Arts and Crafts Based on Big Data and 3D Technology

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In this paper, to solve the problem of slow design of arts and crafts and to improve design efficiency and aesthetics, the existing big data and 3D technology are used to conduct an in-depth analysis of the optimization of the rapid design system of arts and crafts machine salt baking. In the system requirement analysis, the functional modules of this system are identified as nine functional modules such as design terminology management system and external information import function according to the actual usage requirements. In the system design, the overall structure design, database design, and functional module design of the system are comprehensively elaborated, and the key issues such as 3D display and home layout generation algorithm based on reinforcement learning are analyzed and designed. In the implementation part of the system, the overall construction of the system and the composition of functional modules are introduced in detail and the main functional modules of the system are presented with interface diagrams. In the system implementation part, the overall system construction and functional module composition are introduced in detail, the main functional modules of the system are shown with interface diagrams, codes, and algorithms, and the specific implementation process of 3D display and soft layout algorithms are also explained in detail. The process of Surface Mount Technology (SMT) big data processing and analysis is designed, and the design of SMT production line data collection scheme and real-time data processing architecture is completed. Based on the characteristics of SMT production line data, the K-means algorithm is used to detect data outliers and verify the accuracy of the method; also, the Spark-based association rule printing parameter recommendation model is designed, and the efficiency of the Apriori algorithm is significantly improved by parallelization.

1. Introduction

With the continuous development of industry, the mechanization of factories through water and steam has been abandoned and replaced by electronics and information technology, whose widespread use has led to a significant increase in automation control. 3D printing technology has emerged in line with the trend of the times, which has made products personalized, customized, and achievable by moving away from mass production lines, and has even called the hallmark of Industry 4.0. It has even been called the hallmark of the Industry 4.0 era [1]. People can skip the production side to achieve their private customization, and humankind has opened a new way of production. However, in practice, most 3D printers are prone to a series of problems such as loose and unshaped models, skewed printing, rough surfaces, interrupted printing, and jittering printing, which seriously affect the quality of printed products, and the accuracy and smoothness of the product surface are not as good as those in the laboratory [2]. Most 3D printers cannot effectively control the accuracy at the time of printing and often require postpolishing. This paper presents a series of studies on the accuracy of 3D printers to obtain high-quality products, reduce the need for technicians to debug 3D printers at each print run, and reduce unnecessary polishing processes [3]. The rapid development of IT technology has enabled billions of people to generate large amounts of data through various digital devices, covering unstructured, semistructured, and structured data types. Image semantic feature extraction is used to understand images by extracting multilevel semantic information from images through certain computational models.

Optimizing image retrieval results has become a research hotspot due to the explosive growth in the number of images on the Internet and the increasing demand for effective use of images, and image semantic feature extraction is critical to retrieval performance [4]. Most of the current search engines use textual keywords to retrieve images, and the retrieval performance suffers from the semantic gap between text and image visual features. Many types of research are devoted to retrieving images based on content, and these approaches are called content-based image retrieval (CBIR). To achieve such a goal, features abstracted from images should have high discriminative power for image classification tasks. Facing the massive data of SMT, these methods not only have slow analysis speed, low utilization of SMT data, and poor analysis effect but also lack effective validation means; to address these problems, this paper uses emerging technologies such as big data analysis and 3D visualization simulation to develop a big data analysis platform for SMT industry, which can quickly establish business models of SMT and help quality analysts [5]. Using 3D visualization simulation technology, the platform can build the SPI (Solder Paste Inspection) inspection simulation verification module of the SMT production line to verify the analysis results, thus, saving production resources and improving the analysis efficiency and quality of electronic assembly products [6].

To solve the problem of slow design of arts and crafts and to improve design efficiency and aesthetics, during the implementation of the soft decoration project, the layout of many soft decoration items is involved. Before the interior soft decoration design, the layout of the house needs to be understood, to decide the specific decorative scheme of various types of soft decoration, but for different soft decoration items placement scheme, it needs to be evaluated from multiple aspects such as function, visual effect, and occupied area, which generally requires a senior technician to spend a lot of time to complete, resulting in a long process time for such work.

2. Current Status of Research

Liu et al. tested the effect of printer design structure and printing parameters on the quality of 3D printed products and proposed a method to improve the surface smoothness of 3D printed products on the physical layer [7]. In response to the lack of high-precision printing methods for low-cost printers, Rieder and Simon investigated improved control systems for low-cost multiextrusion-head 3D printers [8]. The accuracy of multiextrusion head printer control was improved by temperature control and position control [9]. Although the overall architecture of the 3D printer was optimized, in practice, the variety of desktop-level 3D printers is bound to cause a huge workload [10]. In this paper, a set of home decoration design system based on building information modelling (BIM) technology is established, which solves the problems of single design tools in the traditional home decoration design industry and the lack of centralized enterprise design resource management, realizes the 3D home decoration design tools based on BIM technology, improves the unified management of enterprise design resources, and enhances the competitiveness of home decoration enterprises [11]. Although human design features have been well applied in image retrieval, there is a big limitation in its generality. The end-to-end learning mechanism of deep networks can improve the limitations of human design features well [12]. Convolutional neural networks can effectively extract high-level semantic features for image database retrieval and obtaining highly discriminative local features from convolutional neural networks is crucial for image retrieval.

