Research Article

Design and Implementation of Industrial Design and Transformation System Based on Artificial Intelligence Technology

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The introduction of AI technology in the process of industrial product design is helpful for designers to better analyze and apply complex data. This study integrates AI with industrial design, applies new ideas and technologies in AI to industrial design, and changes the traditional industrial design mode. The contents of AI and industrial design are analyzed in detail, and the research methods such as literature research, field observation, and interview are used to further clarify the design objectives and conditions. From the perspectives of the design process, product structure, engineering data, and project maintenance, the method of product design information exchange and sharing is put forward. The system architecture of industrial design service systems based on AI technology is given. Theory and practice show that the overall performance of this algorithm is good. The industrial design method based on AI has certain positive effects and achieved good results. This research provides a new idea for intelligent industrial design.

1. Introduction

The widespread popularity of the Internet has formed the information age, and the global development of manufacturing has led us to the industry 4.0 era [1]. AI (Artificial Intelligence) is to let machines do some dangerous or complicated work instead of human beings, help people deal with some problems, and formulate solutions similar to or even better than human thinking patterns [2]. Thus, we ushered in the “big design era.” With the vigorous development of the AI industry, theoretical research on intelligent product design has gradually become the focus of attention at home and abroad [3]. How to effectively carry out intelligent product design and what are the specific design problems of intelligent products at present are the problems to be solved at present. The application of AI in the field of industrial design can not only inspire designers’ design inspiration but also solve very complicated calculation problems, making the industrial design more standardized [4]. Design is uncertain, and intelligent products are important design objects in the intelligent era. The complexity of intelligent products increases the uncertainty of design [5]. Intelligent product process design needs a lot of experience knowledge and special knowledge, which is a complex decision-making process. Faced with the complexity and design uncertainty of intelligent products, the solution of design problems has changed from traditional single linear solution path to multidimensional dynamic solution mode, while the design focus of intelligent products has shifted from defining system to building system solutions [6]. Therefore, the design problems of industrial products based on AI need systematic innovative solutions.

According to the development trend of manufacturing informatization and the actual needs of enterprises, “mass customization technology that can quickly respond to customer needs” has become an important condition for enterprise innovation [7]. Scientists transform human intelligence activities into algorithms, create intelligence similar to human intelligence, and apply it to specific fields to analyze and process data [8]. Industry is produced with the development of machine industry in the process of high development of human civilization. It is the product of the
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combination of science and technology and culture and art [9]. An important feature of the contemporary manufacturing industry is that "product design is the soul of manufacturing industry" because the structure, function, quality, cost, delivery time, manufacturability, maintainability, disposal after scrapping, and the relationship between man and machine environment of products are all determined in the product design stage in principle [10]. In the process of product design, in order to obtain user demand information, it is usually necessary to conduct predesign research on products, while the research on user demand of industrial products often involves perceptual and nonquantitative information [11]. The combination of AI and industrial product design can make the professional knowledge, data calculation, and design innovation involved in the product design process well integrated through AI technology, thus forming a relatively complete design scheme and finally manufacturing products that meet the requirements. Based on AI technology, this paper designs and implements the industrial design and transformation system.

AI includes robot, intelligent voice, natural language processing, and other branches [12]. From the beginning of its development to the present, not only has the technology been greatly improved but also the fields involved in AI are constantly expanding and predictable. Intelligent products are everywhere, but there are only a handful of researches on the design system of intelligent products [13]. Intelligent hardware is an important part of intelligent products, which refers to a new generation of intelligent terminal products with data acquisition, analysis and connection capabilities, remote control, intelligent identification, and other functions. AI will bring greater convenience to people’s lives in the future development and create more unexpected high-tech products for people [14]. This paper studies the AI technology and analyzes the intelligent design technology in intelligent industrial design. In this paper, an AI technology-assisted industrial design and transformation system is proposed, and the framework of intelligent industrial design is given. Then, the industrial product design and transformation system based on AI technology is implemented. The scene-driven intelligent product design process is constructed, including demand mining operation process based on user scenes, product design operation process based on conceptual scenes, and product verification and feedback operation process based on real scenes. The system can effectively and accurately process the perceptual vocabulary involved in the product design process and obtain quantitative information that can guide industrial design by means of output weights and network prediction. Our experiments, theory, and practice show that the industrial product design and transformation system based on AI technology really plays an active role in industrial design, and the system has certain practical significance.