Generative adversarial networks (GANs) based on convolutional operations are an important branch of convolutional neural networks [13]. Although generative adversarial networks have been widely used in many computer vision tasks especially in the field of image processing, there are fewer results in the field of instance-level image retrieval. In literature [14], an instance-level image retrieval method based on generative adversarial networks is proposed, which uses adversarial training in the retrieval process. The improved generator and discriminator are used to try to generate retrieved similar images and to identify different images from the retrieved ones, respectively, and then the decisions are passed to the generator until the discriminator of the retrieved images generated by the generator cannot identify whether they are in the results or not [15].

Compared with the traditional PID, the stepping PID has a great improvement in both applicability and precision control [16]. The reasons for the low printing accuracy of the 3D printer are analyzed from the perspective of the printing process of 3D printing, and a formula for the surface smoothness of 3D products is established. To further improve the precise control of the 3D printer, the speed profile of the stepper motor was studied, improved acceleration/deceleration curve was proposed, and the superiority of the curve was verified. For the problem that the acceleration and deceleration curves do not have speed feedback and the resulting errors cannot be eliminated, an S-curve stepping PID is proposed for stepper motor control, and the effectiveness of the method is verified by simulation experiments.

3. Optimization Analysis of the Rapid Design System for Arts and Crafts with Big Data and 3D Technology

3.1. Big Data Optimization Algorithm Design. For convolutional neural networks, multiview data have two layers. First, in deep convolutional neural networks, each convolutional layer usually contains multiple convolutional kernels, and after convolutional operations, multiple feature maps representing different features are obtained, which can also be regarded as multiple views of the input image at some semantic level, so deep convolutional networks themselves are architectures for processing multiview data fusion of images. This multiview data are extracted by the deep convolutional network by learning many convolutional kernels. In plain language, the purpose of visualization is to "let the data speak," to tell the story of the data with graphics. Visualization is a way of expressing data, an abstract representation of the real world. Like words, it tells us a variety of stories. As a medium, 3D visualization has evolved into a great way to tell stories. Good visualization design requires knowledge of statistics and design. Without the former, visualizations are just illustrations and art exercises; without the latter, visualizations are just research and analysis results. Knowledge of both statistics and design can only help you with a portion of your data graphics. Second, there is another multiview application scenario: multiview data are obtained outside the network by different image preprocessing methods, and these multiview data form a data tuple input to the convolutional network. Since the information between the tuple elements complements each other, the learning performance can thus be improved. The introduction of convolutional operations brings two features to convolutional neural networks: local perception and weight sharing [17].

The learning objective of the self-encoder can be abstracted as a convex optimization problem that minimizes the reconstruction error:

$$\sum_{i=1}^{n} \left\| x_i + \overline{x_i} \right\|^2, \tag{1}$$

$$\frac{1}{2n}\sum_{i=1}^{n} \left\| x_i + W\,\overline{x_i} \right\|^2. \tag{2}$$

The solution of the minimization objective function (2) depends largely on which features of the input data are corrupted randomly. To reduce the variance of the reconstruction process, this paper uses MDA to process the training data several times and adds a different random noise to the input data during each processing. The loss function of least squares can be redefined as

$$\frac{1}{2mn}\sum_{i=1}^{m}\sum_{j}^{n} \left\| x_i + W\,\overline{x_i} \right\|^2, \tag{3}$$

$$\arg\max \sum_{e\in E}\sum_{v\in e} \frac{w(e)}{\delta(e)} \left(\frac{f(u)}{\sqrt{d(u)}} + \frac{f(v)}{\sqrt{d(v)}} \right)^2. \tag{4}$$

To describe the proposed method in this paper more clearly, multiple important hypergraphs learning tokens are first defined, as shown in Table 1. Each vertex in the hypergraph corresponds to a sample, and each hyperedge describes a common property of multiple samples. To solve the Laplacian matrix of the hypergraph under the locality constraint, the problem can be approximated as a real-valued function optimization problem as in (3).where $f(u)$ is the fractional vector of u-vertex samples and $f(v)$ denotes the fractional vector of v-vertex samples. To improve the computational efficiency, (4) is converted into the form of a matrix.

Table 1: Definition of important markers for hypergraph calculation.