2. Related Work

Literature [15] pointed out that the key to product design is the benign matching degree between products and users. Industrial design can be understood as taking product design as the core, industrial design is equivalent to product design, and the objects of product design are mainly industrial products and handmade products. Literature [16] holds that product design is an innovative and creative activity that allows the actual product to design and further improve its style, function, and internal structure by using the latest scientific research results and other pieces of knowledge and integrate social science with theory and practice. Literature [5] holds that the modern division of labor leads to the emergence of industrial design, which is the inevitable result of modern production, and the design object is modern industrial products to meet the needs of modern society and people. The practicability and aesthetic feeling of products are the main contents of industrial design research. Literature [17] mentioned that industrial design is an interdisciplinary subject involving many fields, and the factors influencing its design are complicated. This kind of design activity must be more innovative. Therefore, it is considered that innovative design is the core of the man-machine intelligent design. Literature [18] studies the characteristics of network real-time interaction in product design and analyzes the functions and characteristics of SameData software. Literature [19] proposed to optimize the design steps of industrial products based on genetic optimization algorithm for the problem of the poor design structure of industrial products. In literature [20], aiming at the defects of traditional AI CAID (Computer Aided Industrial Design) system based on expert system, the artificial neural network model of industrial design, combinatorial optimization, and uncertain reasoning methods are theoretically analyzed and studied. Literature [21] put forward the idea of comprehensive intelligent industrial design, conducted in-depth research on its key technologies, and put forward and developed a new technology of comprehensive intelligent industrial design mechanism. Literature [22] discusses the concept, category, and characteristics of industrial design, discusses the current development of industrial design, and applies AI theory to the field of industrial design. Literature [23] holds that AI is designed by imitating the process of human psychological cognition and following the process of human creation, and it is a form of data processing.

Based on the detailed study of related literature and AI technology, this paper constructs an industrial design and transformation system. In this paper, the improved particle swarm optimization algorithm is used to train the network for the complex mapping relationship in order to ensure that the algorithm has a faster convergence speed and better convergence effect. It has great advantages for solving complex problems; especially when it is used for perceptual data research in the industrial design process, it can more accurately simulate people’s thinking and make the problem solving more intelligent. Moreover, this paper systematically solves the problems of integration and expression of structured knowledge resources and product design. It has a certain engineering application potential and provides a new idea for intelligent industrial design.

3. Methodology

3.1. AI and Industrial Design. With the rapid development of the Internet era, people’s economic ability and vision have
been significantly improved, and consumers have put forward higher requirements for product design. Modern product design is developed on the basis of traditional product design methods and theories, integrating product design theory, AI, information technology, computer technology, knowledge engineering, and management science [24]. The world’s advanced industrial countries, because they pay more attention to industrial design, have greatly promoted the development of industry and economy and promoted the improvement of social living standards. The development of high technology has provided many modern design means and methods for industrial design, and the application of computers has brought industrial design into a new historical stage. Faced with the rapid development of intelligent products and AI technology, how to turn intelligent technology into products, improve people’s lives, and achieve business success is a problem to be solved by designers and enterprises.

At present, computer software and hardware technologies are maturing, and computer graphics, computer-aided design, VR design, and other technologies are developing rapidly. The application of CAD has been further deepened, and the theory and method of modern industrial design have made a qualitative leap. The appearance of many intelligent assistants further proves that the development of AI will be more and more beyond people’s imagination and closer to people’s thinking mode, thus helping people’s work to a certain extent [25]. The application of AI technology to industrial design is one of the research hotspots in the newly developed CAID field, and it is also the development trend of industrial design modernization. It can not only transplant the research results in the field of AI to industrial design but also expand the application field of AI so that they can be perfectly combined and promote common development. The product design process view is shown in the following (Figure 1).