Sign	Definition	Values
n	The number of training samples in the training set	1
u, v	Sample vertices	3
$f \in R$	Some score vector of all samples	4
$f(u)$	Score function	6

$$\arg\min \left(f^T L f^2 \right), \tag{5}$$

where $f^T L f^2$ can be considered as the smoothness measure off concerning the hypergraph Laplacian matrix L: optimizing $f^T L f^2$ makes the f values of the more neighbouring vertices in the hypergraph closer. From (6), we have L:

$$L = I + \frac{1}{D_v^{1/2}} H\Omega D_e^{1/2} H^T \frac{1}{D_v^{1/2}}. \tag{6}$$

PAF maps the high-dimensional feature space I onto the low-dimensional feature space S while keeping the local geometry of the hypergraph unchanged as much as possible, and in this paper, I is the feature space extracted by the self-encoder. In the local batch construction stage, for each label l and each training sample $x_i \in I$, by computing the set kind of k_s nearest neighbours with the same l-label value (0 or 1) as $x_i \in I$ and the set kind of k_d nearest neighbours with different l-label values as $x_i \in I$, we can construct local batch $p_i = x_i \in K_{nn}$. p_i forms a hyperedge corresponding to a subhypergraph representing the local geometric structure, and the local Laplacian matrix L_i can be constructed by defining (3–10). Correspondingly, in the low-dimensional feature space S, the local batch of $x_i' \in S$ in the low-dimensional feature space can be computed in the same way p_i', where x_i' is the value of $x_i \in I$ corresponding to the low-dimensional feature space. To maintain the maximum consistency between p_i and the samples contained in the set of p_i' and the geometric relationships between the samples, the objective function of local batch optimization can be expressed as

$$\arg\max\left(p_i' L_i \left(p_i'\right)^T \right). \tag{7}$$

To effectively fuse the influence of multiple labels on feature selection, the Laplacian matrix L_i corresponding to all labels is weighted and summed as the characterization matrix of the global hypergraph geometry, denoted as L_g. In this paper, the contribution of each label is assumed to be equal, so that L_g fuses the influence of multiple labels on the local geometry between samples, as shown in

$$L_g = \sum_{l=1}^{|Y|} L^l \cdot \gamma_l. \tag{8}$$

The efficiency of our results is improved by about 10% compared to other results, and the probability is higher in terms of aesthetics. So, our results are very strong for reference and learning purposes. From the above analysis, the operation mechanism of the Spark framework is compatible with the requirement of multiple iterations of the Apriori algorithm. Therefore, this section proposes a parallelized design of the Apriori algorithm based on the Spark framework [18]. The parallelization of the Apriori algorithm is divided into two parts: generating frequent itemsets and extracting association rules, where frequent itemsets are computed by transformation to calculate the local support count of candidate itemset and action to calculate the global support count of candidate itemsets. The parallelization framework of the Apriori algorithm is shown in Figure 1.

Data augmentation can be used to augment existing data to obtain more discriminative features, and it can also be used to generate much larger amounts of data than the existing data to train many parameters in a deep neural network. Thus, data augmentation can also be considered as a form of model regularization, which achieves the regularization goal not by adjusting the architecture of the deep neural network but also by generating more valid input data [19]. In machine learning, test sets are used to validate the performance of the proposed model in some algorithmic metric sets M, but the performance of the model on M cannot be optimized on the test set. Therefore, during training, indirect optimization is performed on the training set by reducing the cost function $J(\theta)$ defined by the display. $J(\theta)$ is defined as

$$J(\theta) = E_{(x,y)} L(f(x;\theta), y), \quad (x, y) \sim p_{\text{train}}. \tag{9}$$

Radial texture can be divided into equal interval stripe texture, nonequal interval stripe texture, random stripe texture, and so on according to the arrangement of veneer group melding. Among them, equal interval stripe texture is a kind of texture with a very integral and regular visual effect, which is generally obtained by using two veneers with the same specifications dyed in different colours and arranged in 1 : 1, 1 : 2, and 1 : 3 ratio and then cut. The difference between nonequally spaced stripe texture and equally spaced stripe texture is that the thickness of the two different colours of veneer is not the same, each showing a step-shaped cycle change so that the texture obtained also has the effect of gradual change, undulation, vertical horizontal, and so on, with a more hierarchical sense. The random stripe texture is obtained by a random combination of veneer thickness, veneer grouping order, veneer dyeing, and so on. This kind of stripe has the characteristics of a distinctive and changeable style.

The results of the recommended printing parameters mined on this basis using Spark parallelized Apriori algorithm are shown in Figure 2, where the three colours represent the distribution intervals of volume, area, and height.

To address the problems caused by the traditional in-line testing mode of SPI inspection, this section proposes and designs an offline simulation verification model for SPI inspection. However, by BP neural network as a gradient search-based parameter search algorithm, the weights of the network are gradually adjusted by following the negative gradient direction, which will cause the algorithm to fall into local extremes and lead to network training failure. In contrast, a genetic algorithm is a randomized global search algorithm, which can effectively solve the local extremity problem of the BP neural network, so the simulation verification model of SPI detection can be established by using BP neural network optimized by a genetic algorithm.