The formula of the AI algorithm is designed to imitate human thinking mode and creative mode, so that AI can be combined with corresponding artistic styles to design products. The combination of the two has greatly promoted the development process of some work fields. With the increasingly fierce market competition, in order to fundamentally strengthen the rapid response ability and competitiveness of enterprises to market demand, people put forward higher requirements for design automation in the field of industrial design: on the basis of knowledge processing automation provided by computers, decision-making automation can be realized, that is, to help industrial design experts make decisions in design activities [26]. This is the advanced stage of the intelligent design-man-machine intelligent design system. The core problem of a design expert system is pattern design and scheme design. The core problem to be solved in an intelligent man-machine design system is an innovative design. Due to the diversity of market demand, product design is more and more characterized by large-scale system engineering. It is impossible for designers to fully grasp the knowledge of different disciplines and different application fields, and product design requires comprehensive, cross-disciplinary, and interdisciplinary knowledge. Therefore, the systematization and standardization of design knowledge, design principles, and criteria is one of the key problems to be solved in modern product design, and it is also the basis of knowledge acquisition and application. Intelligent design is the application of intelligent engineering in the design field. Industry design is a complex design work, and domain experts and designers have to do a lot of decision-making activities in the design, which are based on extensive domain knowledge.

The function of industry extends to people’s physiological and psychological needs and adaptation to the environment and society. Satisfying people’s dual needs of material and spirit and exploring human’s reasonable lifestyle and living environment have become the principles of industrial design in the above developed countries and regions. With the continuous improvement and enhancement of the concept of AI, intelligent programs will enter more updated fields. Therefore, in the future, industrial designers should take a longer view and apply AI to the industrial design process so that the unique innovative thinking and convenient design forms of AI can be fully applied to industrial design, and the intelligent development of science and technology can be truly combined with industrial design. This is more conducive to designers to jump out of the only way of thinking, refer to the design scheme of AI to stimulate design inspiration, and create more products that are beneficial to social development. The framework of the CAID system is shown in Figure 2.

In the whole process of industrial design, creative design thinking and frequent human-computer interaction are bound to be involved. Applying AI to industrial design can help designers create better products. AI can not only calculate the extremely complicated forms that cannot be calculated by human beings but also provide some innovative design styles and schemes for designers. It is the soul of innovative industrial design. Whether it is innovation in design technology, design means, or design thinking, it will directly affect the final product quality and market competitiveness. Designers can combine their own ideas with their own design style and use an AI system to integrate the above requirements together to make a preliminary design scheme and design graphics. AI can provide designers with a broader way of thinking and more creative directions so that designers can create more perfect works. The combination of the two can realize the automation and intelligence of design decision-making, make product design respond quickly to market demand, and enhance market competitiveness.

The construction of safe and reliable design knowledge resources is the foundation of modern industrial design. The most important task of knowledge construction is to standardize, standardize, and systematize the design knowledge. So that different design platforms and different application fields can realize the understanding and application of knowledge resources. AI can calculate the optimal usage data in the process of industrial design, which can save a lot of costs in production. In the process of work, AI can design different products according to the needs of different customers, which can meet customer requirements to the maximum extent, and this also greatly reduces the waste of
Therefore, the combination of industrial design and AI can not only save time but also save a lot of manpower and material resources.