Since there is a highly nonlinear mapping relationship between the adjustable parameters of the printing press and the SPI detection values and considering the problems of local minima and low training efficiency of the BP algorithm, this paper establishes a simulation validation model for SPI detection using a BP neural network optimized by genetic algorithm. Specifically, the SPI detection results of the specified printing parameters and the corresponding historical data are used as the input and output of the model, and the genetic algorithm is used to optimize the weights and thresholds of the BP neural network.

3.2. Rapid Design System Design for Arts and Crafts with 3D Technology. The analysis of the system functional requirements analysis required the identification of user classification for the system. According to the research and the design purpose of the subject, the main user groups of the system were classified into four categories, namely, junior designer users, intermediate designers, senior designer users, and system administrators. The main users of the system are the users, who enter the system through the system login domain [20]. The operation authority of the junior designer can only use the preliminary style and navigation bar for interior design; the intermediate designer is based on the junior designer, the preliminary interior design works of the junior designer for stylization and collocation adjustment, the defects in the primary design process, by calling the new software assembly, and the primary collocation way to exchange. The function of the intermediate designer is mainly to supplement and improve the primary design case designed by the junior designer; the senior designer is the finalizer of the whole interior design planning case. The main functions of the senior designer are to manage a project or project, to make macroadjustments to the designer's work, to make the final rendering of the case designed by the intermediate designer, and to delete the existence of levels that are not relevant to the needs, and the senior designer also needs to consider the function of product information, as shown in Figure 3.

The auxiliary system management module is for the specific needs of the householder to choose the type of soft furnishings and home model according to the designer's proposal. In this module, we divide the architectural style types into four categories according to the characteristics of the building: rustic, neoclassical, and so on, while the house types are divided according to the actual situation of the house. When arranging interior items, designers can use this auxiliary module to complete their work more quickly and efficiently. In this system, the user's permission is given according to the role level, which is the "role-permission" control concept that is currently used. Also, because the role of using this system is the interior designer, its ability will be enhanced according to the experience of the designer, so the system's permission management adopts a flexible way of

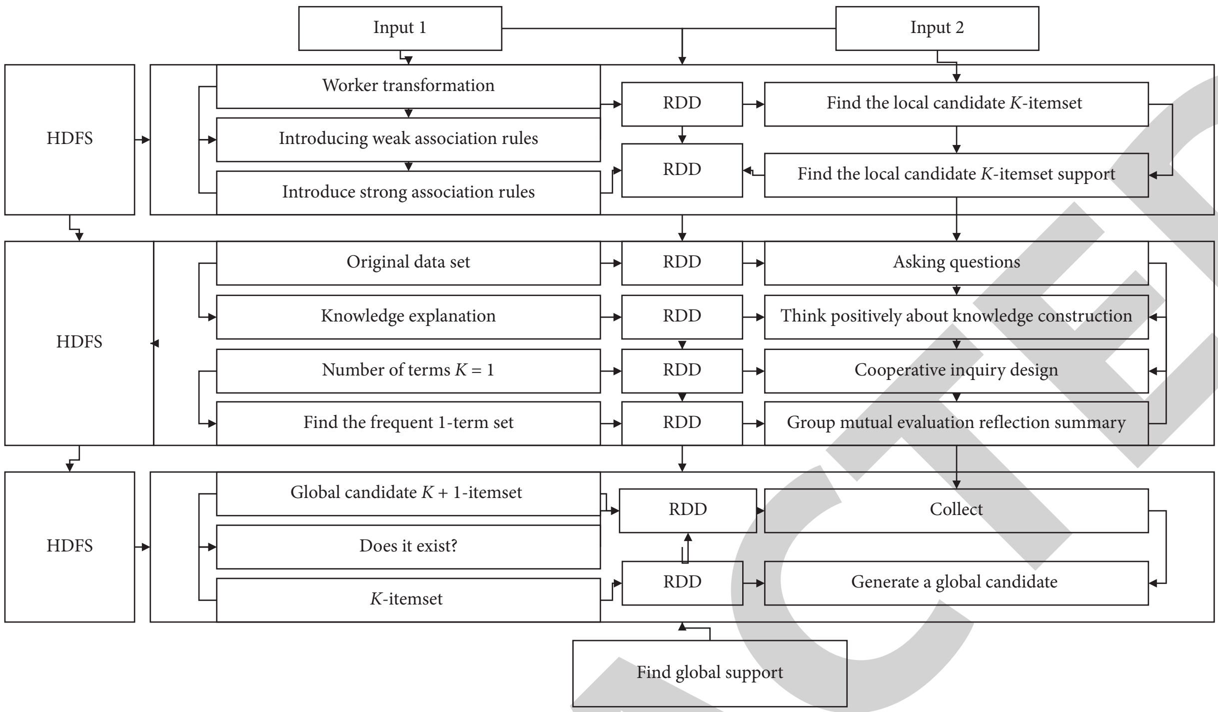

Figure 1: Algorithm parallelization framework.