3.2. Design and Implementation of Industrial Design and Retrofit Systems. Modern industrial design increasingly embodies the characteristics of large-scale system engineering. Products are becoming more and more complex, and many technologies need to be integrated. The design involves more and more knowledge fields, and the rapid development of knowledge and technology requires the division and cooperation of industrial design. When designing products, industrial designers must determine the design scheme of products according to many factors such as product functions, users, environment, manufacturing process conditions, economy, environmental protection, and market conditions. This is actually a decision-making activity. AI is a higher development state of product intelligence, but one of the conditions for the establishment of intelligent products is that the products should have a certain ability of independent calculation and execution and interact with users to a certain extent. Product intelligence is product intelligence, which is the materialized expression of intelligent technology. Intelligent products are products that can collect data, process information, feedback information, actively regulate and control, and realize real-time and effective interaction with people.
If the domain experts’ knowledge is modeled, the product information is refined and abstracted to form a formal description, that is, the corresponding knowledge modules, so that the computer system can identify and automatically process these knowledge modules, thus realizing the automation of the design and decision-making process. In this process, the acquisition and organization of domain knowledge is the key factor and the difficulty. This shows that domain experts must be included in the intelligent design system. AI technology is used to establish an industrial information model, and industrial data is stored in knowledge base or engineering database as the “instance” of the object. Production rules are used to represent industrial decision-making knowledge and decision-making process control knowledge because this knowledge describes the relationship between object classes and their attributes. Therefore, as the “method” of the object class, this knowledge is integrated with the object-oriented industrial information model in the object class.

Let the input layer, hidden layer, and output layer have \( r \), \( s1 \), and \( s2 \) neurons, respectively. \( j = 1, 2, \ldots; r; i = 1, 2, \ldots, s1; k = 1, 2, \ldots, s2 \). The input is \( P \), and the activation functions corresponding to the hidden layer and the output layer are \( F1 \) and \( F2 \), respectively. The thresholds are \( b1 \) and \( b2 \), respectively, the outputs are \( a1 \) and \( a2 \), respectively, and the target vector is \( T \). The output of the \( i \)th neuron in the hidden layer is shown in formula (1):

\[
a1_i = F1 \left( \sum_{j=1}^{r} \omega_{1ij}P_j + b1_i \right), \quad i = 1, 2, \ldots, s1. \tag{1}
\]

The output of the \( k \)th neuron in the output layer is shown in formula (2):

\[
a2_k = F2 \left( \sum_{i=1}^{s1} \omega_{2ik}a1_i + b2_k \right), \quad k = 1, 2, \ldots, s2. \tag{2}
\]

The error function is defined as formula (3):

\[
E(W, B) = \frac{1}{2} \sum_{k=1}^{s2} (t_k - a2_k)^2. \tag{3}
\]

Industry is a typical complex problem involving a wide range of information and knowledge. Therefore, the functions of the system can be divided into industrial information model, industrial data, industrial decision-making knowledge, decision-making process control knowledge, and so on. Knowledge model is a model used to abstract, represent, and deal with knowledge resources in the real world. Knowledge modeling is to describe the structure, function, attributes, and other pieces of related information of knowledge in the physical world. Because the computer is an indispensable tool for modern product design, the purpose of knowledge resource modeling is to store all kinds of information of the knowledge model in the computer in a form that can be understood and processed by the computer, that is, to obtain the digitized knowledge information model. Adaptive features are the essential attributes of intelligent products compared with traditional products. Traditional products do not have the ability to make self-decisions and change product behaviors, while intelligent products with adaptive features can learn and analyze user behaviors based on data.

In the field of industrial design, design expert system generally only solves specific problems in one aspect, which is isolated and closed, and it is difficult to integrate with other knowledge systems. The man-machine intelligent system faces the whole design process and is an open architecture. Therefore, the man-machine intelligent design system can not only be competent for conventional design but also support innovative design. That is, it can meet the requirements of automation and intelligence of industrial design to the greatest extent. Perception layer features of intelligent products include connection attributes and scene awareness. Scene perception features refer to the ability to perceive the outside world and obtain external information. Connection attribute features refer to the ability to connect products with products. Data is the basic component of intelligent products. Intelligent products are not only the key to data collection but also the medium of data exchange. Data collection and exchange are the basis of everything connection and scene perception. Functional genes are the core of product design and the index of retrieval. According to the matching degree function, the functional genes that meet the requirements are matched, and the search process of product functional genes is designed by using a genetic optimization algorithm.

The mathematical expression of particle swarm optimization is that \( n \) is the total number of particles in the \( D \)-dimensional search space. The vector position of the \( i \)th particle is

\[
X_i = (x_{i1}, x_{i2}, \ldots, x_{id}). \tag{4}
\]

The optimal position in the motion of the \( i \)th particle is

\[
P_i = (p_{i0}, p_{i2}, \ldots, p_{id}). \tag{5}
\]

Among them, the historical optimal position \( P_g \) of the \( g \)th particle is the optimal solution in \( P_i(i = 1, \ldots, n) \). The expression for the velocity of the \( i \)-th particle vector is

\[
V_i = (v_{i1}, v_{i2}, \ldots, v_{id}). \tag{6}
\]

The position of each particle is moved using equations (7) and (8).

\[
V_{id}(t + 1) = \omega \times V_{id}(t) + c_1 \times \text{rand} \times [P_{id}(t) - X_{id}(t)] + c_2 \times \text{rand} \times [P_g(t) - X_{id}(t)], \tag{7}
\]

\[
x_{id}(t + 1) = x_{id}(t) + v_{id}(t + 1), \quad 1 \leq i \leq n, 1 \leq d \leq D. \tag{8}
\]

In the formula, \( C1 \) and \( C2 \) are constant acceleration factors, and the result of the \( \text{rand()} \) function is a random number between \([0, 1]\). \( \omega \) is the inertia factor, and the magnitude of the inertia factor varies with the search range.
The larger the inertia factor, the larger the search range; the smaller the inertia factor, the smaller the search range.

In order to get the lower limit of the number of individuals in the offspring under the transformation, according to the formula of pattern theorem,

\[ m(H, t + 1) \geq m(H, t), \]

where \( t \) represents a group; \( H \) represents the representation mode; \( m \) represents the number of digit strings.

Objects are meaningful things in the application field, while object classes are abstractions of objects with the same properties, which gather the common properties of this group of objects to illustrate the properties and capabilities of this group of objects. The object is called “class” for short. A major feature of class is its hierarchical structure. A class has superclass and subclass. The hierarchical structure of object class is used to realize the inheritance of properties and methods of object class. In the stage of data analysis, first of all, the input and output should be clearly defined. Take several subperformances of the product as input and the overall performance evaluation score of the product as output. Through the training of the algorithm, the weight values of various subperformances to the overall performance score are extracted to represent the contribution of various subperformances to the overall performance evaluation of products so as to obtain the preference differences of different user groups for products. Function layer information mainly refers to various functional units required in the product design process, and functions are the external interfaces of the product information model. This function is based on the component level, not the whole machine level. The features of intelligent products in the smart layer include self-organization and self-improvement. Self-organizing feature refers to the fact that the intelligent product system, driven by some internal mechanism, automatically forms an orderly structure while performing its duties in a coordinated manner and completes a certain task purposefully. Self-improving feature refers to the fact that the intelligent product self-learning based on a large amount of data constantly optimizes the functions of the intelligent system and product.

The function prototype is built to meet the user’s functional requirements. According to the user’s functional requirements, the requirements are divided into core functions and secondary functions, and the mechanism design and product internal structure design are carried out according to the functions. The modeling of a complex collaborative design system involves various factors such as function, information, process, resources, and control, which need to be described from different angles. The analysis and modeling tools of complex systems are generally used to reflect different aspects of complex systems with different views. Scene-driven intelligent product design model and design method are obtained under the framework of scene theory, which has a relatively mature theoretical framework and practical strategies with operability. From the product design point of view, the problem solving of the complex intelligent product system is compatible with the multidimensional scene-driven product design method.