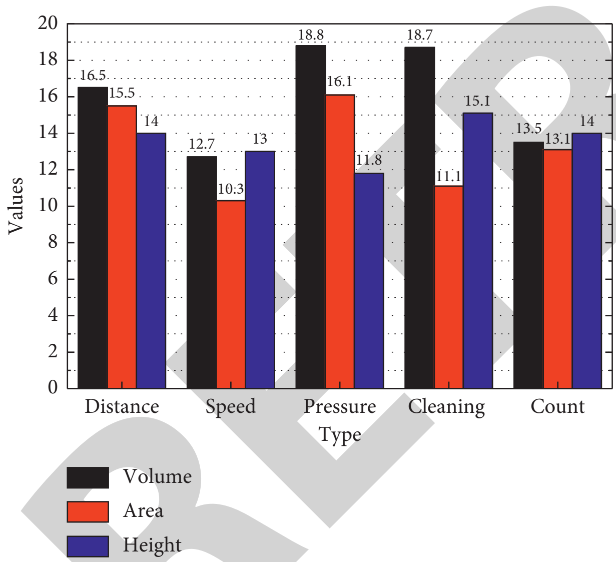

Figure 2: Parameter recommendation results.

empowerment. The core function of the soft decoration auxiliary management system is to run the system management module, in which the design work to be done by the user after logging into the system can be realized. The auxiliary functions are all designed to facilitate the work of designers, and the specific performance is in this module. Web content management provides users with mainly information query and product consultation functions. The latest product trends and information consultations are sent to designers through the network promptly. Data backup is a module that exists to prevent the loss of user information. In this subsystem, information deleted by users is stored in the recycle bin for a period, where users can restore information when they delete it by mistake. However, to ensure the smooth operation of the system, the system will automatically clean up the useless information if the deleted information has not changed its status after the system's retention period.

In the figure, it can be seen that the manufacturing auxiliary resource management function includes basic subfunctions such as automatic measuring scale, automatic colour balance adjustment, automatic brush configuration, and automatic technical parameter setting; the auxiliary system management function is divided into subfunctional modules such as style type selection and home model selection; the external information import includes material vendor information import and product vendor information import [21–23]. The subfunction of soft furnishing design experience knowledge management function is divided into two main subfunction modules, such as soft furnishing home terminology management and characteristic symbol language management. The 3D display and layout generation algorithm are implemented in the background and included in the home model selection module. The Apriori algorithm generates frequent itemsets with two characteristics: first, it is hierarchical, that is, from frequent 1-itemsets to frequent k-itemsets; second, it uses a generate-and-test strategy to discover frequent items, generating new candidates from the previously generated frequent items after each iteration and then performing support counts on the newly generated candidate sets to obtain the new frequent itemsets.

This system involves various businesses related to 3D soft furnishings, including design results and conceptual drawings under design concepts, which are related to the

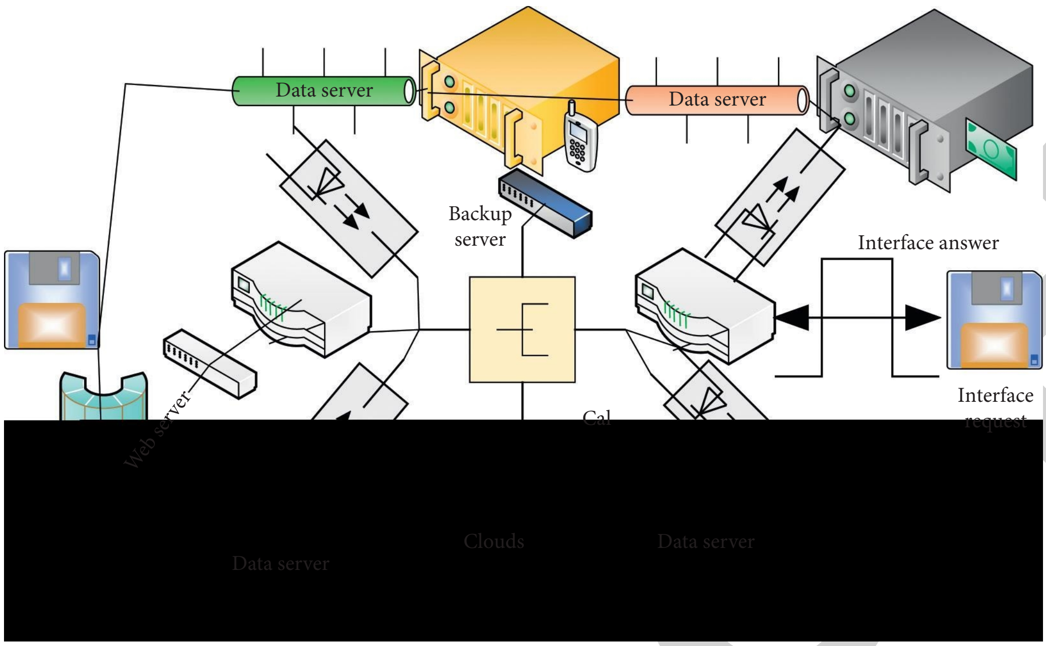

Figure 3: Framework of the rapid design system for arts and crafts with 3D technology.