4. Result Analysis and Discussion

Industry is to design a feasible scheme to realize a specific idea, and it follows a series of design behaviors. It mainly uses modern means to design products and other industries, especially product design, which is mainly based on people’s functional and sensory needs for products, including tools, machinery, interior decoration, and packaging. Excellent enterprises have strong R&D efforts in industrial product design. In order to ensure a certain forward-looking, numerical analysis is carried out on each data during the experiment. Integrate the sample description and semantic scale into a questionnaire, and conduct a questionnaire survey on the target object. In the process of investigation, we should ensure the authenticity of the data and try to avoid the interference of external factors in the investigation. In order to prevent users from interfering with the evaluation value, the traditional method of calculation formula test and the design method of optimization algorithm in this paper are used to retrieve the product gene matching degree. In order to make the results more convincing, the convergence trend diagram of this network is derived in the process of solving, as shown in Figure 3.

It can be seen from the figure that, after 50 iterations, the output error of the network as the particle fitness value has converged to a certain degree. If there is a higher requirement for accuracy, the number of iterations can be increased according to the situation. For this paper, 50 iterations can meet the requirements.

In order to facilitate users to carry out industrial design and industrial information management and ensure the standardization and integration of industrial information, it is necessary to determine the value constraints of some attributes. In the database, 20 samples were randomly selected. In the experiment, considering the relationship between the experimental samples, the order of the experiment should be determined first, and the functionally independent product genes should be put in front. Product design is an iterative process, and the preliminary design can only be completed after several revisions. The modification problems here are generally put forward by designers or customers, and the system stores the proposed problems in the problem report form to form the basis for changing the design. In the product verification stage, typical users need to participate together. Taking typical users as the research object, through product verification and testing based on real scenes, we can test whether the product scheme meets the needs of users and whether there are other potential problems so as to provide support for product design iteration and improvement.

In this experiment, firstly, product genes are input, the assignment algebra of randomly generated initial product gene population is set to 0, and the fitness function value of each product gene is calculated. Then get the optimal product genes according to the design process. Establish an evaluation index set to evaluate the quality of product genes selected by the two methods. Finally, the fuzzy evaluation method is used to compare the traditional method, the genetic algorithm, and the industrial product design algorithm in this paper to
retrieve the gene matching degree. Line graph is used to analyze the relationship between numerical values, and the experimental results are shown in Figure 4.

From the results shown in the figure, it can be seen that the product gene matching degree retrieved by traditional methods is low. The reason for this phenomenon is that the product structure efficiency of traditional methods is low, and the optimal solution cannot be obtained. However, the algorithm used in this paper is based on the pattern theorem, and the gene matching degree of the retrieved products is higher. It is proved that the industrial product design method of the algorithm established in this paper meets the design requirements.

Industrial decision knowledge describes the logical relationship between industrial object classes and their attributes, and industrial decision knowledge is closely related to the object model. Production rules are used to represent industrial decision-making knowledge, and rules with the same decision-making function are organized as an object. Multilayer error correction gradient descent method is used for offline learning. After several times of learning supported by the sample set, the weights of each layer of the network are fully adjusted to obtain and express the knowledge contained in the sample. This knowledge representation is not expressed explicitly in the form of rules like the traditional expert system but stored in each weight in an implicit way. When the network is trained for 50 iterations, the prediction trends of the evaluation samples by BP network and the improved network in this paper are shown in Figures 5 and 6, respectively.

It can be seen that when the iteration times are all 50 times, the mean square error of the improved network is less than that of the standard BP network, which means that its calculation results are better. At the same time, by comparing Figures 5 and 6, it can be seen that the stability of the improved network is obviously better than that of the standard BP network.

In order to get the influence degree of each subperformance index of the product on the overall performance evaluation, a neural network model needs to be established. Take five subperformance indexes as input and the overall performance evaluation score as output. The neural network is trained by the data in the above table, and the weight of each input to output is extracted from the
trained neural network as a measure of the contribution of each subperformance to the overall performance evaluation score. Method is the organizational unit of industrial decision-making knowledge, and it is a collection of rules with the same decision-making function. An object can have multiple object methods, and each object method contains multiple production rules to complete a certain decision task. In order to standardize the representation and processing of production rules, the concept of the rule element is introduced. According to the needs of representation and reasoning of industrial decision rules, some reserved words and command words are determined.

Fuzzy comprehensive evaluation of positioning and clamping schemes is to take positioning and clamping schemes as the object of comprehensive evaluation, select some candidate positioning and clamping schemes as the object set, take all factors affecting positioning and clamping schemes as the evaluation factors, and then make comprehensive evaluation on the basis of the evaluation set. In the user experience test, pretest is conducted according to the test process, and the rationality of the test is evaluated. Invite typical users or target users who have participated in user portraits, then experience the design scheme under the observation and guidance of the experimenters, record the process through videos, photos, and other media, and finally conduct in-depth interviews with the participants after the test. A comparison of design scores of different systems is shown in Figure 7.

From the data analysis in the figure, it can be concluded that the score of this design is better than the other two system designs, which reflects the superiority and practicability of this method.

Expressing knowledge resources in a neutral and system-independent form is only the basis for realizing that knowledge resources can directly provide services for product design. To realize a distributed integrated information system supporting product design, the knowledge resources in the system are independent of the platform and the specific application system. For a specific designer and design platform, the neutral knowledge model must be introduced into a specific product design environment or platform to have practical significance, which is the realization of the interaction between the knowledge resource information model and the design platform. Rule element is the basic unit of rules, and it is an instruction or judgment with clear meaning. According to the purpose and expression form of rule elements, rule elements are divided into conditional rule elements, command rule elements, assignment rule elements, and so on. Through research and practice, it can be found that the industrial decision-making process can be divided into several decision-making subtasks, and the decision of each subtask is made according to the attribute values of a master object class and its related object classes. Design improvement takes user’s demand as the most fundamental starting point, deeply analyzes the external structure and internal structure of products, and uses industrial design theory knowledge to improve the design of products from the aspects of structure, function, materials, and technology.

This section generates evaluation scores through trained network intelligence and verifies that the new product is better than the original product through comparative analysis so as to verify the effectiveness of this study. The experimental results prove that the system in this paper has good application value for industrial design and is a good way to realize intelligent product design.

5. Conclusions

At present, after decades of development, AI has made great progress in all aspects. The design of intelligence adds great vitality to AI, which not only expands the research in the whole field of AI but also makes AI gradually move from pure theoretical research to application. With the continuous development of the AI industry and the continuous improvement of the level of intelligent technology, in the future, AI will certainly be applied to more industries to help designers create more and higher-end products. Integrating AI with industrial design, applying new ideas and technologies in AI to industrial design, changing traditional industrial design mode, and improving design efficiency are also the development directions of modern industrial design. Aiming at the problems existing in traditional industrial design, this paper constructs an industrial design and transformation system based on AI technology. The research of industrial product design based on AI is completed by using the concept of biological genetic engineering and functional analysis.

To verify the feasibility of the proposed method, randomly select 20 samples from the database and design a triangular matrix to ensure the rationality of the experimental results. Experimental results show that this method can effectively improve the efficiency and quality of industrial design, ensure the integrity and consistency of information, and enhance the integration of the system. The industrial product design method based on the system in this paper meets the design requirements, and the gene matching degree of the retrieved products is higher. I believe that intelligent industrial design will make industrial design develop in the direction of diversification, optimization, and integration, with more natural man-machine interaction and more advanced and effective innovative design methods. Limited by the relationship between time and energy, the
research in this paper is only the tip of the iceberg for intelligent product design, and the industrial design and transformation system based on AI technology constructed in this paper is not optimal. The next step is to continue to optimize the industrial design and reform the system. I believe that the application in the field of intelligent industrial design will have a broader prospect.

Data Availability

The data used to support the findings of this study are included in the paper.

Conflicts of Interest

The author declares that they have no conflicts of interest.

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