original wisdom of the creators, which requires this system to have good data security. Therefore, this system has clear permission restrictions for users, set up by limited setting of system roles in the system, and then configuring different permission ranges for each role to ensure that only the creator can view data related to the design work [24–26]. Software development cannot be separated from the use of the Internet; the system's web content management module includes two aspects of consulting information and product information. The consulting information is expressed in the inquiries of the householder about the configuration of the soft furnishings, while the product information is where the user is concerned [27, 28]. Both are inextricably linked to the soft decoration auxiliary management system, one of which is to know the specific needs of the householder through consultation, and the other is to develop the most suitable soft decoration plan through the system's product information query, as shown in Figure 4.

From the perspective of the application of interactive digital art in the exhibition hall display, the value of the display is not only the meaning and impact of the application of contemporary technology on the viewer but also the feelings and evaluation of the viewer and participants of this technology mean. Therefore, the value system of anything should be the result of interconnection and interaction between two or more parties. When the overall structure and detailed components of the interactive digital art displayed in the exhibition hall are structured, its multifaceted value will increase.

Finally, the exhibition hall, as an open social education institution museum, should shoulder the burden of meeting people's lifelong educational learning in this segment of social education. Interactive digital art is a technological tool that allows young children or adult viewers to acquire knowledge and culture through hands-on participation. And when this technology is combined with the problems of contemporary society, people can gain more life lessons from it, such as protecting the environment and conserving resources. In this way, the value of interactive digital art in the exhibition hall display can be better brought into play.

4. Analysis of Results

4.1. Big Data Optimization Results. To verify the performance of the SPI detection simulation validation model based on the GA-BP neural network, 100 sets of printer adjustable process parameters and their corresponding SPI historical inspection data were selected as the sample data set for the SPI detection simulation validation model training test. Based on the optimized BP neural network model by genetic algorithm, the results of SPI detection simulation validation are shown in Figure 5, respectively.

The maximum average relative error between the real and simulated values of the GA-BP neural network training is 5.1374%, which represents the model generalization error and is small enough to meet the accuracy requirements of solder paste printing quality, thus verifying the reliability of the GA-BP-based SPI detection simulation validation model. This is to verify the reliability of the simulation validation model of SPI inspection based on the GA-BP neural network.

In solid modelling, two issues should be considered: firstly, whether the solid model uniquely represents the real-life 3D objects and secondly, determining the coverage of the solid model, that is, the spatial occupancy of the solid model.

In this paper, we choose the recommended results of printing parameters in Chapter 3, Section 3.5.4 as the model input and set the number of iterations $N = 100, 200, 400, 800, 1600$. The corresponding model accuracy results are shown in Figure 6, where 1-1-25-8-35-3 indicate the values

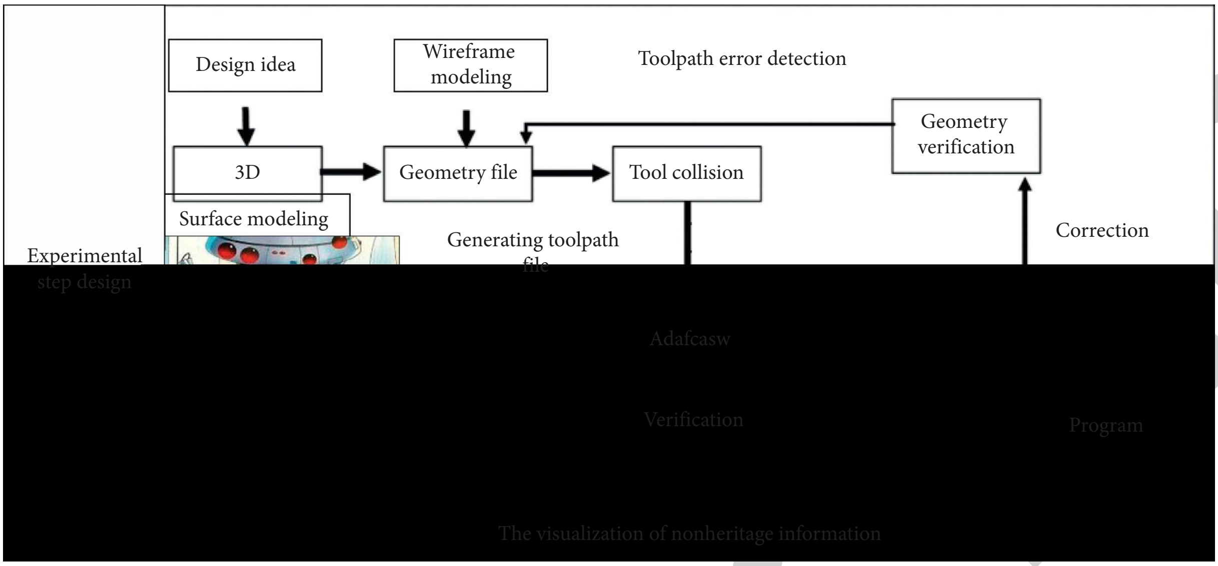

Figure 4: Experimental step design.

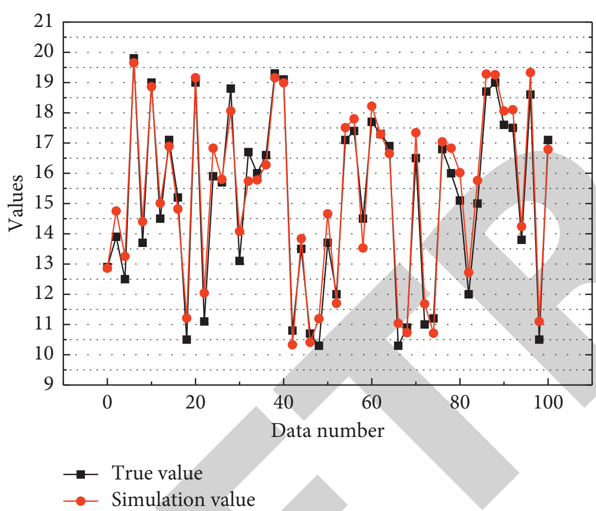

Figure 5: Neural network training results.

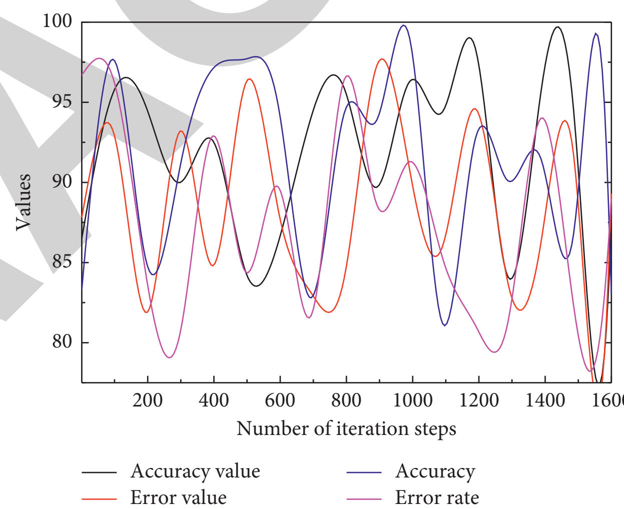

Figure 6: Model training results under the combination of 1-1-25-8-35-3.

corresponding to table separation speed-table separation distance-squeegee pressure-squeegee speed-cleaning speed-automatic cleaning count, respectively.

Firstly, the basic principle and implementation process of BP neural network and genetic algorithm are introduced; the SPI inspection simulation validation model based on genetic algorithm optimized BP neural network is designed; secondly, the virtual model of SMT production line equipment is constructed according to the key technology and modelling method of the 3D model displayed on the website; finally, the accuracy of the recommended model of solder paste printing parameters based on association rules is demonstrated by GA-BP. Finally, the simulation validation model of SPI detection by GA-BP neural network proves that the recommendation model of solder pastes printing parameters based on association rules has high accuracy.

4.2. System Optimization Results. According to the requirement analysis, overall architecture design, and functional module design of SMT big data analysis platform, the development of SMT big data analysis platform is completed by using platform development tools and platform implementation key technologies. The platform is divided into four functional modules, namely, business modelling, data modelling, analysis modelling, and simulation modelling functional modules. The business modelling module can help users quickly understand SMT business-related information, such as business processes, business scenarios, and business problems, and provide business logic support for the data model and analysis model; data modelling is mainly for business modelling analysis of specific business problems, business-related data for data logic relationship sorting, visual statistical analysis and data preprocessing, and other operations. The analysis modelling includes basic analysis tools such as algorithm library and model library and supports Spark distributed memory computing engine to facilitate data analysis in SMT industry; the simulation modelling includes a 3D model library of SMT production line equipment and scenes, which is used to quickly build SMT production line scenes; at the same time, it includes a GA-BP neural network-based SPI. The simulation modelling includes a library of 3D models of SMT production line equipment and scenes for rapid construction of SMT production line scenarios and includes a GA-BP neural network-based SPI inspection simulation validation model for verifying the accuracy of the recommended results of the solder paste printing parameter recommendation model in the analysis modelling, as shown in Figure 7.

Consistent with the structure of the business modelling interface, the top of the interface includes a library of plumb-based process modelling tools, a library of data preprocessing algorithms, and a library of packet partitioning models; on the left side, there is a functional module navigation tree to guide the workflow of data modelling; the right area is the module function operation area. The current initial interface shows the information of data sources uploaded to the platform through the business modelling data import interface under this business. The data modelling module mainly includes nodes of a data dictionary, data logical relationship, visual statistical analysis, and data preprocessing. Since all the fields in the data source table are expressed in English, when the user does not understand the meaning of a field and other pieces of information, he can search the data dictionary for the query. The efficiency of the design can reduce the design pressure, and the results obtained by this method will be more beautiful and atmospheric than when people design.

The analysis modelling module mainly includes the analysis process, analysis modelling, and analysis result display. The analysis process mainly uses the process modelling tool to help users establish the construction process of corresponding business models so that users can quickly clarify the modelling ideas. Analysis modelling mainly uses data analysis algorithms to complete the analysis of different businesses. At present, the platform integrates four kinds of data analysis algorithms: RBF, SVM, Apriori, and GA-BP neural network. Users can choose the corresponding algorithms to analyze the data according to the actual data characteristics and business requirements; this paper takes the business of solder paste printing parameter recommendation as an example, and the corresponding Spark-based association rule printing parameter recommendation model is shown in Figure 8.

From Figure 8, we can see that the response time of the client has exceeded 500 ms when the number of users reaches 300, and after the number of users exceeds 400, the CPU occupancy and memory usage are over 90%, and the response time of the client exceeds 800 ms, and we can feel the obvious delay, so we must control the number of logged-in users below 300 in normal times. As the number of iterations increases, the running time of the algorithm will increase, and the increase will be larger and larger. In terms of accuracy, the increase in the number of iterations will also make the evaluation results more accurate, but the increase will be smaller and smaller, so in the actual operation of this project, it is generally set to 1000 iterations to achieve a balance between running time and accuracy.

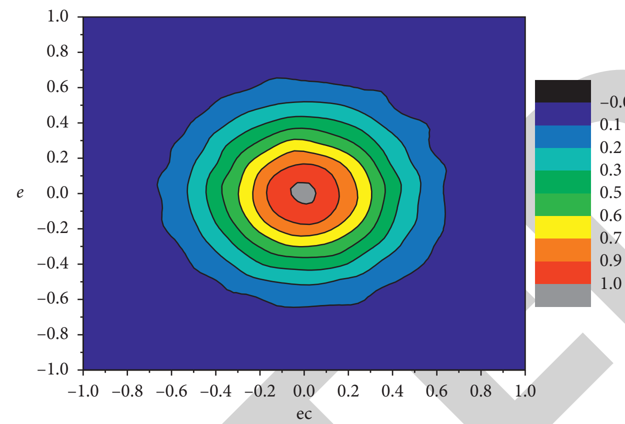

Figure 7: Input/output characteristic surface.

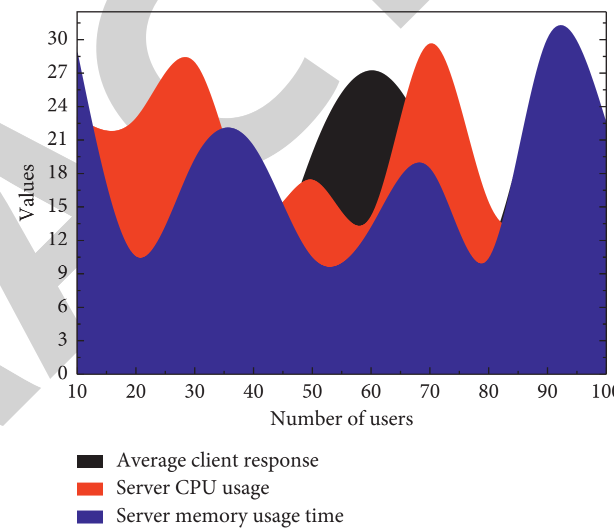

Figure 8: Server performance test.

5. Conclusion

This paper focuses on the development and design of a 3D technology-oriented soft decoration support management system. In the design and implementation of the soft decoration auxiliary management system for 3D technology, the steps are divided into the requirement analysis of the system, the design part of the system, the implementation part of the system, and the testing part of the system. In the system requirement analysis, the functional modules of the system are determined according to the actual usage requirements as nine functional modules such as the design terminology management system and external information import function. In the system design, the overall structure design, database design, and functional module design of the system are comprehensively described, and the key issues such as

3D display and home layout generation algorithm based on reinforcement learning are analyzed and designed. In the system implementation part, the overall system construction and the composition of functional modules are introduced in detail, the main functional modules of the system are shown in the form of interface diagrams, the design and testing process of test cases are illustrated with the login module as an example, and the performance of the system is tested. The specific implementation process of the 3D display and soft furnishing layout algorithm is also illustrated. In conclusion, the paper focuses on the practical problems in soft decoration auxiliary management, combined with the current emerging technologies such as 3D display and reinforcement learning, carries out requirements analysis, system module design, database design, functional design, and other works, and finally implements the system.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest in this paper.

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